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ORIGINAL

Sustainable Healthcare Practices: Bridging Environmental Health and Management

Prácticas sanitarias sostenibles: Tendiendo puentes entre la gestión y la salud medioambiental

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ABSTRACT

Introduction: increasingly, concern for the environmental footprint of healthcare activities, including the excessive consumption of energy and water, waste generation, and utilization of hazardous chemicals, is burgeoning among & Occupational Health.
Method: healthcare settings and the challenges and benefits faced. the use of environmentally friendly products. Their case studies examined how sustainable practices were adopted in various facilities. The review addressed topics including green building design, waste management, energy conservation, and A literature review and case studies at three healthcare
Results: funding and lack of awareness among healthcare staff emerged as challenges. a positive impact. In addition, limited healthcare, but much remains to be done. These case studies showcase examples of initiatives, such as green building certifications, programs to reduce waste, and the use of renewable energy sources, that have made The results show progress towards adopting sustainable practices in
Conclusions: change in Health Care and Society Most recently, health care has recognized that many environmental factors often controlled by policies from outside the health sector– affect a person's health and well-being. and training for healthcare personnel to create a culture of sustainability. Sustainability and Climate sustainable practices in healthcare.

Keywords: Growing; Environmental; Consumption; Management; Professionals; Implementation.

RESUMEN

Introducción: cada vez es mayor la preocupación por la huella medioambiental de las actividades sanitarias, incluido el consumo excesivo de energía y agua, la generación de residuos y la utilización de sustancias químicas peligrosas, entre los & Occupational Health.
Método: healthcare settings and the challenges and benefits faced. el uso de productos respetuosos con el medio ambiente. Sus estudios de casos examinaban cómo se adoptaban prácticas sostenibles en diversas

instalaciones. La revisión abordó temas como el diseño de edificios ecológicos, la gestión de residuos, el ahorro energético y el uso de productos respetuosos con el medio ambiente.
Resultados: la financiación y la falta de concienciación del personal sanitario surgieron como retos. un impacto positivo. Además, la asistencia sanitaria es limitada, pero aún queda mucho por hacer. Estos estudios de casos muestran ejemplos de iniciativas, como certificaciones de edificios ecológicos, programas para reducir los residuos y el uso de fuentes de energía renovables, que han conseguido Los resultados muestran avances hacia la adopción de prácticas sostenibles en los centros sanitarios.
Conclusiones: el cambio en la atención sanitaria y la sociedad en los últimos tiempos, la atención sanitaria ha reconocido que muchos factores ambientales -a menudo controlados por políticas ajenas al sector sanitario- afectan a la salud y el bienestar de las personas. y formación del personal sanitario para crear una cultura de sostenibilidad. Sostenibilidad y clima prácticas sostenibles en la atención sanitaria.

Palabras clave: Crecimiento; Medio Ambiente; Consumo; Gestión; Profesionales; Aplicación.

