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Environmental Sustainability in Healthcare

Kunal Rawal[1*], Shruti Kaushik[2], Anushree Acharya[3]

[1]Associate Professor & Head, Hospital Administration, Sri Aurobindo Institute of Management and Science, Indore.

[2]Executive, Department of Hospital Administration, SGT Medical College and Research Institute, Gurugram.

[3]Assistant Professor, Department of Management Studies, SGSITS, Indore.

Abstract

This chapter examines the intricate connection between environmental health and medical procedures. We look at the ecological effects of the healthcare sector and point out the primary reasons for concern. We then discuss innovative strategies and initiatives that hospitals around the globe have implemented to lessen their environmental impact. In our concluding part, we look at the bigger picture of sustainable healthcare, emphasizing how it could contribute to a more robust healthcare system and a healthier global community.

Keywords: Environmental Sustainability, Healthcare, Sustainable Practices, Telehealth, Smart Hospital, Waste Reduction, Green Practices

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Introduction

Environmental sustainability is a critical issue that impacts all sectors. It involves using resources to ensure future generations can meet their needs. Businesses are beginning to understand the link between a healthy world and human well-being, from the requirement for healthy soil in agriculture to moving energy production toward renewable sources. It is startling to learn that the healthcare industry contributes to environmental degradation despite its admirable purpose of improving human health. Hospitals that use a lot of electricity and landfills with total medical waste present a depressing picture. Still, things are starting to get better. An increasing number of healthcare facilities are realizing that environmental sustainability is crucial for a healthy future—from a moral standpoint and strategically. Several factors have led to this paradigm change. One is the growing realization that people cannot be healthy apart from a healthy environment. Pollution, habitat loss, and climate change all pose serious human health risks. Moreover, the extent of the healthcare industry's environmental impact is becoming harder to argue against. There is an increasing need for sustainable solutions to lower energy use, waste generation, and supply chain ecological effects (Figure 1).

The good news is that the healthcare sector possesses the resources and inventiveness necessary to set sustainability standards. Hospitals utilize energy-efficient technology, reduce waste through responsible purchasing and disposal practices, and investigate greener building and transportation alternatives. By implementing these changes, the healthcare sector can lessen its environmental impact and encourage a healthy planet for everyone.

Corresponding Author: Kunal Rawal, Associate Professor & Head, Hospital Administration, Sri Aurobindo Institute of Management and Science, Indore, e-mail: kunalrawal02@gmail.com

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Literature Review

World Green Building Council (2023), emphasizing energy-efficient technologies, renewable energy, and sustainable design to lessen environmental footprints and enhance air quality, emphasized the importance of green building techniques in the healthcare industry. According to a 2022 study by the American Telemedicine Association, telehealth can enhance access to care in underprivileged areas, lower travel emissions, and save costs for medical facilities. MedTech Europe (2020) emphasized how medical plastics can be converted into new materials, including furniture

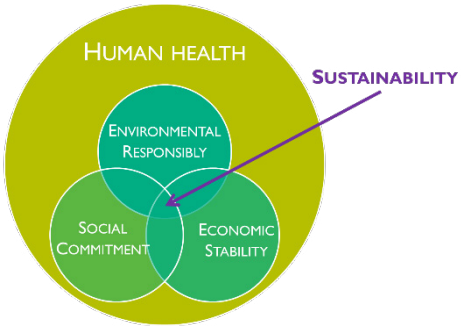

Figure 1: Relation between environment, health, and sustainability

or building components, improving sustainability and resource efficiency in their discussion of recycling in healthcare. Pickett *et al*. (2019) highlighted the significance of integrated waste management in the healthcare industry and promoted recycling, reusable surgical supplies, and waste segregation at the source to reduce environmental impact and advance sustainability. Ellen MacArthur Foundation 2019 first proposed a circular economy in healthcare, with a focus on reprocessing medical devices and utilizing modular designs to prolong product life cycles and cut waste. Golden *et al*. (2017) emphasized the need to cut back on pointless medical tests and procedures, arguing that telehealth and evidence-based treatment could improve environmental sustainability while reducing expenses, resource consumption, and radiation exposure for patients. Scott *et al*. (2016) investigated safe medication disposal practices, highlighting their importance in preventing environmental pollution and advancing public health through efficient pharmaceutical waste management systems.

