



Connecting Climate Change and Clinical Care: Exploring Practical Options to Address a Global Crisis

Cristin Muecke
NZ Regional MOH, NSH
October 28, 2025

1

Disclosures

Member of the Advisory Board for the National Collaborating Centre for Environmental Health

Member of the Canadian Association of Physicians for the Environment (CAPE) – Nova Scotia Chapter

Mitigation:

These affiliations are disclosed in the interest of transparency. This presentation was developed independently and reviewed to ensure it is evidence-based and free of commercial bias.

2

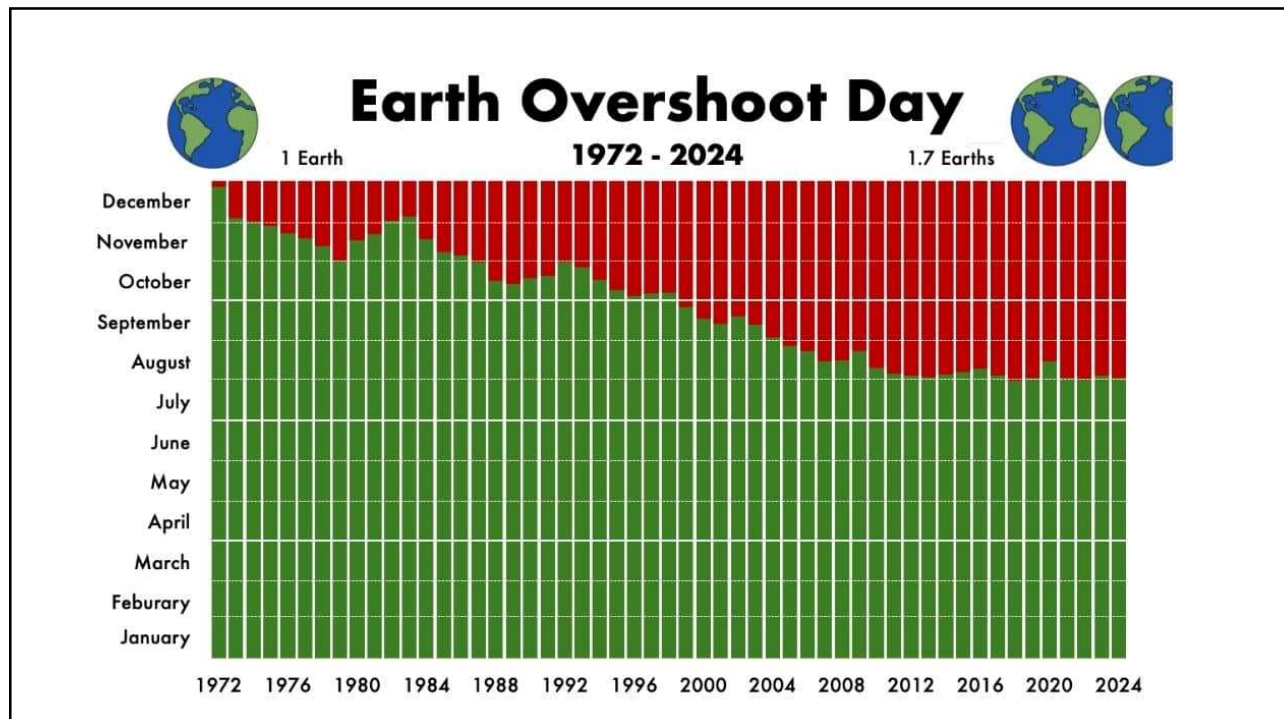
Learning Objectives

At the conclusion of this activity, participants will be able to:

- 1) Describe the direct and indirect impacts of climate change on human health and health care, both nationally and locally.
- 2) Recognize the extent and degree of impact of the Canadian health care system on the environment and its contribution to climate change.
- 3) Identify practical strategies to modify clinical practice in ways that improve patient outcomes while reducing the impact of health care on climate change.

