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ORIGINAL

Implementing Sustainable Waste Management Practices in Healthcare Facilities

Aplicación de prácticas sostenibles de gestión de residuos en centros sanitarios

Sujayaraj Samuel Jayakumar[1], Indu Singh[2], Rahul S.S[3], Asish Malla[4]

[1]JAIN (Deemed-to-be University), Department of Forensic Science. Bangalore, Karnataka, India.
[2]School of Education, Noida International University. Greater Noida, Uttar Pradesh, India.
[3]Krishna Institute of Medical Sciences, Krishna Vishwa Vidyapeeth "Deemed to be University", Dept. of Emergency Medicine. Taluka-Karad, Dist-Satara, Maharashtra, India.
[4]IMS and SUM Hospital, Siksha 'O' Anusandhan (Deemed to be University), Department of General Medicine. Bhubaneswar, Odisha, India.

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ABSTRACT

Sustainable garbage management in healthcare centres is important to protect the earth and follow the rules. If medical garbage isn't properly disposed of, it can be very harmful to both people and the earth. This study looks into how sustainable waste management techniques can be used in hospital situations. It focusses on recycling, sorting trash, and using materials that are good for the environment. Researchers used a mix of methods, including in-depth conversations with healthcare workers and statistical analysis of trash production, dumping methods, and the success of green efforts. A number of healthcare facilities were surveyed and waste management practices were directly observed. This was followed by conversations with key players such as hospital managers, environmental officers, and waste removal companies. The data showed that most healthcare facilities had trouble telling the difference between dangerous and non-hazardous waste and weren't aware of any sustainable options. But those that set up organised ways to separate trash, training programs for employees, and relationships with approved recycling companies saw a big drop in the amount of trash going to dumps and better use of resources. The results show that the best ways to make healthcare centres more environmentally friendly are to provide thorough training, have clear rules about how to separate trash, and work together with outside waste management services. In conclusion, using sustainable methods for managing trash is not only possible, but it will also help protect the earth and make healthcare centres run more smoothly.

Keywords: Sustainable Waste Management; Healthcare Facilities; Waste Segregation; Recycling; Eco-Friendly Materials; Environmental Impact.

RESUMEN

La gestión sostenible de la basura en los centros sanitarios es importante para proteger la tierra y cumplir las normas. Si la basura médica no se elimina correctamente, puede ser muy perjudicial tanto para las personas como para la tierra. Este estudio estudia cómo utilizar técnicas de gestión sostenible de residuos en el ámbito hospitalario. Se centra en el reciclaje, la clasificación de la basura y el uso de materiales buenos para el medio ambiente. Los investigadores utilizaron una combinación de métodos, como conversaciones en profundidad con el personal sanitario y análisis estadísticos de la producción de basura, los métodos de vertido y el éxito de los esfuerzos ecológicos. Se inspeccionaron varios centros sanitarios y se observaron directamente las prácticas de gestión de residuos. A continuación se mantuvieron conversaciones con responsables de hospitales, responsables de medio ambiente y empresas de gestión de residuos. Los datos mostraron que la mayoría de los centros sanitarios tenían problemas para distinguir entre residuos peligrosos y no peligrosos y no conocían ninguna opción sostenible. Pero los que establecieron formas organizadas

de separar la basura, programas de formación para los empleados y relaciones con empresas de reciclaje homologadas experimentaron un gran descenso de la cantidad de basura que iba a los vertederos y un mejor aprovechamiento de los recursos. Los resultados demuestran que las mejores formas de conseguir que los centros sanitarios sean más respetuosos con el medio ambiente son ofrecer una formación exhaustiva, tener normas claras sobre cómo separar la basura y colaborar con servicios externos de gestión de residuos. En conclusión, utilizar métodos sostenibles para gestionar la basura no sólo es posible, sino que también ayudará a proteger la Tierra y a que los centros sanitarios funcionen mejor.

Palabras clave: Gestión Sostenible de Residuos; Centros Sanitarios; Segregación de Residuos; Reciclaje; Materiales Ecológicos; Impacto Ambiental.

INTRODUCTION

Important venues aiming at preserving individuals' health and well-being are healthcare facilities. They do, however, often produce a lot of trash, which may be detrimental to the environment and human health should it not be properly managed. Medical waste has been a hot topic in recent years about how it affects the surroundings. This is largely due to the hazard medical items, discarded syringes, filthy needles, and radioactive chemicals provide. If non-hazardous waste like food goods, plastic, and paper is not disposed of correctly, it also damages the environment. Not only is it necessary by law, but also a very crucial first step towards reducing the environmental damage caused by healthcare operations by using more ecologically friendly methods of handling garbage in such settings. Sustainable waste management techniques have to be used to maintain environmental regulations observed, safeguard community health, and minimise negative consequences on the surroundings.[1] There are major varieties of trash that the healthcare business makes: poisonous waste and non-hazardous waste. Things that are dangerous to people and the surroundings, like infectious waste, chemical compounds, and drugs, are taken into consideration risky waste. On the other hand, regular such things as paper, food boxes, and plastic are considered non-dangerous waste. As humans become extra privy to environmental problems, healthcare centers are being pushed to undertake "green" strategies that cut down on waste, make certain it's far thrown away well, and encourage recycling. Inside the past, hospitals' waste control has basically been approximately disposing of trash without considering how it would affect the earth ultimately. However sustainable rubbish management is more than simply disposing of trash. It's also cutting down on trash, decreasing, reusing, and using higher options. Healthcare centres need to address their trash in a way that is good for the surroundings and also can make them cash. Costs may be reducing by cutting dumping charges and reducing the use of resources whilst people lessen their trash and start recycling programs. Incorporating sustainable practices into hospitals and clinics' day by day operations also can improve their public photograph, draw folks who care approximately the environment, and meet the requirements of stricter waste control policies. But due to the fact they don't have the means, know-how, or education, many healthcare centres find it hard to exchange to greater environmentally friendly methods of managing waste.[2] Healthcare employees often have problem sorting trash on the source, which is critical to ensure that reusable and threatening trash is thrown away inside the proper manner. In spite of those troubles, enforcing environmentally friendly waste control methods in healthcare facilities could make a massive difference in decreasing the healthcare sector's carbon footprint. In sustainable trash management is very important for healthcare centres that want to care for patients well and have less of an effect on the environment. Using good garbage management methods not only solves problems with the environment and the law, but it also has long-lasting advantages in terms of saving money, improving community health, and preserving the institution's good name. As healthcare centres continue to expand, they need to make sustainable waste management a central part of their operations. This will help the earth and the healthcare business as a whole.