Methodology

This study's methodology used an exploratory, qualitative approach to examine how environmental sustainability is incorporated into healthcare procedures. The study focused on the environmental impact of healthcare operations and methods to lessen these effects, and it involved a thorough evaluation of secondary data sources, including industry reports, case studies, and scholarly literature. Medical waste management, energy efficiency, sustainable procurement, and cutting-edge solutions like telemedicine and the circular economy were among the main areas of research. The study used thematic analysis to investigate the environmental issues that healthcare facilities present, including waste production, excessive resource consumption, and greenhouse gas emissions. To emphasize workable alternatives, insights were taken from pre-existing frameworks, such as integrated waste management and green building standards. The approach placed a strong emphasis on the use of real-world examples and best practices that healthcare organizations around the world have implemented, such as the use of telemedicine, proper medical waste disposal, and renewable energy. To determine their efficacy and scalability in lowering environmental footprints without sacrificing the quality of healthcare, these instances were subjected to rigorous analysis. The study also examined obstacles to sustainability in healthcare, including knowledge gaps among stakeholders, reluctance to change, and infrastructure restrictions. The research offered a comprehensive grasp of how environmental sustainability might be integrated into hospital operations by combining data from many sources. The results are intended to help administrators, legislators, and medical professionals build a robust and environmentally responsible healthcare system that strikes a balance between social, economic, and environmental goals.

The Price of Care for the Environment

The existing healthcare system generates a great deal of waste. In addition to adding to already overcrowded landfills, Satterthwaite, McGlynn, and LeClercq (2010) state that wasted drugs, needles, syringes, and personal protective equipment (PPE) can pose a health risk to humans and the environment. The energy use of hospitals and clinics, including lighting, heating, cooling, and medical equipment, is another critical problem contributing to greenhouse gas emissions (Schaefer *et al*., 2012). Manufacturing pharmaceuticals and medical equipment also have a significant environmental impact because of resource extraction and energy-intensive procedures (Finkelstein *et al*., 2003).

The Environmental Burden of Healthcare:

The primary regions where the environmental effects of healthcare activities are felt are broken out in The Environmental Burden of Healthcare.

- *Medical Waste*

Clinics and hospitals generate a staggering amount of waste. According to Satterthwaite *et al*. (2010), discarded surgical instruments, needles, syringes, expired medications, and personal protective equipment (PPE) are the leading causes of overflowing landfills. These products can potentially harm human and environmental health if improperly handled. Improper

disposal of pharmaceuticals can contaminate soil and water, and improper disposal of sharps can result in needle stick incidents for sanitation staff.

- *Energy Use*

Modern healthcare facilities consume a lot of energy. Lighting, heating, cooling, and medical equipment all produce emissions of greenhouse gases (Schaefer *et al*., 2012). For example, MRI equipment uses much energy despite being essential for diagnosis because of the strong magnets they employ.

- *Resource-Intensive Manufacturing*

The production of pharmaceuticals and medical devices significantly negatively influences the environment. This entails resource extraction, usually by environmentally hazardous techniques, for raw materials such as metals and plastics (Finkelstein *et al*., 2003). The energy needs of the actual manufacturing processes also add a substantial amount to the carbon footprint.

- *Chemical Risks*

Two medical procedures involving the use of chemicals that could harm the environment are sterilization and disinfection. These materials can contaminate streams, harm ecosystems, and perhaps pose a future health risk to humans if they are not disposed of appropriately (Pickett *et al*., 2019).

A Prescription for Change

Thankfully, many healthcare institutions are taking proactive steps to lessen their environmental impact. Implementing recycling programs for certain commodities, such as paper, plastics, and metals, is one strategy to reduce waste (Pickett *et al*., 2019). Hospitals are also investigating safe methods to eliminate unwanted medications to prevent contamination and save money (Scott *et al*., 2016). The primary objectives of energy-efficiency initiatives are using renewable energy sources, improved building insulation, and contemporary lighting systems (World Health Organization, 2019). Furthermore, to reduce unnecessary tests and procedures and save costs and radiation exposure for patients, medical experts are reevaluating protocols (Golden *et al*., 2017) (Figure 2).

Figure 2: Pathways to a Sustainable Future in Healthcare

Pathways to a Sustainable Future in Healthcare

Even though there are many obstacles, an increasing number of healthcare organizations are developing ground-breaking solutions.

- *Waste Reduction and Management*

Hospitals are implementing integrated waste management plans. This entails separating waste streams at their source, such as separating recyclables like paper and plastics from hazardous waste like sharps, according to Picket *et al*. (2019). Disposable waste can be significantly reduced using reusable surgical gowns and other supplies.