CanMEDS Roles: Medical Expert, Scholar, Health Advocate, Professional

3



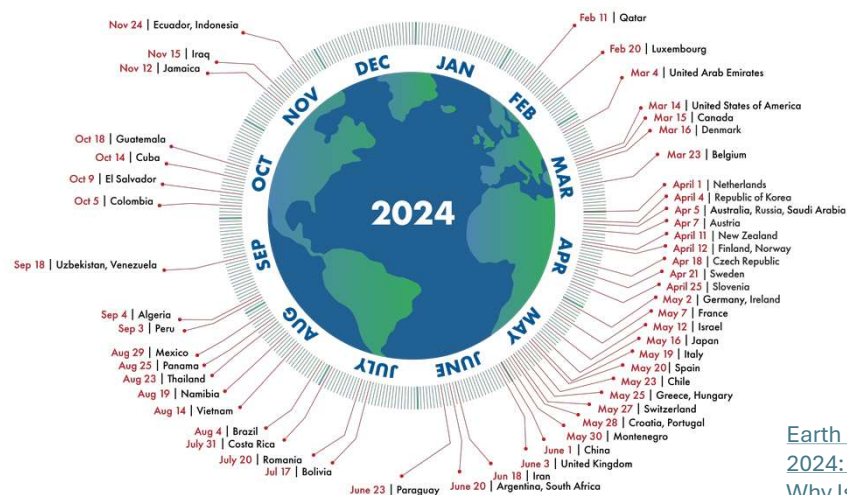
4

Guess what Canada's Earth Overshoot Day is?

5

Country Overshoot Days 2024

When would Earth Overshoot Day land if the world's population lived like...



[Earth Overshoot Day 2024: What Is It and Why Is It Important?](#)

For a full list of countries, visit overshootday.org/country-overshoot-days.



EARTH
OVERSHOOT
DAY

Source: National Footprint and Biocapacity Accounts, 2023 Edition
data.footprintnetwork.org



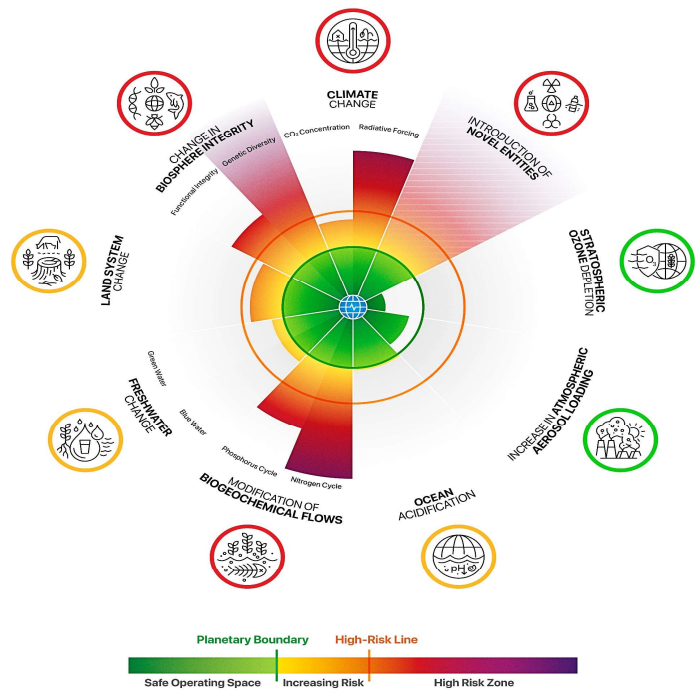
Global Footprint Network
Advancing the Science of Sustainability

6

Planetary Boundaries

- Climate change (GHG, radiative forcing)
- Biosphere integrity (biodiversity loss)
- Land system change
- Freshwater change
- Biogeochemical flows
- Ocean acidification
- Novel entities
- Atmospheric Aerosol Loading
- Ozone Depletion

[Potsdam Institute for Climate Impact Research](#)