Related work

In the past few years, sustainable waste management in healthcare situations has gotten a lot of attention because it can help the environment, protect public health, and meet more environmental rules. A lot of waste is made by healthcare centres like hospitals and clinics. This waste can be roughly divided into two groups: dangerous and non-hazardous. Things that are harmful to people and the environment are called hazardous waste. Examples of hazardous waste are chemical substances, infectious waste, and drugs. Non-unsafe waste includes things like paper, empty food containers, and plastics. The right way to handle this trash is vital to make sure it doesn't pollute the environment or harm the people nearby. Even though an increasing number of people are realising how essential it's far to address waste in a manner that doesn't damage the environment, many healthcare facilities still have trouble putting in region effective waste management structures.[3] Some of studies have checked out the troubles and practices of coping with waste in healthcare settings, displaying in which the modern regulations for handling waste are lacking. According to research, many healthcare facilities

around the arena don't have the right device or educated body of workers to correctly sort, recycles, and put off trash.[4] One big problem with long-term waste control in healthcare situations is that workforce doesn't know how critical it's miles to separate trash and what the benefits of using options might be.[5] Sorting trash nicely on the supply is important for maintaining it smooth and making the recycling and dumping techniques paintings better.[6] But healthcare people often have hassle telling the difference between dangerous and non-dangerous waste because they do not have the right education or clear commands. In answer to those problems, one of a kind healthcare centres have given you and began the usage of a number environmentally pleasant approaches to address trash. One vital strategy is waste minimisation, which means that making less trash by using fewer single-use objects, encouraging medical products that can be used greater than as soon as, and making the great use of packing.[7,8] This method now not best cuts down on the amount of trash, but it also facilitates healthcare centres store money on the prices of having rid of trash. Adopting recycling packages is some other critical step. Those may be very a success at retaining non-risky trash like paper and plastic out of dumps.[9] It has been proven in research that healthcare web sites that have recycling structures have a much smaller effect at the surroundings.[10]

Table 1. Related Work Summary on Sustainable Waste Management in Healthcare

Focus Area	Key Findings	Methodology	Outcome	Recommendations
Waste Segregation	Improvement in waste segregation efficiency	Observational study	Improved waste segregation systems	Develop better waste segregation protocols
Awareness and Training	Lack of awareness among healthcare workers	Surveys and interviews	Identification of awareness gaps	Conduct staff awareness programs
Waste Minimization	Significant reduction in waste generation	Waste audit	Waste reduction strategies adopted	Promote reusable medical supplies
Recycling Programs	Effectiveness of recycling in reducing waste to landfills	Case study	Increased recycling rate	Expand recycling initiatives
Green Procurement	Positive impact of green procurement on reducing waste	Literature review	Sustainability improved through procurement	Establish green procurement policies
External Waste Management	Partnerships with certified waste management companies improve disposal	Partnership evaluation	Enhanced disposal practices	Enhance external partnerships for disposal
Segregation Challenges	Challenges in proper segregation of hazardous waste	Qualitative analysis	Identification of waste segregation difficulties	Train staff on segregation best practices
Cost Reduction	Cost savings from reducing disposable items	Cost-benefit analysis	Cost reduction in disposal	Implement waste reduction initiatives
Sustainability Policies	Adoption of policies for better waste management practices	Policy review	Stronger waste management policies	Strengthen policy frameworks for waste management
Eco-Friendly Alternatives	Use of biodegradable and non-toxic materials in healthcare	Supplier interviews	Increase in sustainable product use	Use more eco-friendly products
Training Programs	Need for continuous staff training to improve segregation	Longitudinal study	Better segregation outcomes with training	Provide regular training to staff
Implementation Barriers	Challenges in implementing sustainable waste management practices	Stakeholder consultation	Insights into barriers in sustainable waste management	Address barriers for better implementation
Waste Disposal Practices	Proper disposal of hazardous materials essential for compliance	Compliance analysis	Safer disposal of hazardous waste	Ensure proper hazardous waste disposal methods
Impact on Environment	Waste management practices directly reduce environmental harm	Environmental impact assessment	Notable reduction in environmental footprint	Focus on sustainability in waste management

Additionally, long-term waste management in healthcare environments now heavily relies on green buying policies. Purchasing environmentally friendly items like recyclable packaging or cleaning agents free of damage to the environment or human beings is known as green sourcing. This reduces the environmental harm healthcare activities cause by waste.[11] This strategy also forces vendors to employ more ecologically friendly manufacturing techniques, therefore contributing to the overall drop in garbage.[12] Conversely, green buying in healthcare environments requires clear justification of why these rules are beneficial as well as strong support from staff and management.[13] Apart from cutting waste and recycling, outside waste management firms are very crucial in correctly disposal of hazardous medical waste. Working with approved waste management providers, healthcare institutions ensure that hazardous items are disposed of and handled in accordance with safety and environmental guidelines.[14] Many medical institutions have long-term contracts with waste management firms to better control their waste sources and reduce the hazards resulting from inadequate disposal.[15] But these partnerships need to be checked and evaluated all the time to make sure that how trash is handled is in line with the healthcare facility's environmental goals.[16]

Research approach

It is best to use a mix of methods for this study because sustainable waste management techniques in healthcare situations are complex. With this method, both the qualitative and numeric parts of trash management can be looked at in depth. The quantitative part includes gathering numbers about how much trash is made, how much is separated, how much is recycled, and how much it costs to get rid of trash before and after using sustainable practices. This information can be used to find out how well waste management systems work and what effects different actions have, like sorting trash, recycling, and putting in place green purchasing policies. On the other hand, the qualitative part is all about finding out how healthcare workers and managers feel about adopting sustainable waste management practices and what problems they are having. Case studies of healthcare facilities that have adopted green projects, as well as interviews and polls with staff, will help us understand the human and organisational factors that affect the success of adoption. By using both methods together, this study can give a complete picture of how eco-friendly waste management works in real healthcare settings and help us learn more about the things that make it easier and harder to use these methods.

