ENVIRONMENTAL SUSTAINABILITY POLICIES IN HEALTHCARE

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Please find following a summary of a literature search and relevant results. All articles can be provided in full - email library@monashhealth.org for a list of the articles you require.

QUESTION

What research is there to support the development of an Environmental Sustainability Policy in a public health service?

RESULTS

ONLINE RESOURCES (GREY LITERATURE)

POLICIES

Korambayil. S, et al. (2020). **A greener NHS: An overview of sustainable development practices in a rural district general hospital.** Link

The implementation of a sustainability-focused action plan at grass-roots level towards is both cost-effective and vital towards achieving a 'Greener NHS'.

Australian Government Department of Health and Aged Care. (2023). **National health and climate strategy: Final thematic stakeholder engagement report.** Link

National Sustainability Development Unit, as well as individual hospital or health district Sustainability Development Units, to increase capacity and support for measurement and reporting.

The Royal Children's Hospital Melbourne. (2023). **Sustainability plan 2023-25.** Link

This plan provides a roadmap for analysing, monitoring and reporting on the hospital's environmental initiatives.

Bragge. P, et al. (2021)**. Climate change and Australia's healthcare systems: A review of literature, policy and practice.** Link

This report provides evidence-based recommendations on ways to reduce carbon footprint, save money and improve healthcare outcomes.

GUIDELINES

Wyns. A, et al. (2022). **A review of sustainable healthcare: Policy, practice, and research with a focus on safety and quality**. Link

This review serves as support for the development of a sustainable healthcare standards, implementation actions and governance.

Victorian Health Building Authority. (2021). **Guidelines for sustainability in health care capital works.** Link

Delivering sustainable healthcare buildings (pg.11)

These guidelines for capital works provide advice and guidance to all stakeholders involved in the design, construction and refurbishment of healthcare facilities on how to build sustainable, healthy and resilient buildings.

Victorian Government Health and Human Services Department. (2017). **Public environmental reporting guidelines: Guidance for Victorian public healthcare services.** Link

The guidelines set out both mandatory and voluntary reporting requirements, as well as providing principles and standards that should be used when collecting and reporting environmental performance data

Climate and Health Alliance. (2021). **Healthy, regenerative and just: Framework for a national strategy on climate, health and well-being for Australia.** Link

This framework offers comprehensive guidance and recommendations on policies and programs.

Victorian Health and Human Services Building Authority. (2018). **Environmental sustainability strategy: 2018-19 to 2022-23.** Link

This strategy sets out commitments to improve the environmental sustainability of the health system.

National Australian Built Environment Rating System. (2022). **The Rules: Energy and water for hospitals – Version 2.0 - December 2022**. Link

NABERS offers a performance-based rating system that allows hospitals to measure, monitor and improve their environmental impact.

PEER-REVIEWED LITERATURE – MOST RECENT FIRST

Articles are grouped by theme:

- Barriers and Facilitators
- Education
- Policy Implementation Strategies
  - Life Cycle Assessment Policy
  - Reduce, Reuse, Recycle Policy
- Quality Improvement Initiatives

Each article summary contains excerpts from the abstract and an online link.

BARRIERS AND FACILITATORS

Aboueid, S., et al. (2023). **Barriers and enablers to implementing environmentally sustainable practices in healthcare: A scoping review and proposed roadmap.** *Healthcare management forum 36*(6): 405-413. Full-text

This scoping review sought to identify the barriers and enablers to implementing environmentally sustainable practices in healthcare, as well as propose a multi-phased approach to enable such implementation. The three concepts guiding the search were (1) environmental sustainability; (2) healthcare; and (3) barriers or enablers. Barriers and enablers were related to the individual , institutional , geographical/infrastructural, political , and other. A key enabler identified was having transformational leadership with a clear vision and collaborative approach.

Sonaiya, S., et al. (2023). **Environmentally sustainable gastroenterology practice: Review of current state and future goals.** *Digestive Endoscopy*. Request article

In this review, we aim to understand the carbon footprint in gastroenterology practice associated with GI endoscopy, conferences and recruitment, identify barriers to change, and recommend mitigating strategies. Gastrointestinal endoscopy and practice contribute to the carbon footprint through the use of disposables such as single-use endoscopes and waste generation. To achieve environmental sustainability, measures such as promoting reusable endoscopy equipment over single-use endoscopes, calculating institutional carbon footprints, establishing benchmarking standards, and embracing virtual platforms such as telemedicine and research meetings should be implemented.