7

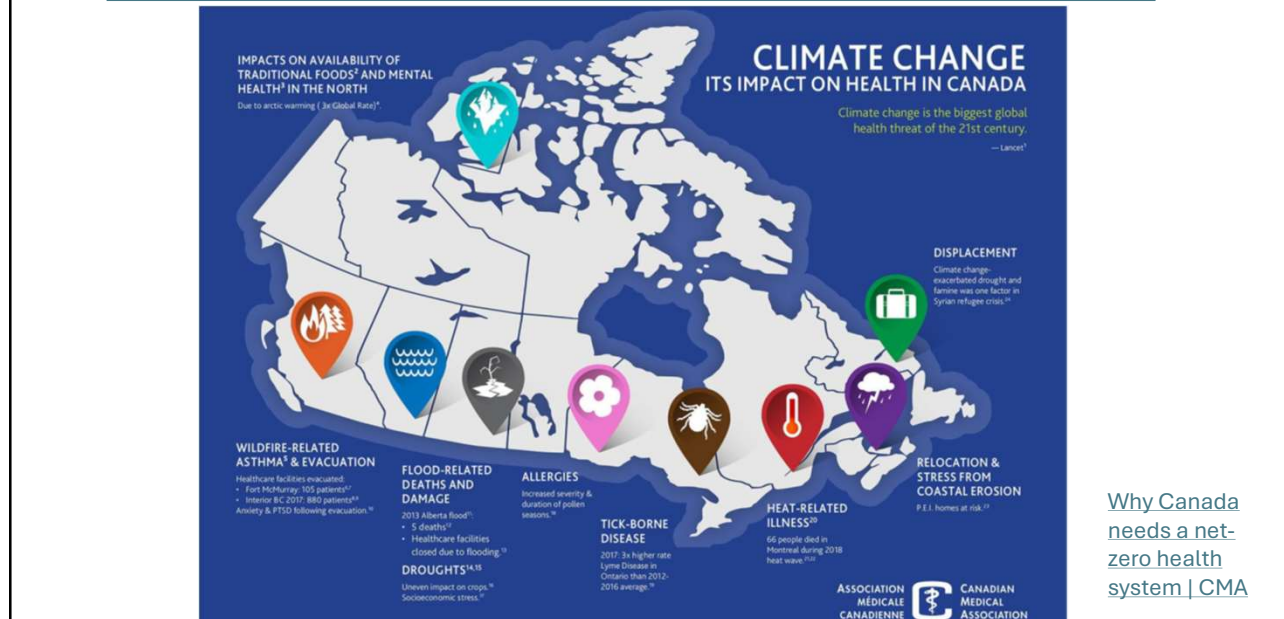
CPHO report 2022

"Climate change is the **single biggest health threat facing humanity** and the livability of the planet. In Canada and around the world, we are already feeling the health impacts and, if left unchecked, these will be considerably more serious and wider reaching" (Dr. Theresa Tam, CPHO).



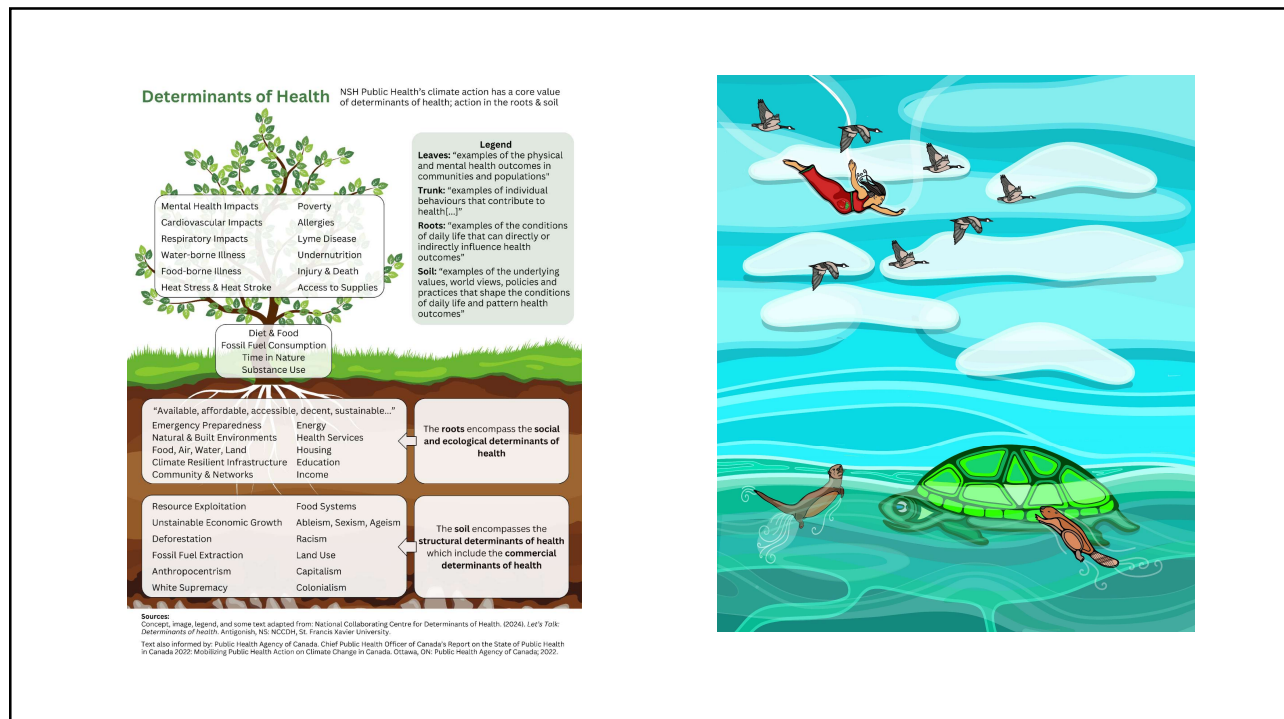
8

CMA: Canadian action on climate and health



Why Canada needs a net-zero health system | CMA

9



10

NS Climate change risk

*Reports on high emissions scenario

Top risks over time:

- Temperatures will continue to rise
- We will have less snow and more intense rain
- Storms will be more frequent and intense
- The sea level will continue to rise
- Ocean temperatures, oxygen, and acidity levels will change

[Climate Risk in Nova Scotia](#) | [Climate Change Nova Scotia](#)

2030s: Flooding poses the top concern.
2050s: Warmer temperatures make wildfires the biggest threat.
2080s: Extreme temperatures and their potential to harm food production, infrastructure, human health, and ecosystems.



11

Climate Change Impacts on the Health of Nova Scotians



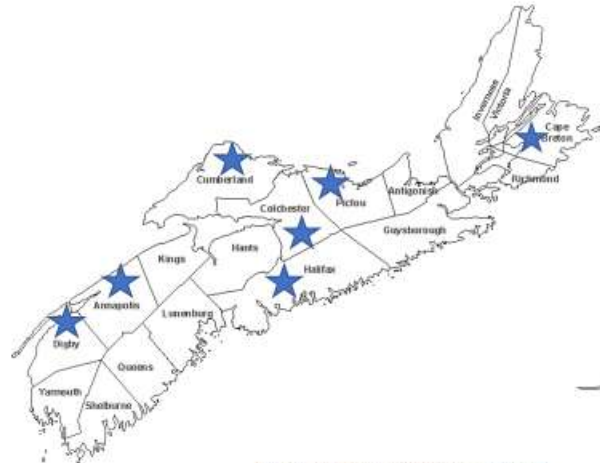
Modified from Public Health Agency of Canada - Chief Public Health Officer of Canada's Report on the State of Public Health in Canada 2022: Mobilizing Public Health on Climate Change in Canada, Ottawa



12

Results

- Inequitable impacts
 - Systemic inequities profoundly affect the well-being of African Nova Scotians, Mi'kmaq, racialized peoples, immigrants, individuals living on low incomes, individuals living with disabilities, older adults, youth, 2SLGBTQI+, and women.
 - Assessment explored statistics on climate vulnerability for groups facing inequities; however, there's a lack of data for marginalized and racialized groups in Nova Scotia.
- Geographical differences/areas most at risk
 - Annapolis, Cape Breton, Colchester, Cumberland, Digby, **Halifax**, and Pictou have highest need to adapt to reduce risks and take advantage of opportunities



93f1768f36ba1a38482690a4c482043.pdf (751x599)
[atnimg.com]

13

Learning Objectives

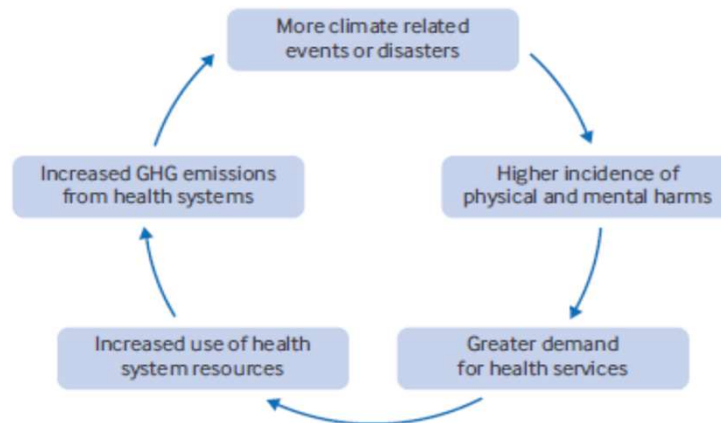
At the conclusion of this activity, participants will be able to:

- 1) Describe the direct and indirect impacts of climate change on human health and health care, both nationally and locally.
- 2) Recognize the extent and degree of impact of the Canadian health care system on the environment and its contribution to climate change.
- 3) Identify practical strategies to modify clinical practice in ways that improve patient outcomes while reducing the impact of health care on climate change.

CanMEDS Roles: Medical Expert, Scholar, Health Advocate, Professional

14

Positive feedback loop reflecting current association between the healthcare system and climate change



[Strategies and tactics to reduce the impact of healthcare on climate change: systematic review](#)

15

Which do you think is the greatest cause of GHG emissions in health care?