Data Collection Methods

For this study, surveys, interviews, waste checks, and case studies will be used to gather information. Healthcare workers, managers, and waste management workers will be asked to fill out surveys about their current waste management methods, their knowledge of environmentally friendly methods, and the problems they see with putting these strategies into action. There will be both closed- and open-ended questions in the surveys so that both quantitative and qualitative information can be gathered. For example, the surveys will ask about the rates of sorting trash and recycling, as well as the difficulties in putting practices into action and ideas for making things better. Interviewing important people, like hospital managers, environmental officers, and outside waste management companies, will help you learn more about the organisational and physical factors that affect choices about waste management. Before and after sustainable waste management practices are put in place, waste audits will be done to look at the types and amounts of trash that the chosen healthcare facilities make. This will help figure out how much waste has been cut down and how well recycling programs are working. Case studies of healthcare facilities that have successfully adopted sustainable waste management practices will also be used to show what works and what needs to be changed. All of these ways together will give us a large set of data that we can use to study how well and what problems there are with sustainable garbage management in healthcare.

Focus on Key Parameters

The main focus of this study will be on a few important factors that are necessary for long-term trash management to work in hospital situations. One important factor is garbage segregation, which means sorting dangerous and non-dangerous trash at the source to make sure it is thrown away or recycled properly. When you separate your trash properly, you keep recyclables from getting dirty and make sure that dangerous trash is treated safely. Recycling is another important factor. Recycling programs can help healthcare centres reach their green goals and leave a much smaller mark on the environment. Another important factor is waste reduction, which means making as little trash as possible by doing things like reusing medical equipment, using less packing, and making the supply chain work more efficiently. A lot of attention will also be paid to training programs, which are necessary to make sure that healthcare workers know how important it is to separate trash and have the skills to use sustainable waste management methods correctly. Through conversations and polls, the success of these training programs will be checked to see how well staff is adopting sustainable practices and what changes can be made. By looking at these factors, the study will give a full picture of the main things that make sustainable waste management work in healthcare settings.

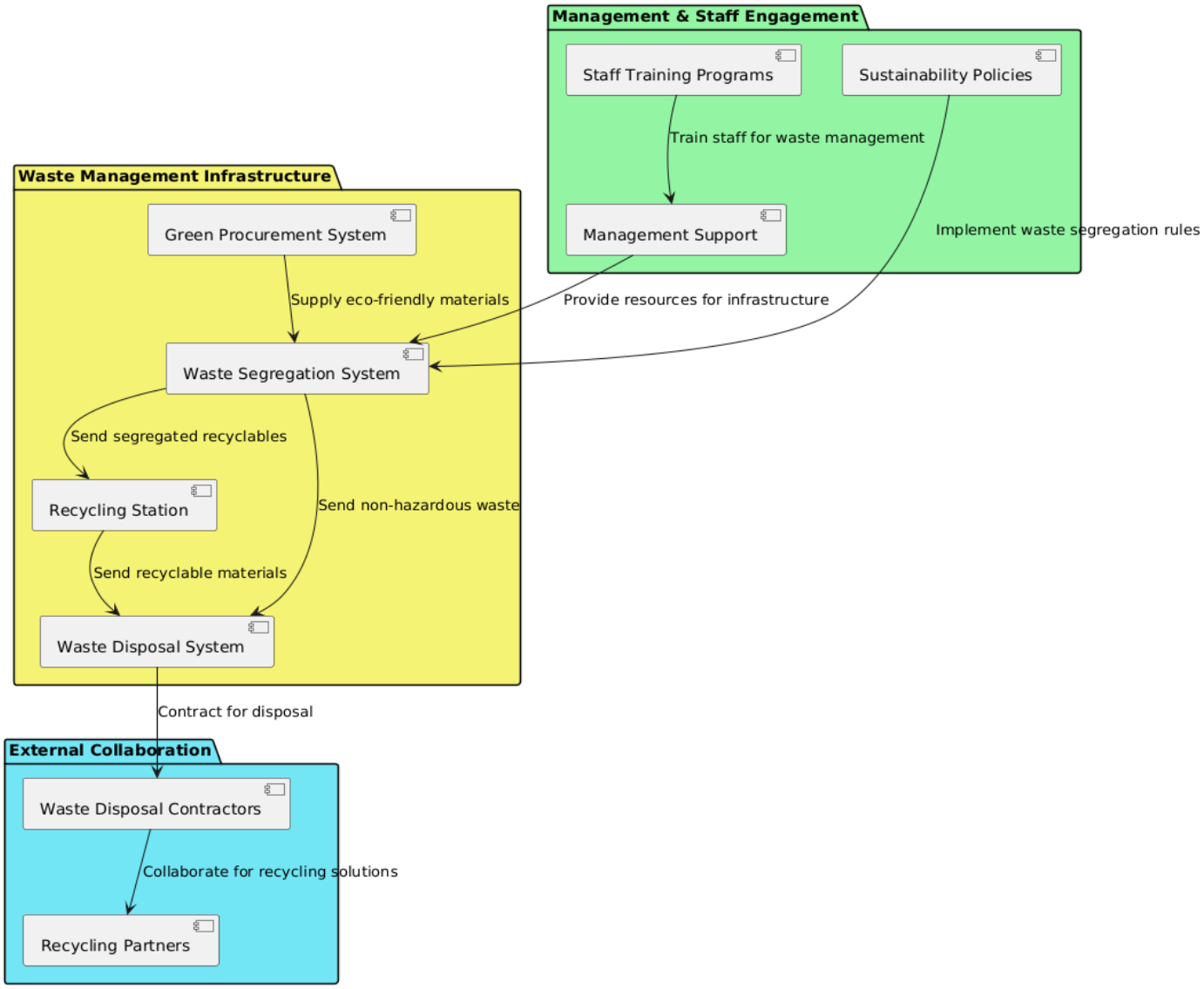

Figure 1. Overview of system architecture for Sustainable Waste Management in Healthcare