EDUCATION

Chambrin, C., et al. (2023). **Association between anesthesia provider education and carbon footprint related to the use of halogenated anesthetics.** *Anesthesia and analgesia 136*(1): 101-110. Full-text

Inhaled halogenated anesthetics are responsible for half of operating room total greenhouse gas emissions. We aimed to assess whether implementing such information campaigns was associated with a decrease in the carbon footprint related to inhaled halogenated anesthetics. The setup of the sustainable anesthesia groups was associated with a dramatic reduction in the carbon footprint related to halogenated anesthetics. These results should encourage health care institutions to undertake information campaigns toward anesthesia providers so that they also take into account the environmental impact in the choice of anesthetic drugs, in addition to the benefits for the patient and economic concerns.

Pradere, B., et al. (2023). **Climate-smart actions in the operating theatre for improving sustainability practices: A systematic review.** *European urology 83*(4): 331-342. Full-text

Surgical activity contributes to global warming though the production of greenhouse gases and consumption of resources. To date, no clinical practice guidelines have been made to promote and implement climate-smart actions. This review provides arguments for many climate-smart actions that could be implemented in our daily practice. Improving awareness and education are important to act collectively in a sustainable way. Further studies are mandatory to assess the impact of these climate-smart actions in the OR. There is still a long way to go to homogenise and improve the quality of our climate-smart actions.

Afanasjeva, J. and K. Gruenberg (2019). **Pharmacists as environmental stewards: Strategies for minimizing and managing drug waste.** *Sustainable Chemistry and Pharmacy 13*: 100164. Request article

As the awareness about the negative effects of disposed medications on the environment increases, pharmacists and pharmacy administrators must be aware of potential waste minimization strategies to implement in community and hospital pharmacies. Education on appropriate disposal of different types of medications is the key intervention for all pharmacy settings. Other interventions include medication reviews, de-prescription, and drug take-back programs. Hospital pharmacies can focus on assessing the frequency of batch compounding of sterile products and using smaller vials and products with longer expiration dates. Finally, rounding of biologic or cytotoxic agents can be implemented in hospital pharmacies and infusion clinics.

IMPLEMENTATION STRATEGIES

Graham, M., et al. (2023). **Impact of customized electronic duplicate order alerts on microbiology test ordering: Financial and environmental cost savings.** *Infection control and hospital epidemiology*. Full-text

Alerts were implemented for microbiology tests at the largest public hospital in Victoria, Australia. These alerts were designed to pop up at the point of test ordering to inform the clinician that the test had previously been ordered and to suggest appropriate reordering time frames and indications. Greenhouse gas footprint, measured in carbon dioxide equivalent emissions for cancelled EBV and CMV serology tests, resulted in a saving of at least 17,711 g, equivalent to driving 115 km in a standard car. Customized alerts issued at the time of test ordering can have enormous impacts on reducing cost, waste, and unnecessary testing.

Bozoudis, V., et al. (2022). **Action plan for the mitigation of greenhouse gas emissions in the hospital-based health care of the Hellenic Army.** *Environmental monitoring and assessment 194*(3): 221. Request article

The environmental impact of the delivery of medical and hospital care, which generates its own greenhouse gas emissions, needs to be examined and analyzed in detail in order to design and implement effective mitigation actions and measures. A portfolio of energy saving and emission reduction actions is proposed and mapped according to their abatement cost and greenhouse gas (GHG) reduction potential. Furthermore, several key performance indicators (KPI) are proposed as simple and easily monitored metrics of the hospital's performance towards its sustainable low carbon objectives.

Carino, S., et al. (2023). **The role of policy in supporting environmentally sustainable foodservice in healthcare: lessons from exemplar hospitals.** *Frontiers in nutrition 10*: 1122911. Full-text

There is little known about the role of policy in supporting environmentally sustainable foodservices. The creation, content and methods of communication and creating accountability made internal organizational policy successful. Public policy was most effective when it was mandatory, had clearly defined targets and funding to assist implementation. Policy from within the

healthcare organization is an important mechanism for enabling hospitals to deliver and maintain environmentally sustainable foodservice.

LIFE CYCLE ASSESSMENT POLICY

Adhikari, B., et al. (2023). **Carbon footprint of Nepalese healthcare system: A study of Dhulikhel Hospital.** *F1000Research 12*: 1366. Full-text

Though direct greenhouse gas emissions cannot be observed in health care sectors, there can exist indirect emissions contributing to global climate change. This study addresses the concept of the carbon footprint and its significance in understanding the environmental impact of human activities, with a specific emphasis on the healthcare sector through gate-to-gate (GtoG) life cycle assessment. Transportation, energy consumption, and solid waste generated by hospitals are the primary sources of carbon emissions. Healthcare professionals and policymakers can take action to reduce the sector's carbon footprint by implementing best practices and encouraging sustainable behavior. This study can be taken as foundation for further exploration of indirect emissions from healthcare sectors not only in Nepal but also in south Asian scenario.