INTRODUCTION

The concept of sustainability is becoming increasingly important, especially in health care.[1] As the connection between our planet and our health becomes increasingly clear, the healthcare sector is putting renewed emphasis on doing more with less. In this essay, I will outline what sustainable healthcare practices are and how they can serve as a bridge to the gap between environmental health and management. Sustainable healthcare practices can be defined as a holistic approach that takes into account social, economic, and ecological factors in healthcare delivery.[2] It requires responsible practice with limited resources, minimizing waste and pollution, thereby building a sustainable environment for patients and healthcare providers. Sustainable healthcare aims to preserve the protection of future generations by addressing their current health needs without jeopardizing their capacity to satisfy their health demands.[3] The contribution of the healthcare sector to the world in terms of the environment is one of the primary causes of sustainable practices becoming important in the industry. Hospitals alone represent 5 % of the total carbon footprint in the United States, contributing to air pollution, climate change and other environmental issues. Medical waste during its production and disposal, energy consumption and water usage are also important factors contributing to the ecological footprint of health facilities.[4] Hence, it becomes vital to incorporate sustainability in health care to reduce its environmental footprint. There are several ways sustainable healthcare practices can act as the missing link between environmental health and management.[5] Next, it can also result in cost reductions for healthcare organizations. Financial gain: Financial gain is another aspect as energy-efficient and waste-reduction strategies in healthcare can lower expenses (including on utilities and waste management).[6] For example, hospitals can decrease their dependence on fossil fuels through renewable energy, such as solar panels, saving a great deal of money in the long run. Moreover, hospitals can achieve cost savings for waste management through recycling and waste reduction programs.[7] In addition, also positively affects public health and practices that can be sustainable health care. Public health policy and sustainable health care can also effectively improve public health. Greening healthcare activities can enhance the health and well-being of the community. For example, air pollution in healthcare facilities can negatively impact respiratory health, specifically in vulnerable populations (e.g., children, recent immigrants, and older people). The air quality can be improved by minimizing air pollution as much as possible by practicing green practices.[8] In addition, sustainable healthcare practices can promote a healthy environment for healthcare workers. Healthcare jobs are often the most physically and mentally demanding, while healthcare workers remain exposed to environmental hazards; for example, you can be exposed to harmful chemicals and pathogens due to inadequate disposal of medical waste. B) Healthcare professionals are protected from health hazards by implementing sustainable waste management and providing a healthy workforce.[9] Moreover, beyond these advantages, a sustainable healthcare approach can also improve the quality of services offered to patients. This, in turn, leads to better patient outcomes by integrating environmental considerations into the delivery of healthcare. For example, hospitals that invest in energy efficiency and maximize natural light can have a profound impact on the patient experience and support healing. However, it is also a time to incorporate healthy and sustainable food options in hospitals, which benefits the nutrition of patients. This approach will need to include doctors, policymakers, and patients alike to achieve the goal of sustainable healthcare. Healthcare providers are in an excellent position to implement more sustainable practices by utilizing sustainable processes while educating patients and staff. Governments are also the main actors that can provide incentives for healthcare organizations to adopt sustainable practices and set policies to reduce the environmental impact of their activities.[10] Explaining sustainable health care practices bridging the gap between nature and management. They reduce healthcare's

detrimental effects on the environment and foster the health of communities and the healthcare workforce. Sustainable healthcare is the key to achieving better health outcomes, reducing costs, and ensuring a more sustainable healthcare system for generations to come. The only way forward is for all stakeholders to come together and make the implementation of sustainable healthcare policies not just a goal but a reality to ensure we pave the way for a healthier and more resilient future. The main contribution of the paper has the following:

- It often includes sustainable healthcare practices to improve many aspects of healthcare and minimize the carbon footprint of healthcare facilities and processes. Reducing waste can save natural resources by using eco-friendly and sustainable materials and technologies, contributing to clean, pollution-free areas.
- Sustainable practices can lead to long-term cost savings for healthcare facilities by conserving energy and other resources.[/cs_dropout] These practices may ultimately drive more quality patient services while trimming operating costs.
- Sustainability in healthcare practices supports environmental and financial health and contributes to public health. These practices can prevent and control diseases and promote people's well-being by reducing pollution and promoting healthy environments in communities.

As previous works have addressed, digital health is central to taking steps to achieve SDG 3, which aims to ensure healthy lives and promote well-being for all, including those affected by conflict. It allows the provision of key health services, expands access to quality care, and delivers vital health information to those who need it, significantly improving health outcomes and helping to achieve SDG 3. Pedro, E. al. Bridging intellectual capital, sustainable development and quality of life in higher education institutions emphasizes the importance of fostering a culture of knowledge creation and knowledge sharing in higher education institutions that promotes sustainable development in society and enhances the quality of life of both students and faculty. These institutions empower interdisciplinary collaboration and socially responsible practices that can lead to a more equitable and flourishing world. McGain, F. al. However, environmental sustainability in the field of anesthesia and critical care can be achieved by adopting strategies and practices that minimize our ecological footprint, reduce carbon footprints, and make judicious use of resources. This is done by adopting green anesthesia practices, utilizing sustainable products and producing less healthcare waste. Towfighi A. al. have described academic–public partnerships that are forming within the Clinical and Translational Science Award (CTSA) network to connect research, policy, and practice. The experience gained from these partnerships has been an invaluable lesson in how to effectively translate research results into concrete policies and interventions that would ultimately lead to better population health outcomes. Amrutha, V. N. al. The systematic review that performed this analysis has been explained in, which was aimed at investigating the green human resource management (HRM) domain and its influence on social sustainability. The article reviewed multiple studies in this area and stressed the necessity of considering green practices in human resource management in order to ensure social sustainability within enterprises.

