

GREENING THE WARDS

A guidebook for promoting
environmental stewardship in
general internal medicine



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PURPOSE AND SCOPE

Climate change is the greatest threat to global health in the 21st century and is brought on by human activities and the burning of fossil fuels. The health care sector is a significant contributor to the climate crisis; Canadian health care is responsible for about 5% of national carbon emissions, which is greater than the combined carbon footprint of our shipping and aviation industries. It is clear that a healthy future depends on the urgent decarbonization of society and healthcare has the opportunity to lead by example and fulfill our mandate to do no harm. [1, 2]

As a specialty, the general internal medicine service takes care of medically complex, multi-comorbid patients who are especially vulnerable to the growing health impacts of climate change. We are also a service with the largest inpatient presence in the hospital, which makes general internal medicine a specialty that is well-positioned to address the outsized carbon footprint of inpatient medical care. The purpose of this guidebook is to provide evidence-based suggestions for climate-conscious general internal medicine practice. [3] We hope that this guidebook will serve as a source of inspiration to embed environmental sustainability into your clinic, ward, and department.



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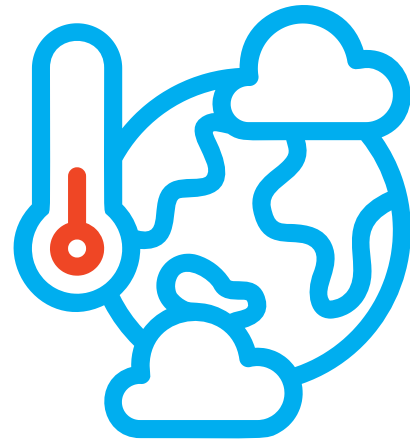
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HEALTH CARE AND THE CLIMATE CRISIS



WHY IS THIS IMPORTANT?

The global pandemic has taught us that we can focus the attention of the health care system on a clear purpose when there is a looming threat. Climate action is required from all sectors of the economy including health care. This effort is crucial in order to achieve the net-zero carbon emissions goal by 2050, which was established by the Canadian government. In addition, building climate resilience among health care institutions and their supply chains is urgently needed as they are already being impacted by a changing climate.

Canada has already committed to delivering low-carbon health systems at the 2021 UN Climate Change Conference (COP26). Accordingly, the Canadian Medical Association (CMA) has advocated for adopting a net-zero health care system, as Canada is currently one of the worst per-capita health care polluters in the world. It is clear that health care should lead by example to support the decarbonization of all societal sectors.

Physicians play a pivotal role in the interdisciplinary care team, collaborating with nurses, pharmacists, dieticians, physiotherapists, social workers, and more to deliver comprehensive patient care. This makes them key influencers who can advocate for and implement sustainable practices across wards, departments, and hospitals. By fostering a culture of sustainability that extends beyond individual patient care to broader health care infrastructure, physicians can act as essential drivers of lasting change. [1, 2]

While long-term improvements will undoubtedly require large-scale solutions, meaningful change starts with individual health care providers. By adopting sustainable practices, physicians can contribute to a culture that prioritizes environmentally conscious clinical decision-making. This illustrates how the individual actions of a physician can initiate a domino effect that leads to significant downstream changes in the health care system. [4, 5, 6]

**HEALTH CARE NEEDS TO ACKNOWLEDGE
THE NEEDS OF PEOPLE **AND** THE PLANET**

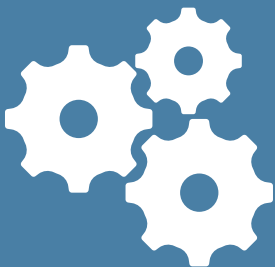
REWARDS FOR ADOPTING SUSTAINABLE PRACTICES



SUSTAINABLE PRACTICE ALIGNS WITH GOOD CLINICAL PRACTICE THAT AVOIDS UNNECESSARY TESTING AND INTERVENTIONS AND PROMOTES HIGH-VALUE PATIENT CARE



SUSTAINABLE PRACTICE CAN REDUCE COSTS OF CARE AND STRAINS ON HEALTH CARE RESOURCES, LEAVING MORE RESOURCES TO BE ALLOCATED TO PATIENT CARE

