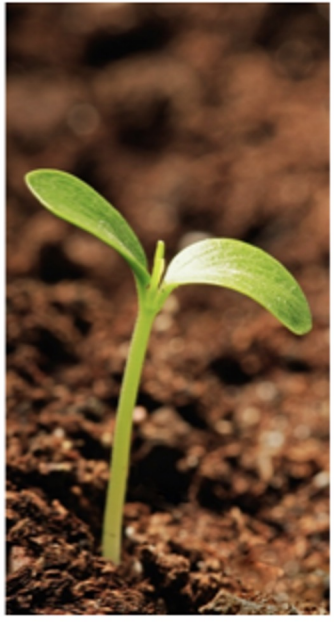
PROJECT GREEN HEALTHCARE

PROJET VERT LA SANTÉ

# Project Green Healthcare

**UofT Medicine – Choosing Wisely Team**

Chris Knox, Shamini Vijaya Kumar, Golsa Shafa
Jessica Petricca, Isabella Janušonis, Michael Lee



# Objectives of This Module

- Help physicians and medical students learn about the environmental impact of healthcare, and how we can promote environmental sustainability

- Learn about the environmental impact of healthcare, and we how we can promote environmental sustainability through the Choosing Wisely Canada family medicine recommendations

- Discover tips on how to include these recommendations into your current or future practice

# What is Choosing Wisely Canada?

- Choosing Wisely Canada is the national voice for reducing unnecessary tests and treatments in health care.[1]
- It launched on April 2, 2014, and is organized by a small team from the University of Toronto, Canadian Medical Association and St. Michael's Hospital (Toronto).
- It is part of a global movement that began in the United States in 2012, which now spans 20 countries across 5 continents.
- Choosing Wisely Canada inspires and engages health care professionals to take leadership in reducing unnecessary tests, treatments and procedures, and enables them with simple tools and resources that make it easier to choose wisely.

# Why Physicians Should “Choose Wisely”

- **Unnecessary harm**
  - Every test and treatment has risks and downstream consequences. Investigations that yield a high number of false positives or inconclusive results may result in incorrect diagnoses and/or further unnecessary testing, and over treating a patient may cause damage their health. Understanding when tests and treatment are indicated helps minimize unnecessary investigations and harm.
- **Costs and savings**
  - Our healthcare system pays for most necessary equipment and investigations, meaning that we don’t always realize how expensive testing can be. Knowing which investigations to choose and helps reduce financial strain on our healthcare system.

# Why Physicians Should “Choose Wisely”

- **Overuse of human resources**
  - Healthcare workers are important at every step of a patient’s healthcare journey, but the number of trained professionals who can do the work is limited. In order to ensure a just healthcare system, workers must be able to help those most in need. This can only happen when the right patient gets the right investigations.

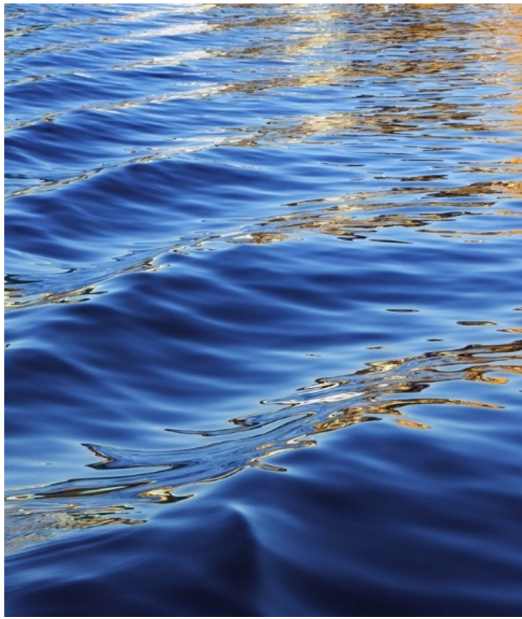
- **Environmental/ecological considerations**
  - Healthcare uses a significant sum of resources and produces an exorbitant amount of waste. Limiting investigations to what’s necessary to care for each patient is an important way of conserving resources and protecting our environment. Because environmental risks caused up to 24% of all deaths worldwide in 2016[2], we cannot care for patients without also caring for the environment.