- *Safe Medication Disposal*

There is a significant environmental and public health risk if outdated or unused medications are disposed of properly. Hospitals are looking at safe disposal techniques to prevent contamination, and one of the objectives is to provide programs for patients to return unused prescriptions appropriately (Scott *et al*., 2016).

- *Energy Efficiency*

Hospitals are exploring various strategies to reduce their energy usage. Some of these are the utilization of renewable energy sources, such as solar panels, upgrading energy-efficient lighting systems, and improving building insulation. The World Health Organization (2019) suggests that medical equipment might have automated shut-off systems installed to reduce energy usage further when not in use.

- *Sustainable Procurement*

Healthcare facilities increasingly select environmentally friendly products when purchasing. This could mean choosing drugs with less energy-intensive processes or medical gear made of recycled materials.

- *Encouraging Green Building Practices*

Using sustainable design principles, new or renovated healthcare facilities can significantly reduce their environmental impact. This could include components like green roofs, which improve air quality and serve as insulation, or natural lighting systems, which lessen the demand for artificial lighting.

- *Reducing Needless Procedures*

Overuse of specific medical tests and procedures hurts people and the environment. By promoting evidence-based treatment and utilizing telehealth technologies for pertinent consultations, healthcare professionals can reduce unnecessary resource consumption and radiation exposure to patients (Golden *et al*., 2017).

The Ripple Effect

Going Beyond Eco-Friendly Habits Sustainable healthcare is more than just using "green" practices in hospital management. By funding public health initiatives and preventative treatment, the healthcare sector may considerably lessen the burden of chronic diseases—many of which are exacerbated by environmental factors (Watts *et al*., 2015). The healthcare sector can also contribute to creating a healthier world for all people by endorsing environmental health-promoting laws, like those dealing with cleaner air and water.

Significance of Sustainable Healthcare Practices

- *Preventive Care and Public Health*

By promoting preventive care and public health initiatives, healthcare may help reduce the burden of chronic diseases, many of which are exacerbated by environmental factors (Watts *et al*., 2015). To prevent diabetes and obesity, for instance, promote a balanced diet and active lifestyle. These two disorders are sometimes exacerbated by environmental factors such as poor air quality and restricted access to green spaces.

- *Advocating for Environmental Policy*

The healthcare sector is well-represented. By supporting environmental regulations that promote clean air, clean water, and a stable climate, healthcare companies may contribute to creating a healthy world for all people. This could mean promoting laws that support renewable energy sources or demanding stricter regulations on emissions from industrial sources.

- *Cooperation for Change*

Sustainable healthcare cannot be achieved in isolation. Collaboration between the general population, environmental organizations, lawmakers, and healthcare providers is essential. Increasing public awareness, fostering creativity, and sharing best practices are crucial elements of this collaborative effort.

Future Range of Healthcare and Environmental SustainabilityIntegration

Achieving environmental sustainability in the healthcare sector is a marathon, not a sprint. It demands unwavering commitment, imagination, and cooperation. However, there is a huge potential benefit.

The healthcare industry can reap the following benefits from implementing sustainable practices

- *Reduced Operating Costs*

Over time, various sustainability measures, such as waste reduction and energy efficiency enhancements, can save a significant amount of money. The savings can be used for other crucial areas, like patient care.

- *Enhance Medical Care*

A healthy environment is necessary for a healthy population. Sustainable practices can benefit patients by improving their outcomes by reducing the prevalence of environmental-related diseases like allergies and respiratory disorders. Additionally, these actions promote more stable climate conditions and healthier air and water.

- *Attract and Retain Talent*

A growing number of healthcare professionals place a high premium on workplace sustainability. By adopting sustainability, healthcare companies may draw in more talent and develop a more engaged, environmentally conscious workforce.

- *Build Public Trust*

By demonstrating a commitment to environmental sustainability, healthcare institutions can enhance their reputation and develop stronger relationships with the communities they serve. By setting the standard for environmental health promotion, healthcare organizations may win the general public's confidence.

Latest Trends in Environment Sustainability in Healthcare

The wave of innovation the healthcare industry is adopting is centered on reducing its environmental effects. A closer look at a few of the more encouraging patterns is provided in Figure 3.

The Circular Economy in Healthcare:

The circular economy's tenets challenge the conventional "take-make-dispose" paradigm.