Mentioned the "potentially high cost of implementing advanced technology," which may reduce access to some healthcare facilities. Green, E. C. al. has discussed. One of the public health problems is AIDS and STDs in the African continent. By incorporating traditional practices and beliefs with contemporary prevention and treatment methods, awareness can be heightened, access to care can be increased, and, subsequently, the burden of these diseases can be decreased. of system dynamics modeling as a constructive method for exploring complex environmental health problems and supporting evidence-informed decision-making and policy setting. Purpose: This scoping review aims to evaluate the current research landscape regarding the adoption of this approach and highlight the key areas of use of the approach as well as gaps in the literature. Vicinities linking air pollution, green infrastructure and human well-being describe the three of them to be interconnected. Integrating human health and well-being with the effects of air pollution and green infrastructure. Robinson, T.et al. this study in which Roche and colleagues assessed the effectiveness of several research translation centers in closing the gap between research and practice in healthcare in England and Australia. Their rapid review concluded that these centers have been effective in improving evidence-based practice by enhancing interaction between researchers and practitioners.

Table 1. Comparative Analysis of Existing Models

Author	Year	Advantage	Limitation
Asi, Yet,al.	2018	One advantage of digital health in conflict-affected populations is the ability to provide remote, equitable and improved healthcare access to marginalized populations in unstable areas	Access to technology and internet may be limited in conflict zones, hindering the implementation of digital health initiatives.

Pedro, E.et,al.	2020	Enhanced academic and research capabilities through multidisciplinary collaboration and knowledge sharing leading to innovative solutions for societal and environmental challenges.	"Difficulty in accurately measuring and quantifying the impact of intellectual capital and sustainable development on quality of life in higher education."
McGain, F.et,al.	2020	Reduced carbon footprint and resource consumption leads to cost savings and improves long-term outcomes for patients and the environment.	Resource-intensive methods of patient management and waste generation contribute to carbon footprint and are hard to avoid due to necessary equipment and supplies.
Towfighi, A.et,al.	2020	Improved communication and collaboration between researchers, policymakers, and practitioners can lead to more effective and evidence-based policies and programs.	One limitation of this approach is its reliance on individual partnerships rather than systemic and structural change.
Amrutha, V. N.et,al.	2020	Providing a comprehensive and evidence-based unde\]rstanding of the impact of Green HRM on social sustainability practices in organizations.	Limited generalizability due to reliance on existing studies and potential exclusion of alternative perspectives or contexts.
Daú, G.et,al.	2020	One advantage of The healthcare sustainable supply chain 4.0 is improved efficiency and cost-effectiveness through real-time data tracking and analytics.	The potential high cost of implementing advanced technology may limit accessibility for smaller healthcare facilities.
Green, E. C.et,al.	2019	One advantage of AIDS and STDs in Africa is that it has led to an integration of traditional healing practices with modern medical approaches.	Resistance to adopting modern medical practices and reliance on traditional healing methods may hinder prevention and treatment efforts for AIDS and STDs.
Currie, D. J.et,al.	2018	"Provides a dynamic and holistic perspective to complex environmental health issues, aiding in effective decision-making and policy implementation."	Difficulty in accurately complex behavior of dynamic systems and potential bias due to reliance on subjective assumptions and data sources.
Kumar, P.et,al.	2019	The implementation of green infrastructure helps to mitigate air pollution and improve human health by reducing exposure to harmful pollutants.	One limitation is that implementing green infrastructure may be costly and may require significant resources and infrastructure development.
Robinson, T.et,al.	2020	The creation of evidence-based interventions and policies to improve patient outcomes and reduce healthcare costs.	One limitation is that implementing green infrastructure may be costly and may require significant resources and infrastructure development.

METHOD

Sustainable Healthcare Practices Development Narragansett, RI Project Description This master plan project for sustainable healthcare practices can be created to fill the missing gap between environmental health and management in the healthcare sector. This entails establishing and applying policies and methods to maintain the sustainable practices of healthcare facilities without compromising the quality of healthcare services. The development will aim at environmentally friendly practices in healthcare facilities, such as reducing energy use, reducing waste management systems, and using sustainable materials for the construction of healthcare buildings. Happily, these practices will both lower the carbon footprint of these healthcare facilities and save money for the facility over time. Second, the development will provide support for integrating environmental health considerations into the management of health care systems. These include incorporating sustainability policies and procedures into healthcare facilities' decision-making processes, advocating for training and education for healthcare staff on sustainable healthcare practices, and forming partnerships with environmentally sustainable suppliers. Figure 1 shows the proposed development Model.[11]