# Section 1: Imaging Tests

# CWC Recommendation - Imaging

“Don't order screening chest X-rays and ECGs for asymptomatic or low risk outpatients.”[3]

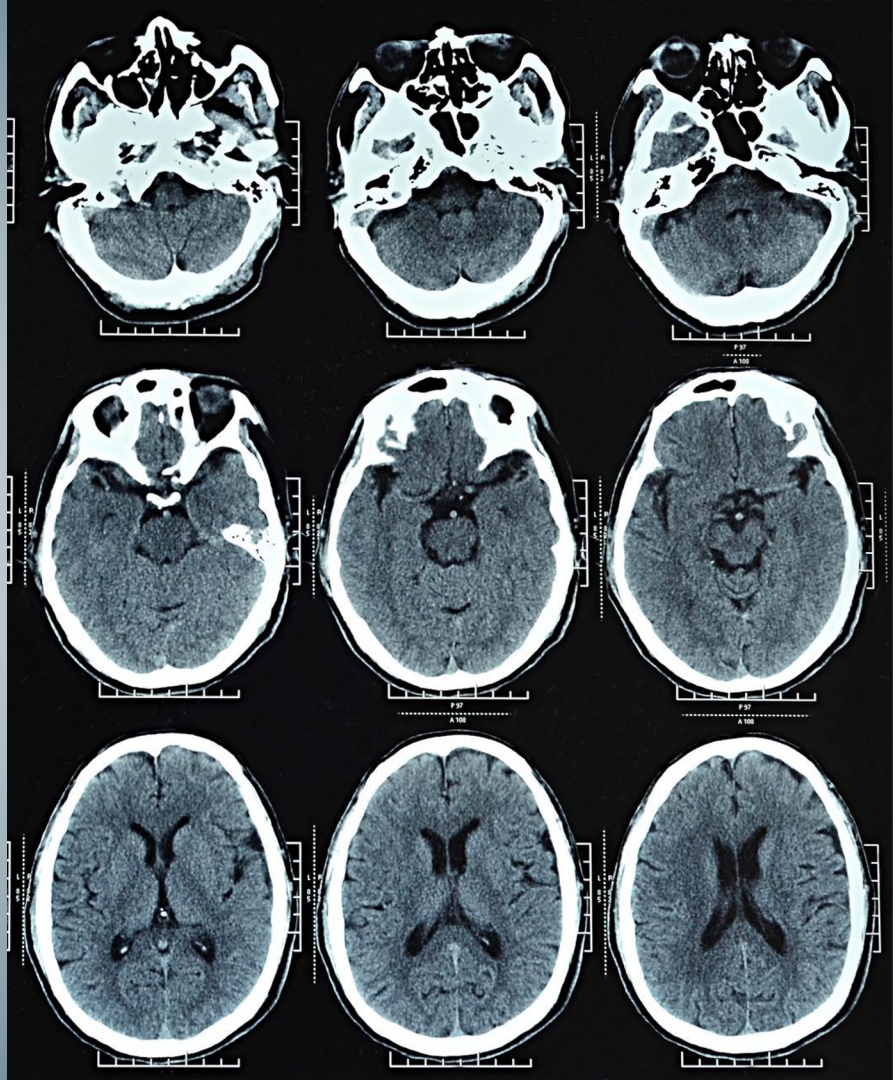
“Don't do imaging for low back pain when red flags are not present.”[3]



**Red flags** where imaging is indicated include, but are not limited to:

- severe or progressive neurological deficits
- when serious underlying conditions such as osteomyelitis are suspected.