Anastasopoulos, N. A. and V. Papalois (2022). **How can we address the ever-pressing need to 'green up' surgical practice in the National Health Service?** *Journal of the Royal Society of Medicine 115*(6): 213-219. Request article

Clinical practice has inadvertently changed after the COVID-19 pandemic and currently the need to provide sustainable surgical services is more pressing than ever. The National Health Service has committed to a long-term efficient plan to reduce carbon footprint but there is no detailed plan for surgical practice, the domain that contributes the most to hospital-derived pollution. A series of consecutive steps and measures ought to be taken, starting from a hybrid approach quantifying surgically attributed carbon footprint. Then, a variety of suggested measures can be widely discussed and accordingly applied on a wider or more local level. Also, the necessity of green research and reinvestment of materials and resources is highlighted. A change of philosophy from a cradle-to-grave approach to a repurposing approach is suggested. We are confident that a new era is dawning in surgical practice and teamwork is the key for providing greener surgical services.

Seifert, C., et al. (2021). **Life cycle assessment as decision support tool for environmental management in hospitals: A literature review.** *Health care management review 46*(1): 12-24. Full-text

Life cycle assessment (LCA) is an environmental accounting tool aimed at determining environmental impacts of products, processes, or organizational activities over the entire life cycle. Although this technique already provides decision-makers in other sectors with valuable information, its application in the health care setting has not yet been examined. LCA results can support health care managers' traditional decision-making by providing environmental information. With this additional information regarding the environmental impacts of products and processes, managers can implement organizational changes to improve their environmental performance. Furthermore, they can influence upstream and downstream activities. However, we recommend more transdisciplinary cooperation for LCA studies and to place more focus on actionable recommendations when publishing the results.

REDUCE, REUSE, RECYCLE POLICY

Lam, K., et al. (2023). **Interventions for sustainable surgery: a systematic review.** *International journal of surgery 109*(5): 1447-1458. Full-text

Several interventions across the operative pathway have been trialed to minimize this impact. Few comparisons of the environmental and financial effects of these interventions exist. A narrow repertoire of interventions to improve the environmental sustainability of surgery has been trialed. The majority focuses on reusable equipment. Emissions and cost data are limited, with

longitudinal impacts rarely investigated. Real-world appraisals will facilitate implementation, as will an understanding of how sustainability impacts surgical decision-making.

McAlister, S., et al. (2023). **Carbon emissions and hospital pathology stewardship: a retrospective cohort analysis.** *Internal medicine journal 53*(4): 584-589. Full-text

As healthcare is responsible for 7% of Australia's carbon emissions, it was recognised that a policy implemented at St George Hospital, Sydney, to reduce non-urgent pathology testing to 2 days per week and, on other days only if essential, would also result in a reduction in carbon emissions. To measure the impact of an intervention to reduce unnecessary testing on pathology collections and associated carbon emissions and pathology costs. Reduction in unnecessary hospital pathology collections was associated with both carbon emission and cost savings. Pathology stewardship warrants further study as a potentially scalable, cost-effective and incentivising pathway to lowering healthcare associated greenhouse gas emissions.

Sullivan, G. A., et al. (2023). **Operating room recycling: Opportunities to reduce carbon emissions without increases in cost.** *Journal of Pediatric Surgery 58*(11): 2187-2191. Full-text

Our aim was to generate estimates of greenhouse gas emissions avoided and cost implications following implementation of a recycling program across operating rooms at our freestanding children's hospital. Clinicians and hospital administrators should consider operating room recycling programs as they work towards improved environmental stewardship. Level of Evidence: Level VI - evidence form a single descriptive or qualitative study.

QUALITY IMPROVEMENT INITIATIVES

Sullivan, G. A., et al. (2023). **Environmental impact and cost savings of operating room quality improvement initiatives: A scoping review.** *Journal of the American College of Surgeons 236*(2): 411-423. Full-text

Operating rooms are major contributors to a hospital's carbon footprint due to the large volumes of resources consumed and waste produced. The objective of this study was to identify quality improvement initiatives that aimed to reduce the environmental impact of the operating room while decreasing costs. Quality improvement initiatives that reduce both cost and environmental impact have been successfully implemented across a variety of centers both nationally and globally. Surgeons, healthcare practitioners, and administrators interested in environmental stewardship and working toward a culture of sustainability may consider similar interventions in their institutions.