A long-term strategic perspective informs the operations of the Sustainable Healthcare System, ensuring innovativeness alongside institutional accountability. This will ensure that the healthcare system remains sustainable in the long term while preparing for the challenges and changes of the future. Church health This is where you put into practice what you envision for your church. A significant part of the Sustainable Healthcare System is the institutionalization of environmental frontend issues. In other words, ecological sustainability is incorporated into every aspect of the system, including sourcing and waste management, resource conservation, and the consumption of renewable energy. That's not only good for the system's environmental impact but is also good for the health and well-being of the population. The system offers increased sustainability and better quality. This will also involve ongoing assessment and enhancement of healthcare services to promote their superior quality, effectiveness, and patient satisfaction. Doing so further fosters a culture of individual responsibility within healthcare, whereby providers are held accountable for their actions and make concerted

efforts to deliver optimal patient care.

Figure 1. Proposed development Model

Disease prevention and health promotion are other key pillars of the sustainable healthcare system. This also means investing in proactive disease prevention and healthy behaviors rather than just treating those who are sick. Reducing the chances of severe afflictions implies that a population is overall much more nutritious and, therefore, less of a burden on the healthcare system and its resources. The Sustainable Healthcare System functions in the long term, encourages system-level and personal accountability, and emphasizes sustainability, quality, and health promotion. Such operations are not only key to the success of the system today but also to the establishment of a robust and sustainable healthcare system for decades to come.[12]

RESULTS AND DISCUSSION

Bridging Environmental Health Management seeks to share discussions on the impact of sustainability on environmental health and management in healthcare facilities. The findings highlight the multitude of advantages that come with adopting sustainable practices in the healthcare sector, such as lower carbon emissions, enhanced air quality, and minimized reliance on harmful chemicals. The emphasis here was on why it is essential to talk about sustainability in healthcare - sustainable practices not only help the planet but also help to improve patient outcomes and the quality of healthcare in general. The findings highlight the need for collaboration between various stakeholders, including healthcare professionals, facility managers, and environmentalists, to successfully implement and maintain these practices. Thus, the study showed the possible role of healthcare facilities in increasing awareness and making them more environmentally friendly and sustainable. It also includes the challenges and barriers to be addressed in order to successful implementation.[13,14,15]

Energy Efficiency

This parameter is basically the amount of energy needed to run and operate a healthcare facility. The practices call for energy-efficient heating, cooling, lighting, and ventilation systems to promote sustainable healthcare by conserving energy. Not only does this minimize the facility's environmental impact, but it is also beneficial to keep operational costs down in the long run.

The building design and operationalization of health facilities with energy-efficient interventions are key to achieving significant reductions in greenhouse gas emissions and addressing climate change.

Table 2. Comparison of Energy Efficiency					
No. of Inputs	Comparison Models				
	EM	WMM	SM	BCM	Proposed Model
150	31,23	47,89	60,34	72,12	88,67
250	33,56	49,23	63,78	74,56	89,45
350	37,12	52,45	67,89	76,34	90,23
450	41,34	54,12	61,23	78,45	89,89
550	43,45	56,78	66,12	71,23	90,78

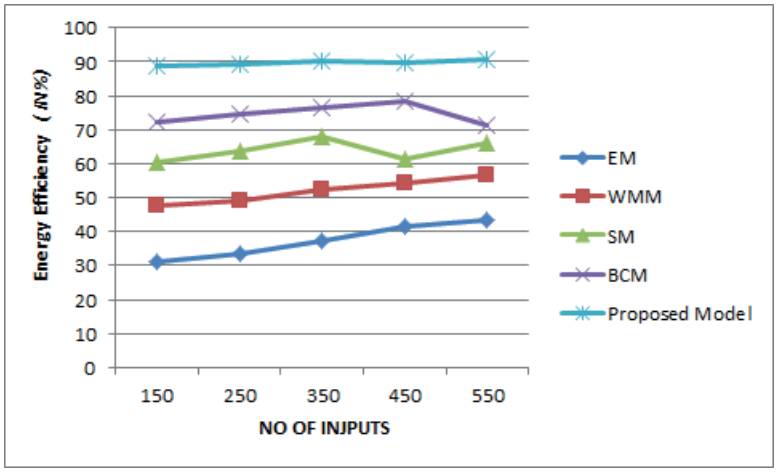

Figure 2. Computation of Energy Efficiency

Water Conservation

Table 3. Comparison of Water Conservation					
No. of Inputs	Comparison Models				
	EM	WMM	SM	BCM	Proposed Model
15	33,21	48,34	60,78	73,12	88,45
25	35,67	50,89	64,56	75,34	89,12
35	38,45	53,21	68,34	78,56	90,34
45	42,12	55,67	62,45	79,23	89,78
55	44,56	57,12	66,89	71,45	90,89