Imaging of the lower spine before six weeks does not improve outcomes.[3]

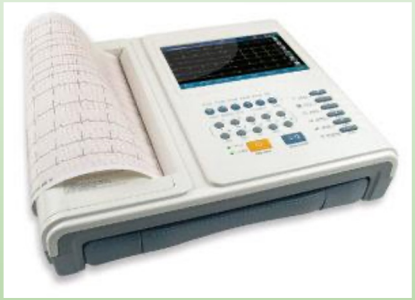


| Imaging Type | Estimated Annual Energy Consumption (kW/h) | Estimated Annual Costs @ $0.15 kW/h (CAD) |
|---|---|---|
| **MRI (Siemens model)** | 190,687 | $28,603 |
| **CT (Siemens model)** | 31,775 | $4,766 |
| **X-Ray (Toshiba model)** | 2,811 | $422 |

Approximate annual energy consumption and costs of using imaging equipment.[4] Limiting imaging to when red flags are present can save energy resources and money.

X-ray Machine

CT Scan Machine



ECG Machine

# What is the Environmental Impact?

**Unnecessary imaging** has significant environmental implications.[4] The estimated annual energy consumption of a CT scan is **31,775 kWh**, while an MRI scan is even higher at **190,687 kWh.**[5] The equivalence in CO2 emissions of ONE machine is: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| Imaging Modality | Annual CO2 Emissions in Pounds | Gallons of Gasoline Consumed | Pounds of Coal Burned | Miles in Average Passenger Vehicle |
|---|---|---|---|---|
| **CT Scan** | 50,000 | 2,500 | 25,000 | 56,500 |
| **MRI** | 300,000 | 15,000 | 150,000 | 340,000 |

# What is the Environmental Impact?

- There are estimated to be **538 Computed Tomography (CT)** units in Canada operating for median of **63 hours per week, 10 hours per day**. Even reducing the unnecessary tests of a few machines each year can have a drastic impact on reducing carbon dioxide emissions.

- In addition to energy consumption, **radioactive isotopes** like technetium-99m (Tc-99m) and Iodine-131(I-131) are used in the nuclear medicine department, **generating radioactive waste.**[6] Infrastructure issues can lead to leakage of stored waste and transportation of these materials, affecting both the hospital and the ecosystem.

# Imaging - T/F Questions

1) One should order a chest X-ray in asymptomatic patients or low risk outpatients. (T/F)

1) Don't do imaging for low back pain when red flags are not present (Red flags include, but are not limited to, severe or progressive neurological deficits or when serious underlying conditions such as osteomyelitis are suspected) (T/F)

1) An average CT scan machine uses 31,775 kWh of energy per year, which is the equivalent of burning 2500 gallons of gasoline. (T/F)

# Imaging - T/F Questions

1) One should order a chest X-ray in asymptomatic patients or low risk outpatients. (T/F) **Answer**: should NOT order (F)

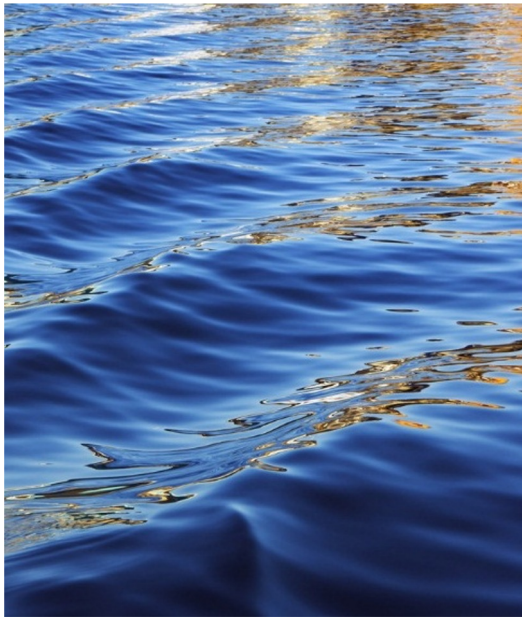
1) Don't do imaging for low back pain when red flags are not present (Red flags include, but are not limited to, severe or progressive neurological deficits or when serious underlying conditions such as osteomyelitis are suspected) (T/F) **Answer**: (T)

1) An average CT scan machine uses 31,775 kWh of energy per year, which is the equivalent of burning 2500 gallons of gasoline. (T/F) **Answer**: (T)

# Section 2: Laboratory Tests

# ECGs and Chest X-Rays — Low-Value Care

"Don't order screening chest X-rays and ECGs for asymptomatic or low risk outpatients."[3]



## Screening for Coronary Artery Disease

Many low-risk patients receive ECGs or chest X-rays following their annual health exams (AHEs) while screening for coronary artery disease. These tests may yield either **false positives or inconclusive results** that lead to a propagation of **unnecessary downstream cardiac tests** being ordered[7].