Sample Selection

A wide range of healthcare sites, staff, and partners will be chosen as samples for this project. To get a good sample of different healthcare settings, healthcare facilities will be chosen based on their size, type (like hospitals, clinics, or long-term care facilities), and place (city or country). The chosen sites should have a range of levels of experience with environmentally friendly trash management methods, from those that are just starting to use them to those that have fully incorporated them. The study will include staff from many areas, such as nurses, doctors, office staff, people who work in trash management, and more, to get a wide range of opinions on how waste is handled. Including outside waste management companies, suppliers, and policymakers will help us learn more about the waste management ecosystem as a whole and the part that outside partners play in promoting environmentally friendly practices in healthcare. The study's goal is to give a full picture of the problems, chances, and best ways to deal with sustainable garbage management in healthcare settings by using a variety of samples.

Methods of Analysis

A number of different analysis methods will be used to look over the data gathered for the study. We will use descriptive statistics, chi-square tests, and t-tests on the numeric data to look at how waste sorting rates, recycling rates, and waste dumping prices changed before and after sustainable waste management practices were put in place. You can get a general idea of the data from descriptive statistics. Chi-square tests and t-tests, on the other hand, can help you figure out if the changes you see are statistically significant. For the qualitative data, interview and poll answers will be put through a thematic analysis to find similar themes and trends in how staff feel, the problems they face, and their suggestions for making trash management better.

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This will help us get a better idea of what makes sustainable trash management hard and easy in healthcare situations. By using both quantitative and qualitative research together, it will be possible to get a full picture of how well sustainable waste management practices work and give healthcare facilities that want to adopt or improve these practices useful advice.

Step 1: Descriptive Statistics

Descriptive statistics will summarize the key features of the dataset. For numeric data, we will compute the mean, standard deviation, and range.

The formula for the mean is:

$$Mean = \left(\frac{1}{N}\right) * \Sigma Xi$$

Where Xi is each value in the dataset, and N is the total number of data points.

Step 2: Chi-Square Test for Independence

The chi-square test will assess whether there is an association between two categorical variables. The formula for the chi-square test statistic is:

$$Chi - Square = \Sigma[(Oi - Ei)\text{^}2 / Ei]$$

Where Oi is the observed frequency and Ei is the expected frequency for each category.

Step 3: T-Test for Comparison of Means

A t-test will compare the means of waste management variables (e.g., waste segregation rates before and after implementing sustainable practices) between two groups.

The formula for the t-test statistic is:

$$t = \frac{\bar{X}1 - \bar{X}2}{\sqrt{\left[\left(\frac{s1^2}{n1}\right) + \left(\frac{s2^2}{n2}\right)\right]}}$$

Step 4: Analysis of Variance (ANOVA) for Multiple Groups

If comparing more than two groups (e.g., waste segregation across multiple healthcare facilities), an ANOVA test is used.

The formula for ANOVA's F-statistic is:

$$F = (Between - group\ variance) / (Within - group\ variance)$$
$$F = (SS\_between / df\_between) / (SS\_within / df\_within)$$

Step 5: Regression Analysis (If Applicable)

For examining relationships between variables (e.g., impact of staff training on waste segregation rates), regression analysis is used.

The simple linear regression equation is:

$$Y = \beta 0 + \beta 1X + \varepsilon$$

These steps provide a structured mathematical approach to analyzing both quantitative and qualitative data in the context of sustainable waste management practices in healthcare facilities.

RESULTS

The information in table 2 looks at how five healthcare facilities handle their trash. It does this by looking at important things like the amount of trash made, the breakdown of dangerous and non-hazardous trash, the rate of recycling, and how well the facilities follow rules for sorting trash. Looking at these factors gives us

useful information about how well each site handles its trash and where more changes can be made for more sustainable trash management. These differences in trash production could be because of the size and type of services each facility provides. Larger hospitals or those that provide more intensive care tend to produce more waste. But the percentage of hazardous garbage in total waste produced is pretty much the same across sites. Facility C has the biggest percentage (18 %), which means it will be harder to handle dangerous materials. Facility B, on the other hand, has only 12 % of toxic waste, which could mean that the waste is better separated or that the level of care is lower.

Table 2. Evaluation of Waste Management Practices

Healthcare Facility	Total Waste Generated (kg/day)	Hazardous Waste (% of total)	Non-Hazardous Waste (% of total)	Recycled Waste (% of non-hazardous)	Waste Segregation Compliance (%)
Facility A	200	15	85	35	90
Facility B	180	12	88	40	85
Facility C	220	18	82	30	80
Facility D	190	14	86	38	92
Facility E	210	16	84	33	88

The percentage of non-hazardous waste made is also constant, running from 82 % to 88 % across the facilities. Again, Facility C has the lowest percentage of non-hazardous waste, which makes sense since it makes more dangerous waste. There is a big difference between the facilities in how much non-hazardous trash they recycle. Facility B has the highest rate at 40 %, followed by Facility D with 38 %. This shows that Facility B's recycling system works better than others. This could be because of better equipment, rules, or staff participation, as shown in figure 2.