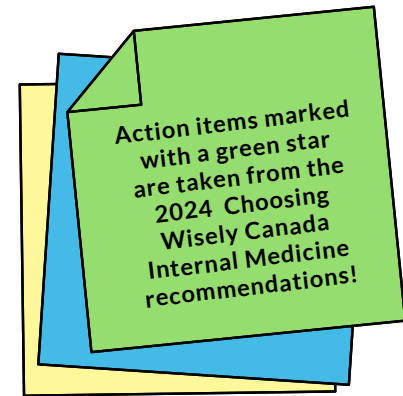


SUSTAINABLE PRACTICES REDUCE THE CARBON FOOTPRINT OF HEALTH CARE WHICH IMPROVES PATIENT HEALTH IN A CLIMATE CRISIS

ACTION ITEMS

LEADERSHIP

- ❑ Appoint a **multidisciplinary team** of “Green Leaders” to oversee and guide the implementation of departmental sustainability efforts and hold regular department planetary health rounds
- ❑ Implement a **standardized method for tracking** the progress of green initiatives and conduct frequent audits so that areas of improvement can more easily be identified [1]



The Canadian Coalition for Green Health Care and Health Standards Organization (HSO) are developing a **new environmental benchmarking tool** used to track environmental progress and conduct departmental audits.



EDUCATION

- ❑ Incorporate **teaching related to sustainability** (e.g. deprescribing, Choosing Wisely) into grand rounds, journal clubs, or other curricula. Improve physical examination and point of care ultrasound to reduce imaging needs. [1, 2]
- ❑ In conjunction with departmental audits, consider conducting **QI projects** to examine ways in which existing practices can be made more sustainable [1]
- ❑ Ensure that all team members are made aware of the **environmental costs** associated with common tests and treatments [6, 7]

SUPPLY CHAIN

- ❑ Choose the **most appropriate bag or vial size** for medications and fluids to minimize waste from unused portions [3]
- ❑ Consider purchasing **reusable personal protective equipment**, including hospital gowns [4, 5]
- ✦❑ Avoid using **non-sterile disposable gloves** when hand hygiene is sufficient

Gloves may not be needed for patients without universal contact precautions and when there is no potential for touching body fluids and visibly soiled items.

- ❑ Reduce reliance on **printed handouts**, such as patient lists or ECG tracings and opt for electronic alternatives [1]
- ❑ Keep track of **product expiry dates** and ensure that products which are set to expire sooner are used first [1]
- ❑ Minimize the amount of **unnecessary supplies** brought into the patient room if they will require disposal after patient transfer or discharge, and limit the use of disposable trays by consolidating patient care supplies into fewer items [2]
- ❑ Ensure that different classes of **medical waste** are disposed of correctly → for example, non-contaminated waste that is thrown into the biohazardous bin will be needlessly incinerated, thus contributing to significant carbon emissions [3]



DRUGS AND DEVICES

SUSTAINABLE PRESCRIBING

- ❑ Review **patient medications** at every phase of care (i.e. admission, discharge, transfer) and ensure that unnecessary medications are deprescribed with a focus on sedative hypnotics, proton pump inhibitors [1]
 - ✦❑ Choose **oral medications over IV or subcutaneous alternatives** if both would otherwise provide the same clinical benefit and are equally preferable to the patient, with special emphasis on antibiotics and DVT prophylaxis [1]
- Utilize validated DVT risk scores (e.g. **PADUA, IMPROVE**) to determine the need for DVT prophylaxis and opt for oral options for DVT/PE treatment over IV or subcutaneous options such as heparin or LMWH [1]

More information on
deprescribing can
be found on the
[deprescribing.org](https://www.deprescribing.org)
website

- ✦❑ Avoid prescribing **metered-dose inhalers (MDIs)** if more sustainable options (e.g. dry-powder inhalers) are available → patients without documented obstructive airway disease with pulmonary function testing should not be chronically prescribed inhalers [1]
- ❑ Limit the use of **antipsychotic drugs** for symptom management of delirium [1]

INVESTIGATIONS AND INTERVENTIONS

- ❑ Remove **invasive lines** (e.g. IVs, urinary catheters) as soon as it is safe to do so [2]
- ✦❑ Avoid ordering **investigations or interventions** before exploring patients' values/preferences and discussing goals of care [1, 5, 6]
- ❑ Reorganize and curate **procedure kits** (e.g. thoracentesis kits) to exclude scarcely-used items to reduce procedural waste [3, 7]
- ✦❑ Avoid ordering **routine investigations** and daily laboratories (e.g. CXR, CBC, CHEM7) if they are not expected to change management [3, 8, 9]
- ❑ Avoid ordering **environmentally costly investigations** if more sustainable options are appropriate → for instance, abdominal ultrasound is less carbon-intensive than CT or MRI [1, 5, 6, 10]



Working towards decreasing length of hospital stay is mutually beneficial for the patient and the environment [6].