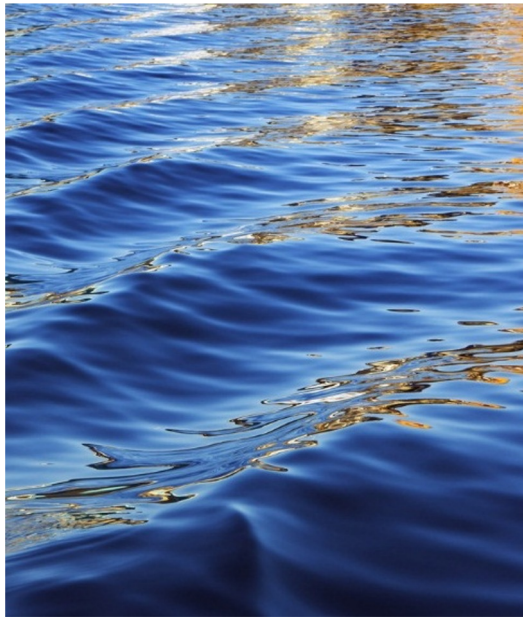
# Screening for Coronary Artery Disease

**POTENTIAL AREAS FOR WASTE REDUCTION:**

- Before ordering an ECG or chest X-ray to screen for CAD, ask your patient if they have any symptoms of CAD or family history of cardiac events, and calculate their Framingham score to determine if they need an ECG.
  - Downstream costs of inconclusive ECGs may be extensive and lead to further **unnecessary testing**. When subsequent stress investigations are necessary (MRI, SPECT scan, echo), an **echocardiogram** has been found to be the most ecologically-friendly, and should be considered when other modalities are not clinically superior[8]. Estimated electrical operating costs for downstream stress tests are:
    - **Echocardiogram: 8.8 kWh/day**
    - **SPECT: 65.7 kWh/day**
    - **MRI: 1275 kWh/day**

# Respirology - Asthma

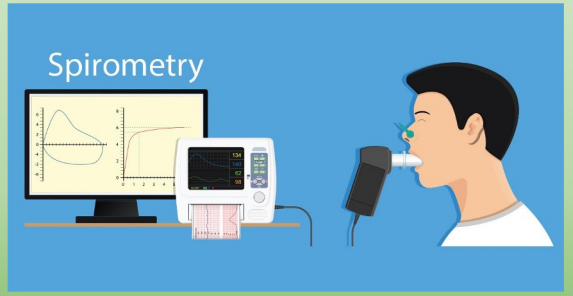
“Don't initiate medications for asthma (e.g., inhalers, leukotriene receptor antagonists, or other) in patients ≥ 6 years old who have not had confirmation of reversible airflow limitation with spirometry, and in its absence, a positive methacholine or exercise challenge test, or sufficient peak expiratory flow variability.”[9]



# Respirology Background

**Significant care gaps in Spirometry exist**: **Only 1/3 of patients** in Canada have actually reported ever using spirometry to diagnose their condition, and less than 50% of primary care physicians reported using spirometry to monitor a patient's asthma[10]

A JAMA study on the "Re-evaluation of diagnosis on Adults with Physician-Diagnosed Asthma" found that **1/3 of patients did not actually have asthma** on testing, and **80% of patients with a label of asthma** but who did not actually have the condition were taking medications. This creates a number of healthcare consequences (unnecessary medication use, side effects of drugs, healthcare burden) but also an immense environmental impact.[10]



# What is the Environmental Impact?

- Life cycle environmental impact of **metred-dose inhalers (MDIs)** is well studied. Hydrofluorocarbon Propellants (HFC-134a and HFC-227ea), used in inhalers, have a significant impact on global warming. It is estimated that **over 1,340,000 tons of CO2** equivalents are produced by inhalers each year (mostly caused by HFC-134a, which has a global warming potential **1300x** that of CO2[11]), and is 4.3% of ALL greenhouse gas emissions by the National Health Service (NHS), the publicly funded healthcare system in the UK.[12]

Examples of Common Dry Powder Inhalers, which are possible alternatives to MDIs.

