

Digital Health and Sustainability: Opportunities and Challenges

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Background & Objectives

- The World Health Organization has deemed climate change the “biggest health threat of the 21st century.”¹
- Climate change will have devastating impacts on the health of individuals, felt most by equity-deserving groups, some of which are already being experienced in Toronto.^{2,3}
- The health care sector in Canada accounts for approximately 4.6% of the country’s total emissions, with one of the highest emissions per capita of any health care system in the world.^{2,4}
- By emitting harmful greenhouse gas emissions and producing large quantities of waste, the health care sector contributes to the climate-related harms experienced by patients.⁵
- Digital health technologies have the potential to catalyze transformative change in the health system.⁶
- This potential has been especially evident during the COVID-19 pandemic and with the rise of artificial intelligence.⁶
- The goal of this Executive Master of Health Informatics Project was to explore the opportunities for digital health to advance climate action and climate resiliency in health care, as well as explore the potential climate harms related to digital health technologies.

Approach

- A literature search was conducted related to digital health and environmental sustainability.
- Information gathering meetings were held with a variety of health care interest holders including hospital facilities and environmental services leaders, digital health leaders, clinical leaders, and sustainability leaders.
- Findings were synthesized into five opportunities for leveraging digital health to improve the environmental sustainability of health care, and four areas of challenges related to the negative environmental impacts of digital health.

Opportunities

1. Data for climate mitigation and adaptation

- Data for climate mitigation**
 - Data related to environmental impacts of health care can be used to help drive decision-making and reduce climate impacts of health care.⁷
 - In a hospital setting, climate-related data spans many areas of the organization, there are many potential reporting structures, and there are some sustainability-related reports that are required. (Table 1)
 - Interest holders stressed the importance of strong governance structures in health care settings to strengthen data-driven decision-making.

Opportunities

Data Sources	Reporting Structures	Required Reporting
Facilities (energy, water)	Key Performance Indicators in existing committee structures	Broader Public Sector Reporting
Environmental services (waste, recycling)		
Clinical programs (medications, tests)	Quality Improvement Plan	Annual Waste Audits & Waste Reduction Plans
Information services (eWaste, virtual care)	Organizational Scorecard	
Human resources (staff commuting, spaces)	External benchmarking tools (e.g. Green Hospital Scorecard)	Energy Conservation & Demand Management Plan

Table 1. Hospital data sources, reporting structures, and required reporting

a) Data for climate adaptation

- Data is also important in efforts to mitigate the impact of climate change on health systems.⁸
- Health Vulnerability and Adaptation Assessments require data related to at-risk populations, rates of climate-related health outcomes, and climate vulnerabilities over time.⁸

2. Influencing clinician behavior

- Electronic health records could be harnessed to support clinician adherence to best practices, provide information on climate impacts at the point of care, and nudge clinicians towards more environmentally-friendly practice.⁷

3. Improving interoperability

- Improving system interoperability can reduce duplication of tests, which has environmental co-benefits.⁹
- Electronic data transfer can reduce reliance on paper and resultant paper waste.¹⁰

4. Improving health care access, self-management

- Virtual care can improve health care access for rural and remote communities and can reduce travel-related greenhouse gas emissions.¹¹
- Digital health programs aiming to empower patients to better self-manage their conditions may reduce health care consumption and associated emissions.¹²
- Digital tools that support aging-in-place may reduce reliance on hospital care which is more carbon-intensive than home or long-term care.¹³

Opportunities

5. Mindful consumption of health information technology

- Authors of the i-CLIMATE framework call for the creation of a circular economy in health information technology (IT), with a focus on reducing waste and reusing, refurbishing, repurposing, and recycling health IT.⁷

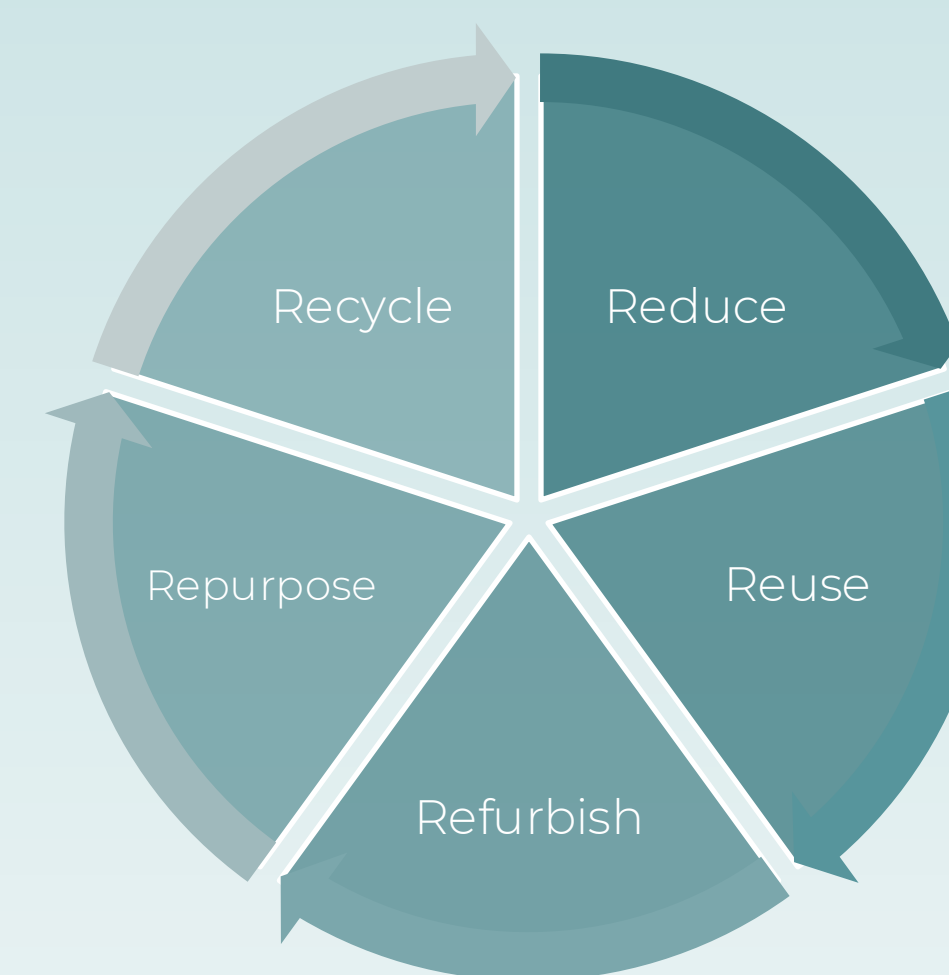


Figure 1. The 5 R's of Waste Reduction

Challenges

1. Emissions related to health data

- The energy required to process and store massive amounts of health data leads to significant greenhouse gas emissions.⁶
- The data supply chain also contributes carbon emissions, and there may be impacts on the material environment where data storage centers are constructed.⁶

2. Resource extraction

- Health IT relies on mineral mining and material production which may contribute to negative environmental impacts.¹⁴

3. E-waste

- The proliferation of health IT has led to soaring volumes of e-Waste globally, the improper disposal of which has been linked to adverse health outcomes in humans.¹⁵

4. Digital Divide

- Digital health technology may not be suitable for all populations, and its rapid expansion may risk worsening existing health inequities.¹⁶

Conclusions

- There are many ways that digital health may be harnessed to improve the environmental sustainability of the health care system.
- These potential benefits need to be weighed against the potential climate-related risks posed by the expansion of digital health technologies, including the energy implications, resource extraction, production of eWaste, and the potential for broadening existing health inequities.

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