

PLANETARY HEALTH ROUNDS - EXAMPLE CASE STUDY

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INTRODUCTION

Intention of Planetary Health Rounds

This Rounds format was created so that healthcare teams can better understand how climate change is impacting the health of patients and begin to understand the greenhouse gas (GHG) emissions associated with care. Team members from across health professions can be included in these presentations.

The Planetary Health Rounds presentations identify clinical activities that contributed to GHG emissions but may not have benefited the patient, highlighting opportunities for more sustainable healthcare practice.

These Rounds are intended to provide a starting point for discussions about providing sustainable healthcare. They should be held in addition to other initiatives that raise awareness of planetary health.

HIGH QUALITY, LOW CARBON CARE

These Planetary Health Rounds are not intended to provide or take the place of of clinical guidance. Clinical considerations and following best practices must always come first. The principles of shared decision making with patients should be followed.

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For more information about this project: <https://cascadescanada.ca/resources/planetary-health-education/>





CASE PRESENTATION

PULMONARY EMBOLISM



Case Presentation

Male patient in his 60s came to the ER after two days of lightheadedness and chest pain. A recent injury had limited physical activity. Patient was diagnosed with a pulmonary embolism with a CT scan.

MEDICAL HISTORY

Multiple broken bones, chronic back pain (treated with opioids) due to spinal injury, is Type 2 diabetic with obesity
Has had multiple knee and ankle operations

NOTE

This case study is based on the experience of the clinical team but details have been changed.

SOCIAL HISTORY

Retired, lives with spouse, occasional cigars, 3-4 drinks/week. Chronic back pain limits mobility, but remains moderately active.

MEDICATIONS

Patient was discharged with multiple medications. Although the impacts of medications on the environment are well known (1, 2), GHG emissions are not estimated here due to lack of reliable LCA data.





Climate Change Impacts on Health

RISK FACTORS FOR PULMONARY EMBOLISM INCLUDE (3):

Stasis

- Environmental considerations: Air pollution can decrease levels of physical activity (4)

Endothelial injury

- Environmental considerations: Extremes of temperature (especially heat waves) (5), air pollution (6) and nanoplastics (7) are risk factors for endothelial injury

Hypercoagulability

- Environmental considerations: Air pollution and pollutants in water vapor in the air can cause hypercoagulability, especially in the city (8, 9)

RESOURCES:

The Health of Canadians in a Changing Climate report was released in 2022 and provides an overview of climate change risks to health and the healthcare system.

- [The Health of Canadians in a Changing Climate](#), Health Canada



Healthcare's Impact on GHG Emissions

The following elements of care were included in GHG estimates:

1. Lab tests
2. Diagnostic imaging
3. Overall hospital stay

Limitations:

Published LCA studies are specific to the study context and may not be generalizable to your location. Limitations in generalizability are noted in this presentation. The values derived are a rough approximation and are not reflective of the actual emissions at your location. These rough estimates can still be used to highlight “hot spots,” but should be considered for informational purposes only.

RESOURCE:



HealthcareLCA is a global living database of healthcare-related environmental impact assessments. Created in collaboration with

CASCADES, the database is designed to support the transition to sustainable, low carbon health systems, providing an open-access, interactive, and up-to-date evidence resource for healthcare workers, sustainability researchers, and policy makers. In addition to global warming potential, the HealthcareLCA database includes data sources on a range of environmental impact categories, including eutrophication potential, ozone depletion potential, acidification potential, and others.



Healthcare's Impact on GHG Emissions

Hospital Stay:

From the literature	Length of hospital stay	Estimated GHG emissions	Limitations on generalizability
1 hospital day in acute care = 45 kg CO ₂ e (10)	9 days	405kg CO ₂ e	Differences in location: Hospital in study located in New York



Healthcare's Impact on GHG Emissions

Diagnostic imaging

From the literature	Type of imaging	Number performed	Estimated GHG emissions	Limitations on generalizability
0.8 kg CO ₂ e/scan (11)	Chest x-ray	2	1.6 kg CO ₂ e	Differences in energy consumption between study site and Rounds setting due to scanner and usage patterns (11)
9.2 kg CO ₂ e/scan (11)	CT Scan	1	9.2 kg CO ₂ e	
2.5 kg CO ₂ e/ECG from ECG patches (12)	Electrocardiogram	12	30.0 kg CO ₂ e	Differences in type of ECG patch may lead to differences in manufacturing