Examples of common Metered-dose Inhalers

# What is the Environmental Impact?

- The NHS wants to use more lower carbon inhalers, like **dry powder inhalers (DPIs)**, increase greener disposal of used inhalers, use lower carbon propellants and alternatives. Dry-powder inhalers can be clinically appropriate, cost effective alternatives that also promote the well being of the environment. A 30% uptake of low carbon inhalers would **reduce CO2 emissions by 374,000 tons/year**[13]


The $CO_2$ produced by 1 Metered-dose inhaler is the equivalent of a road trip from Toronto to New York, while 1 Dry Powder Inhaler is like going to another part of Toronto. Values assume cars achieve 100g $CO_2$/km.[11]

- Unfortunately despite the environmental benefit of dry powder inhalers, they are often **not covered by provincial or territorial drug plans**, which can affect patient's ability to access these medications. **Further advocating needs to be done,** such as working with the Canadian Agency for Drugs and Technologies in Health to support transition with accessible info for patients and healthcare practitioners about creating environmentally sustainable asthma treatment.[14]

- A common misconception is many believe kids can't use DPIs because you need to inhale in hard to use them, but studies have shown it can be used effectively in children aged over 5 years old.[15]

- UK has a **National Institute of Health and Care Excellence (NICE)** to create evidence-based decisions and aid patients with asthma. You can learn more about the environmental impact of inhalers and can help your patients select a more suitable inhaler device with this resource by NICE

# Asthma Treatment - T/F Questions

1) Don't initiate medications for asthma (e.g., inhalers, leukotriene receptor antagonists, or other) in patients ≥ 6 years old who have not had confirmation of reversible airflow limitation with spirometry, and in its absence, a positive methacholine or exercise challenge test, or sufficient peak expiratory flow variability. (T/F)

1) Which of these numbers quantifies the total greenhouse gas emissions created by metered-dose inhalers alone in the NHS? (0.043%, 0.43%, 4.3%, 43%)

1) Dry powder inhalers are possible cost-effective and environmentally-sustainable alternatives to metered-dose inhalers. (T/F)

# Asthma Treatment - T/F Questions

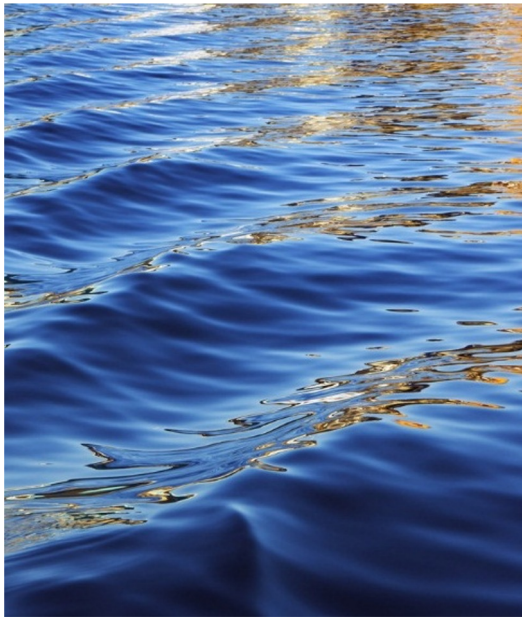
1) Don't initiate medications for asthma (e.g., inhalers, leukotriene receptor antagonists, or other) in patients ≥ 6 years old who have not had confirmation of reversible airflow limitation with spirometry, and in its absence, a positive methacholine or exercise challenge test, or sufficient peak expiratory flow variability. (T/F) **Answer**: (T)