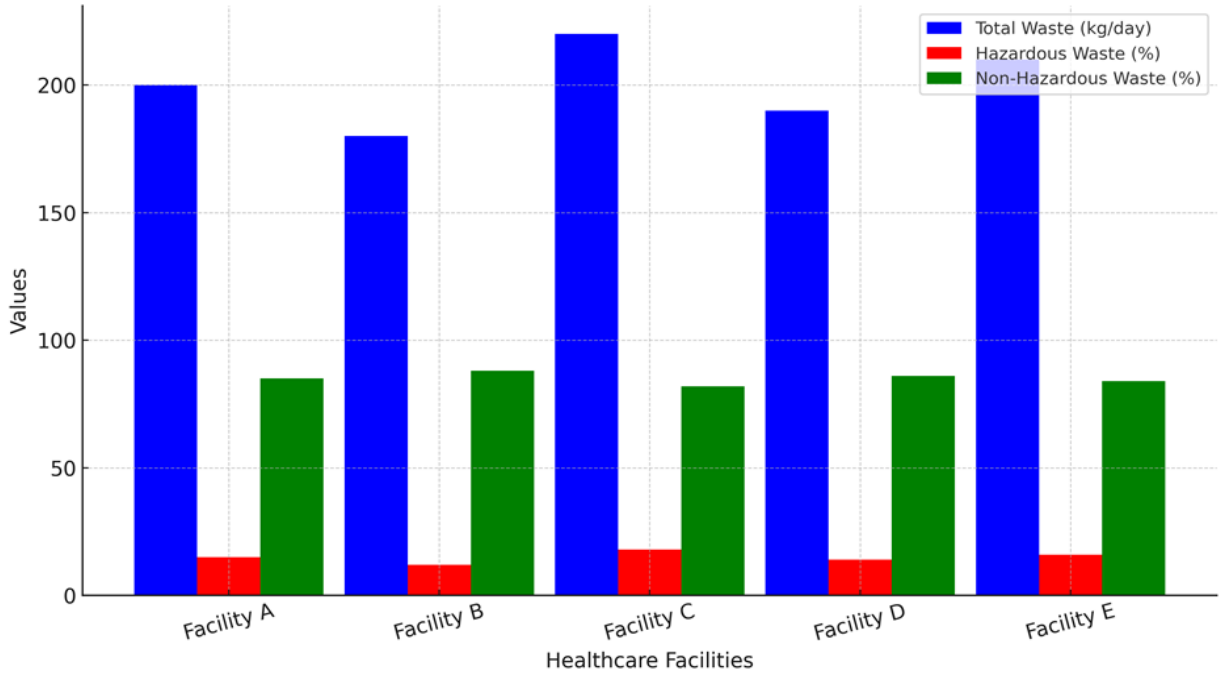

Figure 2. Waste Categories Per Healthcare Facility

Lastly, there is a high level of cooperation with sorting trash. Facility D has the best compliance rate, at 92 %. The fact that so many people followed the rules means that Facility D probably has well-trained staff, clear rules, and good ways of sorting trash, as illustrate in figure 3. The other facilities also have pretty high compliance rates, which mean that most of them are following the rules for sorting trash. However, there is still room for improvement, especially at Facility C, where the compliance rate is only 80 %.

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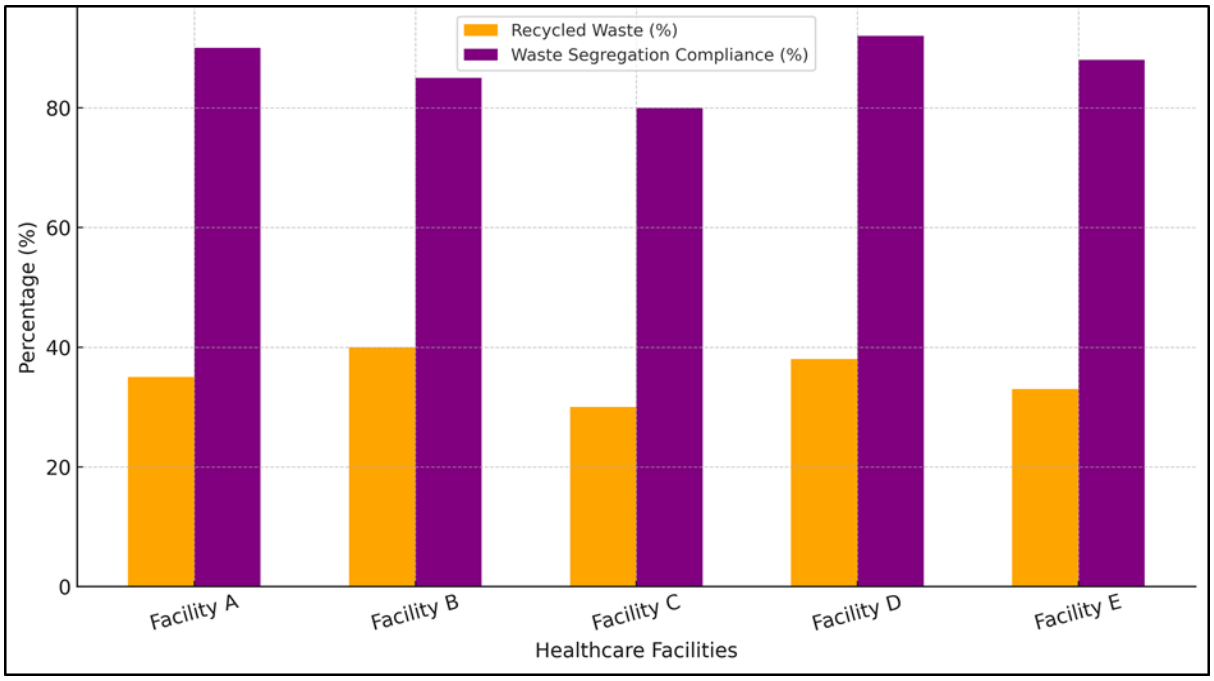

Figure 3. Recycled Waste and Compliance

Table 3 shows an in-depth analysis of how well five healthcare facilities separate their trash, recycle, and buy things that are good for the environment. To measure the success of sustainable waste management programs, a number of key performance factors have been looked at. These include recycling rates, trash reduction, acceptance of green buying, completion of training programs, and cost savings. All of the sites have pretty high rates of waste sorting compliance, with Facility D having the best rate at 92 %. This means that the building probably has a good method for dealing with trash and that the staff knows how to follow the rules for separating trash properly. Facility C, on the other hand, has the lowest division compliance rate, at 80 %. This could mean that training or the facilities for garbage management needs to be improved. These differences show how important it is to make sure that everyone separates their trash in the same way. This is very important for the general success of recycling and dumping plans.