In terms of healthcare, this approach emphasizes the following:

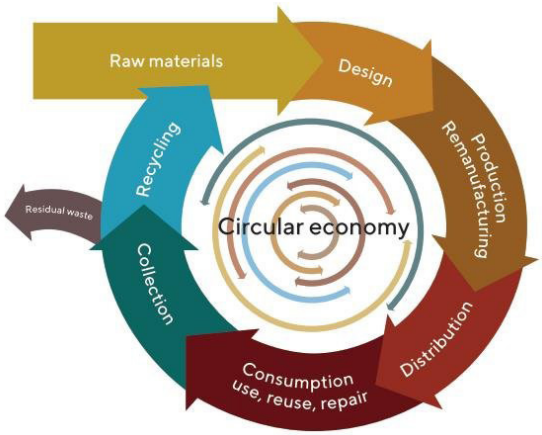

Figure 3: Circular Economy
Source: Model of Circular Economy (World Health Organization Regional Office for Europe, 2018).

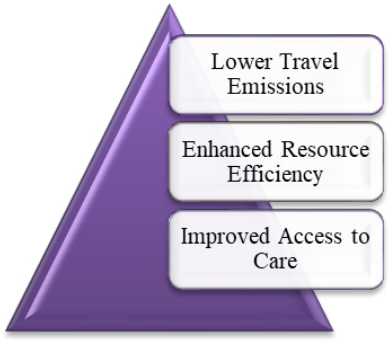

Figure 4: Benefits of Telemedicine on Sustainability

- *Product Design for Disassembly and Reusability*

Reusable devices and medical equipment are produced. This could include easy-clean and reuse components or modular elements that allow for replacing particular parts without discarding the complete gadget (Ellen MacArthur Foundation, 2019).

- *Reprocessing and refurbishment*

These techniques extend the helpful life of single-use medical equipment. Surgical instruments, for instance, can be thoroughly cleaned and sterilized for safe reuse to reduce waste and reliance on virgin materials (Health Care Without Harm, 2012).

- *Recycling and Upcycling*

New uses are made of materials derived from abandoned medical equipment and supplies. Medical bag plastics can be recycled into furniture, and surgical gown linens can be used as building materials (MedTech Europe, 2020). The circular economy offers a thorough approach to resource management in the healthcare sector by lowering waste production and extending the life of precious resources.

Sustainability and Telehealth:

Using telecommunications technology to provide healthcare remotely has significant advantages for the environment (Figure 4).

Lower Travel Emissions

By offering virtual consultations and remote monitoring, telehealth lowers the need for patients and medical staff to travel for in-person sessions. Consequently, automobiles emit fewer greenhouse gases into the atmosphere (American Telemedicine Association, 2022).

- *Enhanced Resource Efficiency*

Telehealth can optimize the usage of physically placed medical facilities. By enabling remote consultations and follow-up meetings, telehealth has the potential to minimize energy use in hospitals and clinics by freeing up space and resources.

- *Improved Access to Care*

Telehealth can get beyond geographic restrictions and provide specialized care to patients in remote places. This reduces the need for extensive travel for consultations, thus reducing the environmental effect.

Telehealth is a win-win situation since it increases access to care while promoting environmental sustainability.

Smart Hospital Technology

There are a lot of exciting opportunities for sustainability when innovative technology is integrated into healthcare facilities.

- *Sensor-Based Energy Optimization*

Smart buildings employ sensors to monitor occupancy, temperature, and lighting. This data can automatically make changes, such as reducing the energy required for heating, cooling, and lighting in unoccupied spaces (World *et al*., 2023).

- *Predictive Maintenance*

Repairs and preventative maintenance can be performed by tracking an item's performance with sensors. This maximizes equipment longevity and reduces energy loss from inefficient gear.

- *Real-Time Resource Management*

Smart technology can be used to monitor and regulate the consumption of water and medical supplies. This real-time data can highlight areas in need of development and streamline the use of resources. By leveraging automation and data, intelligent hospital technology may significantly reduce the environmental impact of healthcare facilities.

Conclusion

In conclusion, the significant harm that energy use, resource-intensive processes, and waste generation do to the environment emphasizes how crucial environmental sustainability is to the healthcare industry. But because they benefit the economy, the environment, and patient care, proactive strategies like waste reduction, energy saving, and sustainable procurement are gaining traction. Adopting a holistic strategy for sustainable healthcare, which includes cooperation, support for environmental regulations, and preventative care, can also improve the benefits of these initiatives. With the adoption of cutting-edge ideas like the circular economy, telehealth sustainability, and intelligent hospital technology, the healthcare sector is poised to take the lead in promoting environmental sustainability and human health.

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