BUILDINGS AND ENERGY

- ❑ Reduce **energy** associated with lighting by switching to LED bulbs, motion-activated lights, or greater use of natural light sources [2, 7, 11]
- ❑ Switch off **devices** such as computers or printers when not in use to minimize unnecessary power drainage [1, 11]

FOOD & TRANSPORTATION

- ❑ Consider **plant-forward menus** for in-patients and enteral nutrition diet regimens [7]
- ✦❑ Avoid booking **in-person follow-up visits** if online alternatives are feasible and preferred by the patient
- ❑ Consider **walking, biking, or carpooling** to and from the hospital [2, 12]
- ❑ Consolidate discussions of **lab results** or other patient meetings into fewer appointments to minimize the need for multiple in-person visits [7]



THE CARBON COSTS OF HEALTH CARE

DRIVING A GAS CAR EMITS 2.3 KILOGRAMS OF CO₂ EQUIVALENTS (CO₂e) PER LITER OF GASOLINE [11]

A ONE-WAY FLIGHT FROM MONTREAL TO VANCOUVER EMITS 573 KILOGRAMS OF CO₂ EMISSIONS [12]

GHG CONTRIBUTOR	CARBON FOOTPRINT	COUNTRY†
pRBC Transfusion	7.56 KG CO ₂ e	UK ⁸
CBC + CHEM7	0.332 KG CO ₂ e	Canada ⁹
Imaging	0.53 KG CO ₂ e (US) 0.76 KG CO ₂ e (CXR) 9.2 KG CO ₂ e (CT) 17.5 KG CO ₂ e (MRI)	Australia ¹⁰
Hospital LOS‡	30.3 KG CO ₂ e/day on ward (BC) 23 KG CO ₂ e/day on ward (QC)	Canada ⁵

pRBC: Packed Red Blood Cells; CBC: Complete Blood Count; CHEM7: Basic Metabolic Panel; LOS: Length of Stay; US: Ultrasound; CXR: Chest X-Ray; CT: Computed Tomography; MRI: Magnetic Resonance Imaging.

†: Carbon footprint estimates may vary based on supply chains and energy grids between hospitals and countries or jurisdictions.

‡: Includes only Scopes 1 and 2 of emissions. See the glossary for more details.

GLOSSARY

Accreditation Standards - Accreditation Canada surveys hospitals to rate them on the extent to which they meet national standards for quality and hospital operations. New Standards regarding environmental stewardship were adopted for leadership in 2021 and for governing bodies in 2022.

CO₂e - A standard unit for quantifying carbon footprints that helps us measure the emissions of different greenhouse gases in terms of the amount of CO₂ that would create the same amount of global warming potential.

Circular Economy - A systematic approach to economic development designed to benefit business, society and the environment. It moves beyond recycling to keeping products in use, eliminating waste streams and regenerating natural systems.

Climate Adaptation - Measures which are taken to protect a community or an ecosystem from the impacts of climate change.

Climate Mitigation - Measures which are taken to decrease or prevent the emission of heat-trapping greenhouse gases into the atmosphere.

Divesting Foundation Funds - Most hospitals have millions invested in their foundations, thus, by moving money from standard portfolios to low-carbon portfolios, significant greenhouse gases are saved.

Green Hospital Scorecard - The annual benchmarking survey of environmental performance carried out by the [Canadian Coalition for Green Health Care](#) provides both comparative and retrospective information for participants.

Greenhouse Gas (GHG) Emissions - GHGs are made up of carbon dioxide (CO₂), nitrous oxide (N₂O), methane (CH₄) and fluorinated greenhouse gases (F-GHGs).

Nature-based solutions - Implementing sustainable designs and natural features into the built environment to promote adaptation and resilience. These solutions would include natural grasses, pollinator gardens, rain gardens, trees and green roofs.

Net-zero - Achieving a balance between the greenhouse gas emissions put into the atmosphere and those taken out. CO₂ emissions make up over 80% of GHGs and can be broken down into Scope 1 direct emissions (i.e. heating and cooling), Scope 2 indirect emissions (i.e. purchased from utilities), and Scope 3 emissions generated from the operations of the company (i.e. supply chain, travel). In order to prevent the worst climate damages, global net human-caused emissions of carbon dioxide (CO₂) need to fall by about 45 percent from 2010 levels by 2030, reaching net-zero around 2050.

Scopes of emissions - Scope 1 emissions refer to direct emissions from owned or controlled sources; scope 2 emissions refer to indirect emissions from the generation of purchased energy; scope 3 emissions refer to all indirect upstream and downstream emissions.

Sustainable Prescribing - This involves optimizing medications for patients, typically resulting in less medications prescribed. Also, in some cases, prescribers can switch from one medication to another one which produces less GHGs. For example, switching inhalers.