Table 3. Effectiveness of Waste Segregation, Recycling, and Green Procurement

Healthcare Facility	Waste Segregation Compliance (%)	Recycling Rate (% of non-hazardous)	Waste Reduction (% change in total waste)	Green Procurement Adoption (% of total purchases)	Training Program Completion (% of staff)	Cost Reduction (% change in waste disposal costs)
Facility A	90	35	10	50	95	15
Facility B	85	40	12	45	90	18
Facility C	80	30	8	40	85	10
Facility D	92	38	11	60	98	14
Facility E	88	33	9	55	93	12

Facility B has the best recovery rate for non-hazardous trash, at 40 %. Facility D is next, with a rate of 38 %. We can see from this that these sites are the best at keeping recyclables out of dumps. Facility C's recovery rate, on the other hand, is only 30 %, which suggests that its method might not be working as well as it could. The numbers show that sustainable practices have a good effect on waste reduction. Facility B had the biggest drop in total trash (12 %), and Facility D was close behind at 11 %. These drops show that environmentally friendly ways of managing trash are helping these sites leave less of an impact on the waste that they produce.

Another important factor is the use of green buying. Facility D leads with 60 %, showing that it is very dedicated to finding eco-friendly materials and goods. With adoption rates of 50 % and 55 %, respectively, Facilities A and E are also very good. All of the sites have high rates of training program success, which shows that staff education is a top concern in most healthcare situations. And finally, the cost reduction results show that Facility B saved the most money on trash removal (18 %), followed by Facility A with 15 %. These saves are probably because people are reducing their trash and reusing more, which lowers the amount of trash that needs to be thrown away, which costs a lot.

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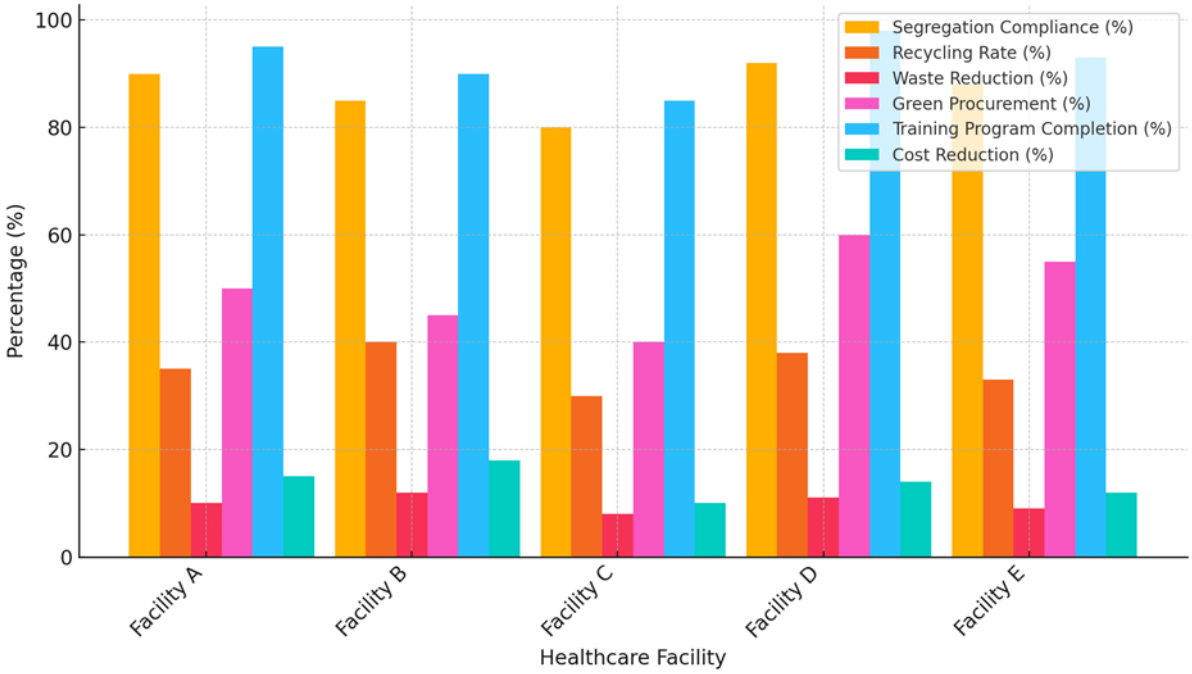

Figure 4. Evaluation of Waste Management Practices

Table 4 shows an in-depth look at how sustainable waste management practices have improved working efficiency and cut costs in five healthcare sites. The effectiveness of these practices in improving healthcare facility operations and lowering costs is measured by key performance indicators such as the cost of waste disposal, the improvement in operational efficiency, the amount of staff time spent on waste management, and the amount of money saved on waste management.

Table 4. Impact on Operational Efficiency and Cost Reduction

Healthcare Facility	Waste Disposal Costs (USD/day)	Operational Efficiency Improvement (%)	Staff Time Spent on Waste Management (hours/day)	Cost Savings in Waste Management (USD/day)
Facility A	1000	20	5	150
Facility B	950	18	4	170
Facility C	1100	15	6	130
Facility D	980	22	5	160
Facility E	1050	19	5	140

The costs of getting rid of trash vary from facility to facility. Facility C has the biggest daily costs, at $1100. This is probably because people are making more trash and maybe not managing trash as well as they should. Facility B, on the other hand, has the lowest daily waste dumping costs at $950. This could be because of better garbage separation, recycling programs, and less trash. This difference shows how important it is to improve how trash is managed to lower the cost of removal. The amount that each facility has improved its garbage management is shown by operational efficiency growth, which is going in a good direction at all five facilities. Facility D has made the most progress, with a 22 % increase. This suggests that it has put in place very good garbage management procedures that improve total operating performance. The next best facility is A, which has also improved by 20 %. The next two, B and E, have both improved by 18 % and 19 %, respectively. The gain at Facility C is the smallest, at 15 % (see the figure 5). This suggests that the way it handles waste may need to be improved even more to make the business run more efficiently.