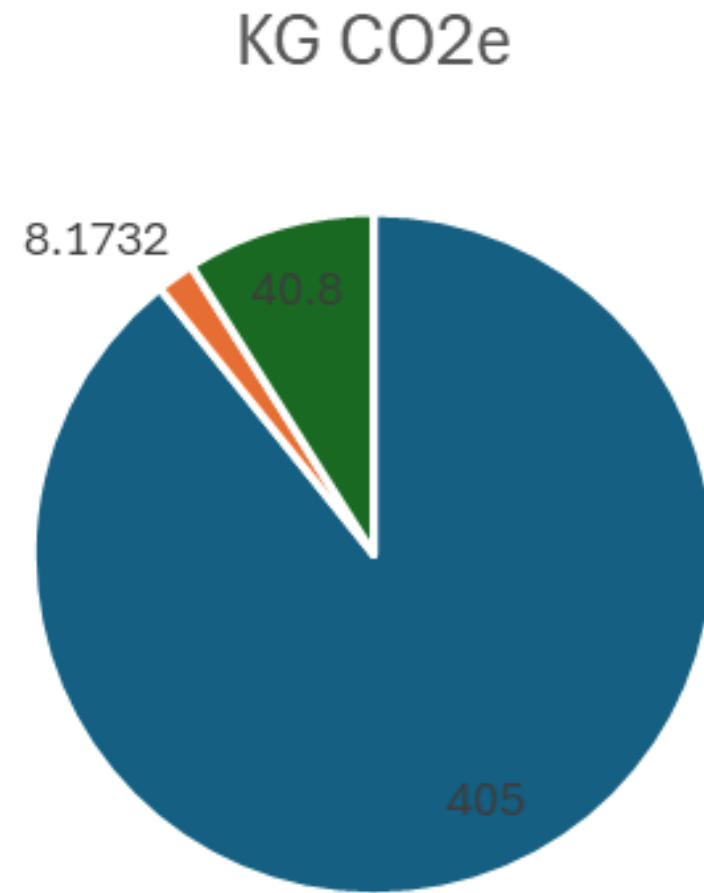
Healthcare's Impact on GHG Emissions

Laboratory tests

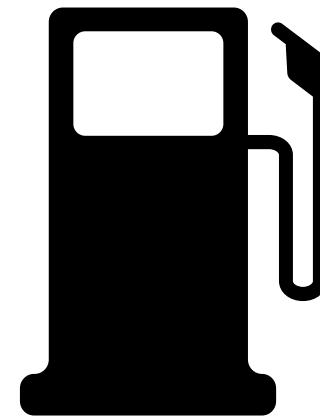
From the literature (13)	Type of test	Number performed	Estimated GHG emissions	Limitations on generalizability
Phlebotomy: 150g CO ₂ e Vial: 34g CO ₂ e/vial Test: 2.4 g CO ₂ e/test	Complete Blood Count (Hematology)	12	2236.8 g CO ₂ e =2.2368 kg CO ₂ e	Regional and site differences in energy sources, transport distances, procurement and waste management practices (13)
Phlebotomy: 150g CO ₂ e Vial: 32g CO ₂ e/vial Test: 67.8g CO ₂ e/test	Creatine/urea (Chemistry panel)	9	2248.2 g CO ₂ e =2.2482 Kg CO ₂ e	
Phlebotomy: 150g CO ₂ e Vial: 32 g CO ₂ e/vial Test: 11.5g CO ₂ e/test	Electrolytes (Chemistry panel)	9	1741.5g CO ₂ e =1.7415 kg CO ₂ e	
Phlebotomy: 150g CO ₂ e Vial: 30 g CO ₂ e/vial Test: 36.3 g CO ₂ e/ combined test	INR/PTT (Coagulation factors)	9	1946.7 g CO ₂ e =1.9467 kg CO ₂ e	



Contextualizing GHG Emissions



■ Hospital Stay ■ Blood Work ■ Diagnostic Imaging



505.57 Kg CO2e =
215 litres of
gasoline
consumed (14)

Other imaging and blood tests were performed but no LCA data was found. This could contribute to underestimation of environmental impact.

Opportunities to extrapolate based on number of procedures (e.g. monthly, annually) can help to strengthen the sustainability argument.



RESOURCES:

Translate GHG emissions into everyday terms using a tool like:

- [Natural Resources Canada's Greenhouse Gas Equivalencies Calculator](#)
- [The US-based Environmental Protection Agency's Greenhouse Gas Equivalencies Calculator](#)



DISCUSSION

OPPORTUNITIES FOR SUSTAINABLE CARE



Discuss Prevention

FACTORS TO CONSIDER DISCUSSING WITH THE PATIENT

- Smoking cessation
- Increasing physical activity
- Optimization of diabetes management
- Monitoring progression of chronic conditions
- Ensure vaccinations up to date



RESOURCES:

Health Canada's resources on healthy living



Climate Adaptation

FACTORS TO CONSIDER DISCUSSING WITH THE PATIENT

Discuss particulate matter exposure with patient and encourage checking [Air Quality Health Index](#) in their area and taking necessary precautions.

- Particulate matter exposure increases the risk of pulmonary embolism (6)
- Climate hazards like wildfires impact air quality and release particulate matter into the atmosphere





Opportunities to reduce unnecessary care

Daily Bloodwork: Consider reducing blood work frequency (as appropriate), reconsider the need to test, and explore opportunities to reduce duplication

- For more details on reconsidering daily lab orders, see [Choosing Wisely](#) (Recommendation 11)

Shorten length of stay: Most emissions are from hospital bed days. This patient may have benefited from pain management planning and monitored opioid weaning to reduce length of stay.



RESOURCES:

Choosing Wisely Canada presents numerous recommendations regarding common tests and treatments that are not supported by evidence. These recommendations have been developed by professional societies representing different clinical specialties in Canada.

- [Choosing Wisely Canada recommendations by specialty](#)
- [Choosing Wisely Canada Climate-Conscious Recommendations](#)



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