Sustainable Procurement - Building environmental sustainability factors into the rating system for the acquisition through purchase or lease of real property, goods or other products, works or services.

ORGANIZATIONS WITH KEY RESOURCES

LEADERSHIP

- Leadership strategy - https://greenhealthcare.ca/wp-content/uploads/2024/11/EN_Streamline-your-journey-guidebook_2024.pdf
- Divesting from fossil fuels, investing in green energy - <https://greenhealthcare.ca/phase-out-fossil-fuel-investments/>

EDUCATION

- Choosing Wisely Canada - <https://choosingwiselycanada.org/recommendations/>
- Calculating your footprint - <https://healthcareclimateaction.org/checkup>

SUPPLY CHAIN

- Procurement contracts - <https://sustainabilityadvantage.com/sp/case/>
- Reusable gowns & waste sorting - <https://cascadescanada.ca/resources/sustainable-perioperative-care-playbook/>
- Reusable items & OR pick lists - <https://sustainablehealthcare.org.uk/what-we-do/green-surgery-challenge>
- PVC reclaiming - <https://www.vinylinstituteofcanada.com/medical-pvc-recycling-pilot-program-pvc-123/>

BUILDINGS AND ENERGY

- OR ventilation setbacks - <https://www.enerlife.com/wp-content/uploads/2017/06/Enerlife-OR-Ventilation-Best-Practices-Guide-April-2017.pdf>
- New buildings - <https://www.cagbc.org> (see 'zero-carbon')
- Energy manager, heating systems, and LED lights - <https://practicegreenhealth.org/topics/energy/energy>

DRUGS AND DEVICES

- Deprescribing strategy - <https://www.deprescribingnetwork.ca/>
- Anesthetic gases - <https://www.peachhealthontario.com/drugs-and-devices>
- Equipment reprocessing - <https://www.stryker.com/us/en/sustainability.html>

FOOD

- Plant forward diets - <https://www.nourishleadership.ca/sustainable-menus>
- Composting - <https://greenhealthcare.ca/wp-content/uploads/2017/07/CCGHC-Organic-Waste-Case-Study-June17-2013-FINAL.pdf>

TRANSPORT

- Active Transport - <https://cape.ca/resource/active-travel-toolkit-en/>
- EV chargers - <https://chasecanada.org/wp-content/uploads/2021/03/ZEV-BACKGROUND-ENG.pdf>

NATURAL SYSTEMS

- Green space - <https://bcgreencare.ca/wp-content/uploads/2021/10/Green-Design-for-Climate-Resilience-and-Well-being.pdf>

RESILIENCY

- Healthcare Facility Resiliency Toolkit - <https://greenhealthcare.ca/climate-change-resiliency-toolkit/>

MORE KEY GREEN ORGANIZATIONS

- <https://synergiesanteenvironnement.org>
- <https://nordicshc.org/>

RESOURCES

CANADIAN COALITION FOR GREEN HEALTH CARE



Preparing Canada's Health Care Buildings for Net-Zero

This project aims to accelerate the readiness of the Canadian health care workforce and leadership to undertake climate change mitigation initiatives that will reduce greenhouse gas (GHG) emissions from health care buildings such as hospitals, health centres, clinics and long-term care homes.

<https://greenhealthcare.ca/net-zero-ready/>



Circular Clinical Care: Reducing Single-Use Plastics in Health Care

This project aims to reduce single-use plastic usage within Canadian health care facilities by advising on reduction, reuse, recycling, and storage options tailored to facility needs.

<https://greenhealthcare.ca/plastics/>



Green Hospital Scorecard

GHS is the only comprehensive health care environmental performance benchmarking tool in Canada measuring energy conservation, water conservation, waste management and recycling, corporate commitment and pollution prevention.

<https://greenhealthcare.ca/ghs/>



Working Groups and Networking Hubs

CCGHC offers the opportunity to collaborate, dialogue, reflect and share with others in a variety of groups and network hubs. These include the Low Carbon Network Hub, Green Team Network Hub, Clinic Network Hub, Sustainable Prescribing Working Group, Sustainable Food Services Committee and the Sustainable Procurement Working Group.

<https://greenhealthcare.ca/groups-and-hubs/>



Environmental Stewardship Guidebooks

Environmental stewardship implementation guides for boards, executive leaders, and clinical staff in a variety of practice contexts, including intensive care, radiotherapy, psychiatry, rheumatology and so on.

<https://greenhealthcare.ca/guidebooks/>



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This is a living document which will be revised as this field evolves. We welcome your comments and suggestions. Last updated: June 23, 2025.

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