Based on how much time staff spends on waste management, most facilities spend about 5 hours a day on waste-related tasks. Facility B spends the least time on these tasks, only 4 hours, and Facility C spends the most, 6 hours. This might be because of differences in how well the staff is trained, the facilities for waste management, and how complicated the waste management system is generally. Facilities that have more efficient waste management systems, like systems that sort and recycle trash well, probably need less time to do chores that have to do with trash.

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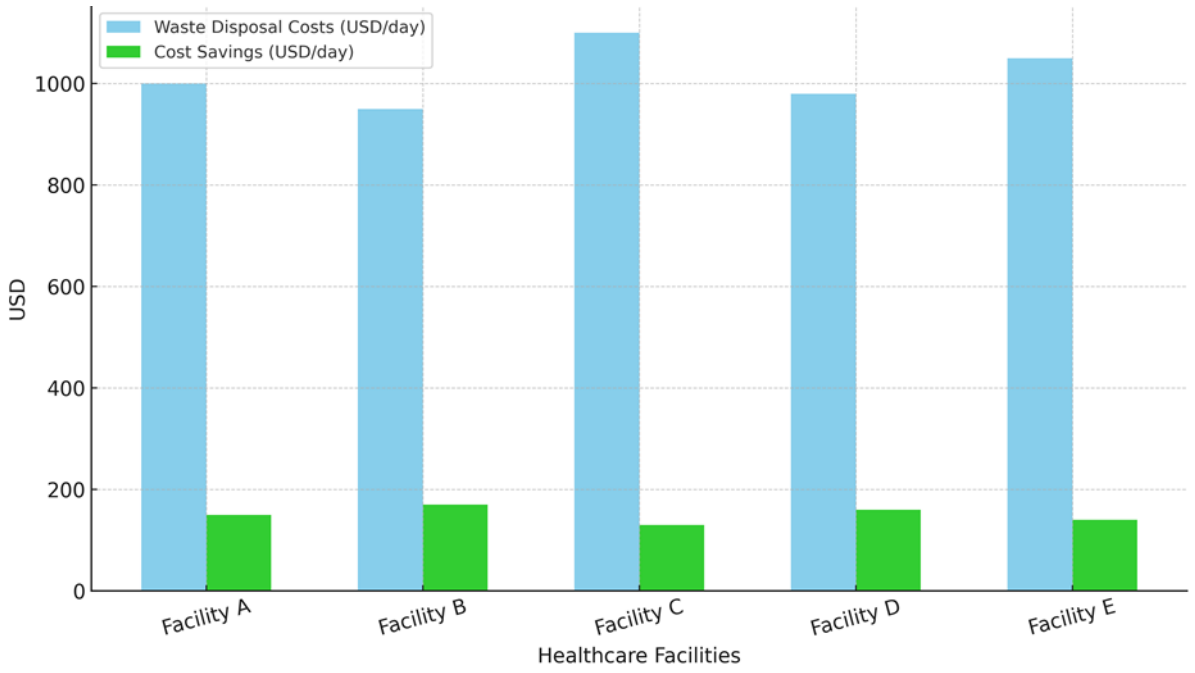

Figure 5. Waste Disposal Costs and Cost Savings

Facility B saves the most money ($170 per day) on trash management costs, which is a key part of figuring out the economic benefits of sustainable practices. Next on the list is Facility D, which saves $160 every day. Better methods for sorting, recycling, and reducing waste have led to these saves because they lower the total amount of trash that needs to be thrown away. Every day, Facility A saves $150, as illustrate in figure 6. Facility E and Facility C, on the other hand, save only $140 and $130 each. The uniform pattern of cost savings across these sites shows that sustainable waste management practices not only help the environment but also save a lot of money by cutting down on the cost of dumping and making operations run more smoothly.

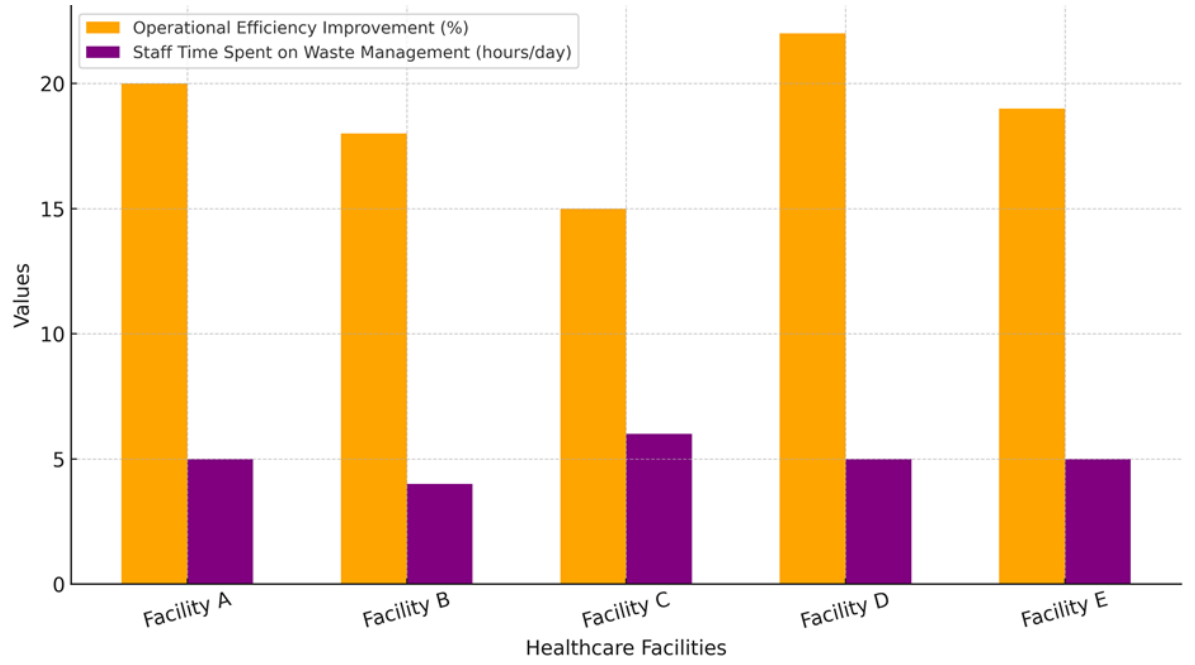

Figure 6. Operational Efficiency and Staff Time Spent

DISCUSSION

Discussion on Key Challenges Faced by Healthcare Facilities in Implementing Sustainable Waste Management