- Building Energy
 - Pharmaceuticals
 - Equipment/Procurement
-

16

Carbon footprints in health care

HEALTH CARE CONTRIBUTES 5% OF ALL GREENHOUSE GAS (GHG) EMISSIONS IN CANADA, WHICH IS GREATER THAN THE AIRLINE INDUSTRY.

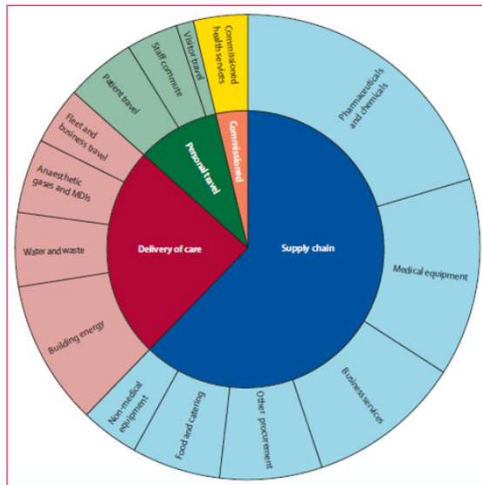
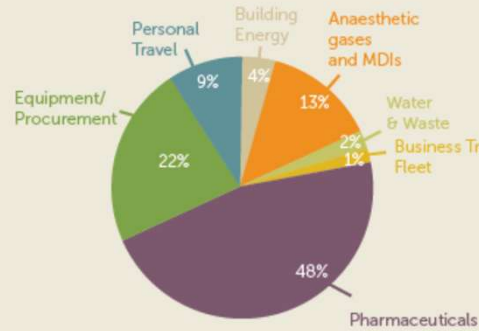


Figure 4: Contribution of different sectors to the greenhouse gas emissions of the NHS England, 2019
Data available in appendix 1 (p 39). MDI=metred dose inhaler. NHS=National Health Service.

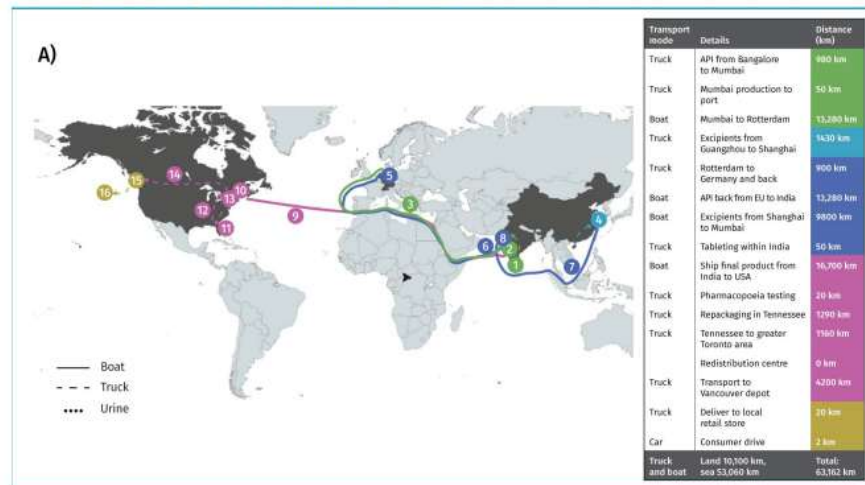
GREEN HOUSE GAS EMISSIONS FOR PRIMARY CARE



17

Journey of a pill | The College of Family Physicians of Canada

Figure 2. Global journey of clonazepam: A) Clonazepam transportation routes and distances. B) API and excipient salt extraction and production. C) Journey through North America.



18

Can where someone spends their last year of life impact climate change?

19

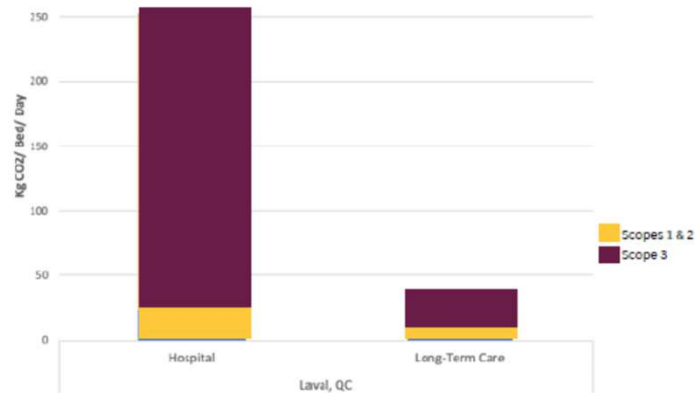


Figure 1. Carbon Footprint of Different Health Care Facility Types. One hospital bed day is estimated to be 23 kg CO₂e, while one long-term care bed day is only 3.5 kg CO₂e, and a home care bed day is less than half that at 1.3kg CO₂e. Data from [Sergeant et al., 2024](#).