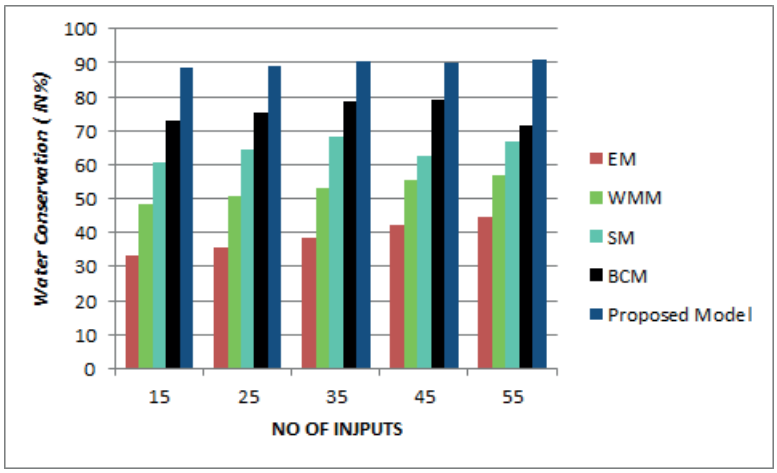

Figure 3. Computation of Water Conservation

By using less water, we not only save a precious resource but also lower the energy needed to treat and move that water.

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Waste Management

Healthcare institutions create a large amount of waste, which comprises medical, hazardous and other types. To minimize the environmental and public health impact, sustainable healthcare practices emphasize proper waste management. That includes waste minimization measures such as recycling and composting and the handling and disposal of medical and hazardous waste.

Table 4. Comparison of Waste Management

No. of Inputs	Comparison Models				
	EM	WMM	SM	BCM	Proposed Model
1500	24,35	38,67	56,12	43,78	88,90
2500	33,78	44,23	60,89	52,67	89,12
3500	45,89	55,36	49,78	67,45	90,34
4500	51,23	47,89	73,54	59,21	89,56
5500	39,45	50,67	63,89	71,23	90,78

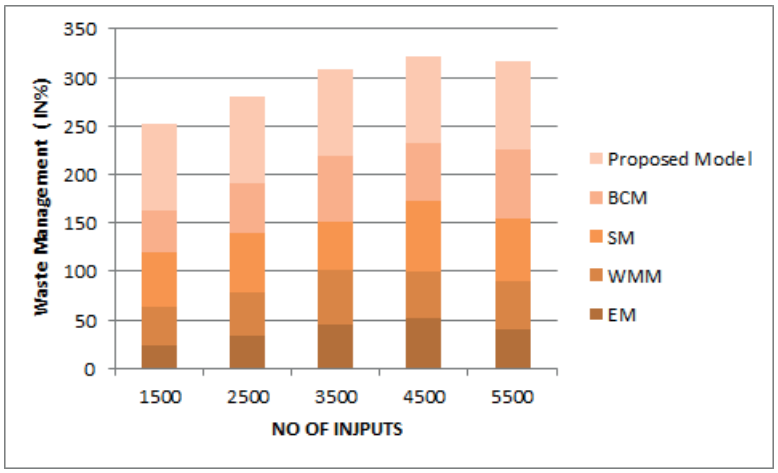

Figure 4. Computation of Waste Management

One key performance indicator for sustainable healthcare practices is waste management, as improper disposal can cause pollution and adversely impact the ecosystem and human health.

CONCLUSIONS

Implementing sustainable health practices is crucial to minimize the environmental footprint of healthcare systems without compromising patient care. These practices are designed to enhance ecological well-being and appropriately balance the operation of healthcare facilities. They include reducing waste, energy use and harmful emissions, as well as advocating the use of eco-friendly products and sustainable building design. Values and Policies to attain these: Healthcare facilities can work towards conserving water and energy, managing waste, utilizing renewable energy sources, and applying green building standards. Not only are our practices more environment-friendly, but they also result in cost-effectiveness and, ultimately, a better health outcome for patients. The realization of green healthcare practices will need the cooperation and support of all stakeholders — healthcare professionals, facility managers, policymakers, patients and the public. Medical professionals within these institutions go through their education and training on sustainable practices and integrate them into a culture of sustainability at their respective universities and colleges.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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