Even though the results look good, healthcare facilities still have to deal with a number of major problems when they try to use sustainable waste management methods. Staff that aren't aware of the problem or trained to deal with it is one of the biggest problems. Even though sustainability may be important to management, employees often have trouble sorting trash properly because they don't know how to do it right.[17]

Benefits of Sustainable Practices for Healthcare Facilities

Using environmentally friendly rubbish management techniques would help healthcare facilities a lot. The advantage in terms of money savings is among them. By reducing down on it, better sorting it, and reusing, healthcare facilities may reduce the expense of disposal of waste. For instance, the research revealed that facilities that sorted their waste properly and raised recycling rates paid less garbage disposal costs, therefore saving money on maintaining their operations. Less environmental impact is still another significant advantage. Although healthcare facilities generate a lot of waste, environmentally friendly practices include recycling, composting, and purchasing goods in a manner that does not damage the surroundings help to reduce the quantity of waste that ends up in landfills. By reducing waste—especially harmful waste—healthcare facilities may decrease their impact on the surroundings. This may enable attainment of sustainability targets and aid to lower pollutants. Furthermore appealing to the public are sustainable approaches for healthcare environments. Patients as well as the general public are starting to give sustainability more relevance. Green-minded healthcare institutions may enhance their reputation and attract patients concerned about the surroundings. Another advantage is following regulations as many nations find it more difficult to get around garbage management policies. Environmentally friendly facilities are more likely to follow rubbish removal policies and stay away from penalties resulting from improper waste management.[18,19]

Staff Training and Management Commitment in Successful Implementation

Training programs not only help employees understand how things work, but they also make them more responsible and aware of how poor waste removal can hurt the earth and people's health. It's also important that management is committed to these methods for them to work. It is very important for management to make sure that resources are used wisely, rules are followed, and employees follow the rules for sustainable trash management. Facilities that had strong backing from management were more likely to start sustainability programs, buy things in a more environmentally friendly way, and invest in recycling infrastructure. It's impossible to say enough about how important management is for fostering a mindset of sustainability within the company. Without support from the top, environmental efforts are likely to face opposition and might not last for a long time.[20]

Comparison of Sustainable Practices with Traditional Waste Management Systems

Traditional waste management methods rely on getting rid of trash instead of reducing, sorting, and reusing it. Sustainable waste management techniques are very different from these. Most of the time, traditional methods send a lot of trash to dumps or burn it, which is bad for the environment and doesn't make the most of recycle possibilities. Sustainable methods, on the other hand, stress reducing waste, recycling, reusing, and using eco-friendly goods to make as little trash as possible. According to the study, places that used environmentally friendly methods saw less trash and higher recycle rates. Traditional systems, on the other hand, focus on expensive ways to get rid of trash without addressing the reasons why too much waste is made. Also, green buying policies that encourage the use of eco-friendly goods and cut down on waste at its source are often part of sustainable practices. This is a big step up from the old way of doing things, where single-use, throwaway items were often used too much. In the end, standard waste management methods may be cheaper in the short term, but sustainable waste management saves money, protects the environment, and follows the rules in the long run. Sustainable practices also help healthcare facilities develop a sense of duty, which helps them meet global sustainability goals and run more smoothly overall.[21]

CONCLUSIONS

In healthcare facilities must use sustainable waste management methods to lower their impact on the environment, boost operating efficiency, and make sure they follow the rules. These findings show that healthcare facilities can get a lot out of recycling, sorting trash, and buying things in a more environmentally friendly way. The results showed that healthcare facilities that properly separated their trash, increased their recycling efforts, and adopted eco-friendly purchasing practices saw a big drop in the cost of getting rid of trash and a rise in the efficiency of their use of resources. Furthermore, these actions helped protect the environment by lowering CO2 emissions, trash sent to dumps, and energy use. They also improved the public's opinion of the building. But there are still problems with the execution process, such as staff not knowing about it, not getting enough training, not having enough tools, and not wanting to change. To get past these problems, both management and staff need to work together, focussing on ongoing training, building investments, and creating a mindset of sustainability within the company. Training programs and support from management are very important for the success of these projects because they give employees the skills and tools they need to use sustainable practices successfully. The study also talked about the financial benefits of using environmentally friendly methods. Sustainability is not only the right thing to do for the environment, but it's also a good idea for the wallet. Reducing trash and recycling can save money, and improving business efficiency will pay off in

the long run. Going forward, healthcare facilities need to make sustainable waste management a top priority as part of their overall sustainability goals. This will help make healthcare processes cleaner, more efficient, and better for the environment. By doing this, healthcare workers can make a big difference in the fight for global sustainability while also making care for patients and running the facilities better.

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AUTHORSHIP CONTRIBUTION

Data curation: Sujayaraj Samuel Jayakumar, Indu Singh, Rahul S.S, Asish Malla.
Methodology: Sujayaraj Samuel Jayakumar, Indu Singh, Rahul S.S, Asish Malla.
Software: Sujayaraj Samuel Jayakumar, Indu Singh, Rahul S.S, Asish Malla.
Drafting - original draft: Sujayaraj Samuel Jayakumar, Indu Singh, Rahul S.S, Asish Malla.
Writing - proofreading and editing: Sujayaraj Samuel Jayakumar, Indu Singh, Rahul S.S, Asish Malla.