20

Climate Emergency Jumpstart Kit: Enabling patients to age and die in their communities

15%

As of 2023, only 15% of Canadians accessed palliative care services in their last year of life, even though most Canadian deaths occur in hospital settings. A comfort care approach allows the patient to spend more time at home, decreases the demand on system resources, and is planet-friendly. Addressing the current practice of resource-intensive, low-value care is paramount for a sustainable health system.



Canadian hospital admissions in the last year of life emit anywhere from 130,000 to 260,000 tonnes of GHGs annually. Time spent in hospital experiencing aggressive medical care at the end of life causes unnecessary generation of GHG emissions of little or no value to patients.



To empower patients to age in place and die at home, health care leaders and providers must recognize the fundamental driver of hospitalization in Canada: end stage frailty. Frailty is a progressive and eventually terminal condition resulting from the accumulation of health deficits over time.

21

Earlier Hospital Discharge



Physiotherapy for early ambulation starting on the first day of admission. Patients who walk 600 steps between day 1 and 2 may be discharged 2 days earlier.



Protocols to remove bed-tethers like foley catheters within 2 days of insertion. Catheters left in for more than 2 days are associated with higher infection risk, mortality, and less discharge to home.



Avoid routine bloodwork. Routine phlebotomy is linked with iatrogenic anemia and can lead to patients remaining in hospital longer. Educating learners about the harms of routine bloodwork can reduce length of stay by 1 day.



Order sets supporting early transition to oral therapies. Changing from intravenous to oral medications (especially antibiotics) as soon as possible impacts the nursing workload, the patient experience, and the length of stay.

22

Preventing Initial Hospital Admissions



Primary Care Solutions: Understanding and engaging with Compassionate Communities.

Compassionate Communities normalize end-of-life experiences in the community and improve quality of life for people with a life-limiting illness. By encouraging community advocacy and practical support, they help with the physical, mental, social, and spiritual needs of those affected by death and bereavement. Primary care providers can share information on Compassionate Communities through waiting room brochures or social media to support community deaths.



Primary Care Solutions: Home visits to support frailty and end-of-life care.

Models that bring care to patients' homes improve access and move clinical decision-making upstream. In 2016, the Nurse Debbie program in British Columbia supported 469 frail patients at home, avoided 500 Emergency visits, and saved over \$3M. Home visitation from primary care providers is directly linked with a reduction in the need for emergency care and hospitalization and improves the odds of a community death.

23

Learning Objectives

At the conclusion of this activity, participants will be able to:

- 1) Describe the direct and indirect impacts of climate change on human health and health care, both nationally and locally.
- 2) Recognize the extent and degree of impact of the Canadian health care system on the environment and its contribution to climate change.
- 3) Identify practical strategies to modify clinical practice in ways that improve patient outcomes while reducing the impact of health care on climate change.

CanMEDS Roles: Medical Expert, Scholar, Health Advocate, Professional

24

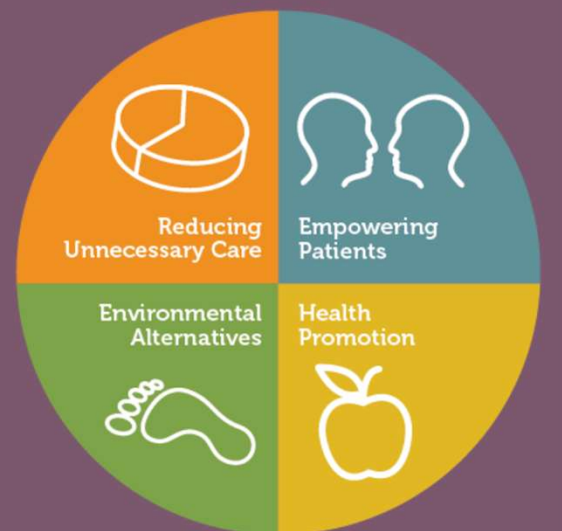
Foundational strategies for net zero health care (CMA)

- **Supporting healthy living, including addressing the determinants of health, encouraging healthy eating and active living**
- **Create a robust primary health care system to alleviate pressure on hospitals**
- **Focus on community care to ensure health promotion and disease prevention, especially in rural and remote communities**
- [Why Canada needs a net-zero health system | CMA](#)

25

Principles of Sustainable Healthcare

Planetary healthcare presents an opportunity to continue providing high quality care for patients today without compromising the health of future generations. It increases equity, reduces costs and can relieve burdens on patients and healthcare workers. This primer is designed around the four principles of environmentally sustainable healthcare: Reducing unnecessary care, empowering patients, shifting our focus towards health promotion and prevention, and choosing lower impact alternatives(8).