Wyssusek, K., et al. (2022). **Greenhouse gas reduction in anaesthesia practice: A departmental environmental strategy.** *BMJ Open Quality 11*(3): e001867. Full-text

Sustainability interventions were implemented at the Royal Brisbane and Women's Hospital (RBWH) following identification of inhaled anaesthetic gases as a target for reducing medical carbon emissions. This quality improvement study assessed and evaluated the impact of sustainability interventions on the environmental and financial cost of inhaled anaesthetic gas use in order to guide future initiatives and research in reducing carbon emissions from healthcare practice. Substantial reductions in carbon emissions from volatile anaesthetics demonstrate the significant degree to which environmentally sustainable practices have been implemented. Applying desflurane-sparing practice can heavily limit anaesthetic drug expenditure and contribution to environmental waste. This is important given the global health sector's challenge to optimise patient outcomes in the face of global climate change crisis.

Glenski, T. A. and L. Levine (2020). **The implementation of low-flow anesthesia at a tertiary pediatric center: A quality improvement initiative.** *Paediatric Anaesthesia 30*(10): 1139-1145. Full-text

Anesthesia machines have evolved over the years to excel in delivering low-flow anesthesia (<1 L fresh gas flow) in a closed-circuit system, with the obvious benefits being decreased costs and

reduced emissions of greenhouse gases. At a pediatric hospital that provides over 25 000 anesthetics a year, a quality improvement project was initiated with the aim of decreasing the amount of sevoflurane used per anesthetic by 20% over the course of a year. A QI initiative aimed at changing the practice of delivering at least 2L fresh gas flow to delivering a low-flow anesthetic has been a successful value-added enhancement to our pediatric anesthesia practice.

Prada, M., et al. (2020). **New solutions to reduce greenhouse gas emissions through energy efficiency of buildings of special importance - Hospitals.** *Science of the Total Environment 718*: 137446. Full-text

Saving energy has an important role in the concerted actions to protect the planet from the effects of global warming, particularly the energy consumed by the existing buildings (with various energy consuming functions, inefficient energy), by implementing environmentally friendly solutions. The present paper emphasizes the need to include elements to stimulate the renovation of the existing buildings and of their energy efficiency in the national strategies, these constructions being important energy consumers. The research started with two case studies (2 hospital buildings) dating from 70-80s, with the aim to be energy efficient and modern constructions in Eastern Europe. In the presented best practice model, significant reductions in greenhouse gas emissions, primary energy consumption along with the use of renewable energy have been achieved by transforming some energy-inefficient buildings into intelligent buildings. Thus, the authors propose a new stake: "70-70-70" for similar buildings.

APPENDIX

SEARCH METHODOLOGY

A systematic search was conducted for literature. The results were screened by librarians using Covidence.

SEARCH LIMITS

- English-language
- Published within the last 5 years

DATABASES SEARCHED

- Medline – index of peer reviewed articles across health sciences and medicine.
- Embase – index of biomed and pharmacological peer reviewed journal articles.
- Emcare – index of nursing, allied health, critical-care medicine and more.
- Cochrane Library – collection of databases containing high-quality independent evidence.
- Grey literature – Google, Google Scholar, Trip database, Duckduckgo.

SEARCH TERMS

Concept	MeSH headings	Keywords
Healthcare	Health Facilities or Health Services	health service or care service or care facility or support service or support facility or health facility or hospital
Environmental Policy	Conservation of Natural Resources or Carbon Dioxide or Environment or Environmental Pollution or Environmental Monitoring or Carbon Footprint or Environmental Policy	environment or sustainability or carbon footprint or environmental impact and Policy or governance or goal
Implementation	Implementation Science	Implementation or initiative or program

MEDLINE SEARCH STRATEGY

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1 (health service* or care service* or care facilit* or support service* or support facilit* or health facilit* or hospital*).ti,ab. 1853329
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3 1 or 2 4128342
4 "Conservation of Natural Resources"/ or Carbon Dioxide/ or Environment/ or Environmental Pollution/ or Environmental Monitoring/ or Carbon Footprint/ or Environmental Policy/ 377605
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6 4 or 5 379719
7 Implementation Science/ 1372
8 (implement* or initiative* or program*).ti,ab. 734494
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