[Sustainable Primary Care Toolkit - CASCADES Canada](#)

26

Planetary Health care = High quality patient care

*Reducing unnecessary care

- Over investigation
- Over diagnosis/detection
- Over treatment

Empowering patients

- Self management
- Shared decision making and discussion
- Consider and address root causes

*Health Promotion

- Vaccinations
- Plant rich diets
- Social and green prescription

Environmental Alternatives

- Rethink and Reduce
- Reusables versus IPAC
- Switch from MDIs

27

Unnecessary care:
What might lead to
overuse of tests,
interventions,
medications?

28

! Drivers of Over-use

- Failure to recognize harms
- Culture of "More is Better"
- Faith in screening/early detection
- Over-reliance on tests

- Time pressure
- Habit / tradition/ training
- Perverse financial incentives
- Lack of awareness of evidence

- Anxiety (patient or provider)
- Industry influence
- Patient requests
- Defensive medicine

29

Medications

- 60-65% of the carbon footprint
- More emission intensive than making cars
- Medications impact the environment across their lifecycle, spanning production, transportation, use, and disposal. Pharmaceutical manufacturing involves the significant use of chemicals, energy, and water.
- Wastewater treatment plants may not be equipped to remove these compounds, leaving the presence of pharmaceutical residues in rivers, lakes, and groundwater.



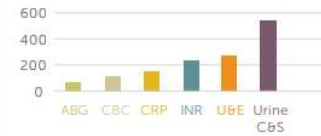
The same is true for medical tests and treatments. Talk to your doctor about what you need, and what you don't. To learn more, visit www.choosingwisely.ca

Choosing Wisely Canada

30

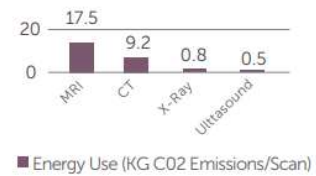
Tests and Imaging

- While many lab tests are needed, some are not and often done routinely or automatically.
- Unnecessary testing and imaging can also result in false positives and drive further testing, procedures, referrals, and treatments — all of which produce additional carbon emissions.
- Unnecessary testing can contribute to greenhouse gas emissions through equipment operation, energy use, water consumption, manufacturing, and material waste.
 - Lab testing involves single-use materials like tubes, syringes, and pipettes
 - Laboratories are energy-intensive operations due to specialized equipment, ventilation, and temperature control systems.
 - More travel to complete



Climate Change Impact of Laboratory Tests (CO2e g per test) (64,65)

Energy Use For Imaging Modalities (67)



31



Rx for Planetary Health

Activity

_____ (walk/bike/dance, etc)

_____ Minutes _____ x per week

Plant-rich diet

Meat-free meals _____ days/week

Nature

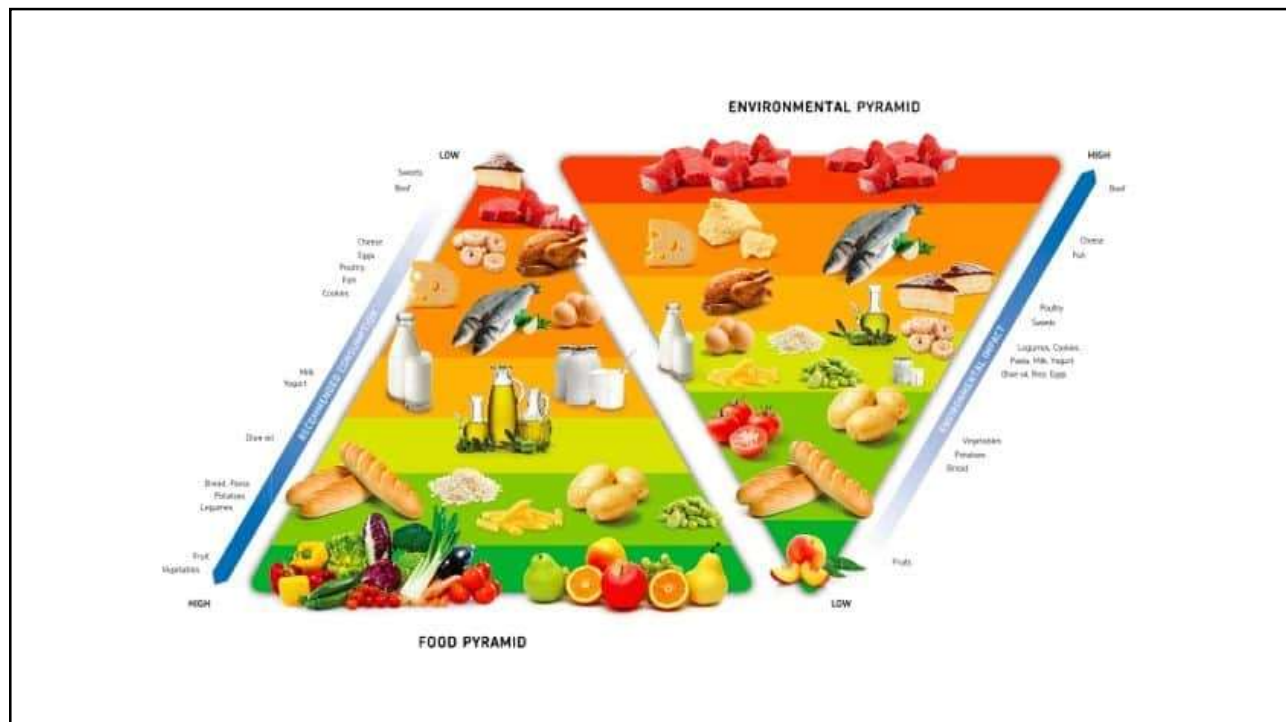
_____ Minutes _____ x per week

Social

_____ (volunteer, go out with a friend, join a club, etc)

_____ x per week

32



33

Green Office Toolkit - February 14, 2025

LEARN AND CONNECT

- Learn from toolkits, blueprints, guidebooks, webinars & podcasts
- Connect with experts
- Use time to reflect on your "stewardship philosophy"

ALLOT TIME AND CREATIVITY

- Dedicate time to communal brainstorming
- Don't be afraid to use creative approaches to address the challenges present within your facility (centre these in practical and evidence-informed thinking)

START WITH SIMPLE GOALS AND EASY WINS

- Start small
- Begin with setting achievable goals to build confidence and momentum

BRING TOGETHER SUPPORTERS

- Put out calls that attract interested individuals to participate (broad and interdisciplinary teams work best!)
- Create a "green team" to rally around common causes
- Develop a specific implementation plan

MONITOR AND DOCUMENT

- Neatly track progress quantitatively and qualitatively
- Document nuances and challenges with the implementation plan

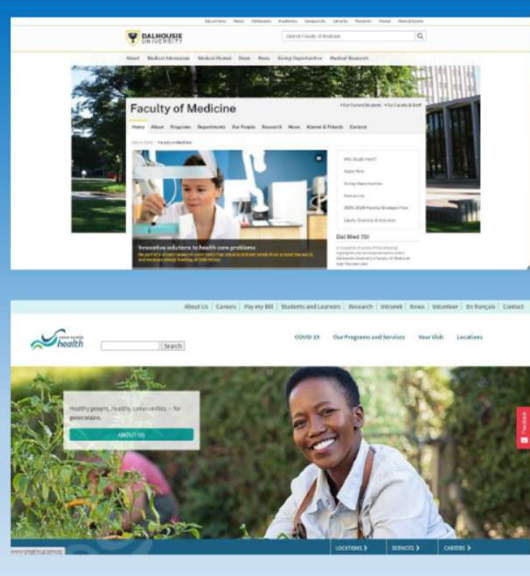
CELEBRATE SUCCESSES

- Share stories of champions in the field
- Mobilize and amplify the causes that intersect with your own interests and goals

34

Dalhousie Faculty of Medicine, IWK & Nova Scotia Health

- Dalhousie Global Health Office
- Nova Scotia Regional Committee Canadian Association of Physicians for the Environment (CAPE NS)
- Doctors NS Section on Planetary Health
- Choosing Wisely NS
- Green Teams – Dal Med Student, OR, MTU, Lab, ICU Nurses
- Central Zone Sustainability Committee
- IWK Environmental Stewardship Committee



35

Sources

- [CASCADES - Primary Care Toolkit_EN.pdf](#)
- [Green Office Toolkit - February 14, 2025](#)
- [Streamline your journey guidebook](#)
- [Mobilizing Public Health Action on Climate Change in Canada: Chief Public Health Officer's Report on the State of Public Health in Canada 2022 - Canada.ca](#)
- [Climate Risk in Nova Scotia | Climate Change Nova Scotia](#)
- [ClimateChoices_Health-report_Final_June2021.pdf](#)

36