1) Which of these numbers quantifies the total greenhouse gas emissions created by metered-dose inhalers alone in the NHS? (0.043%, 0.43%, 4.3%, 43%) **Answer**: (4.3%)

1) Dry powder inhalers are possible cost-effective and environmentally-sustainable alternatives to metered-dose inhalers. (T/F) **Answer**: (T)

# Thyroid function tests (TSH)

"Don't order thyroid function tests in asymptomatic patients."[3]



## Thyroid Function Tests

- TSH testing occurs too often in patients without any indication for it. In a 2016-2017 retrospective study that looked at EMRs from participating Ontario sites, **35.1% of all patients** with no indication for TSH screening were still tested[16]. A UK study found that TSH testing in **vaguely symptomatic** patients had a diagnostic yield of **2.1% hyper- or hypothryoid** -- this was **lower than the population incidence of 2.5%[17].** Therefore, this method was found to be less effective than testing randomly

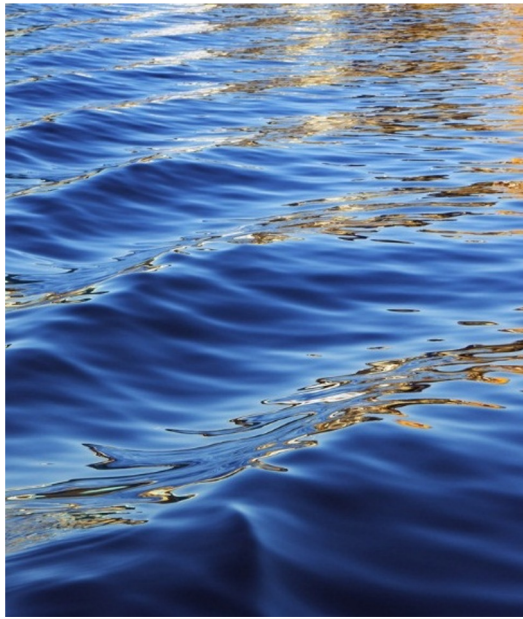
## POTENTIAL AREAS FOR WASTE REDUCTION:

- Thyroid function tests (TSH) in patients who are not pregnant, who are asymptomatic, and who have no risk factors for thyroid disease
  - Currently little evidence that screening for thyroid function in asymptomatic patients with no risk factors will change outcomes, and false positives may lead to unnecessary harm[18]
  - Revised indications for TSH testing can be found here (updated 2019)

# Routine Blood Work

"Don't do annual screening blood tests unless directly indicated by the risk profile of the patient."[3]

Risk profiles involve "age, sex, and any potential risk factors."



# Routine Blood Work

The vast majority of diseases found on routine blood work are lipid disorders, and the most important biochemical markers for diagnosis are: **cholesterol, glucose, and ALT**.

In a retrospective analysis of 493 patients who had received routine blood work, it was discovered that all clinically relevant diagnoses could have been made from the values of cholesterol, glucose, and ALT alone[19]

# Routine Blood Work

**POTENTIAL AREAS FOR WASTE REDUCTION:**

- *Routine blood work in patients where blood work is not indicated*
  - Using blood work for “case finding” rarely results in the implementation of a therapy or management[20]
  - **The most high-yield diagnostic tests include: cholesterol, glucose, ALT[19]**

# Carbon Footprint of Blood Tests[21]


| Blood test | Mean $CO_2e$ (g) (95% CI) | Equivalent distance in car (km/1000 tests) |
|---|---|---|
| Full blood examination | 116 (101–135) | 770 |
| Coagulation profile | 82 (73–91) | 540 |
| Urea and electrolytes | 99 (84–113) | 650 |
| C-reactive protein* | 0.5 (0.4–0.6) | 3 |
| Arterial blood gases | 49 (45–53) | 320 |

# Carbon Footprint of Blood Tests

- While the greenhouse gas impact of individual tests is relatively small, when the consumption of all the unnecessary blood tests are adding together the impact is large.
- In a study, they found that 29 million blood tests were ordered per year in Calgary. According to choosing wisely 30% of tests are unnecessary. That is 8.7 million unnecessary blood tests in this case, equivalent to an estimated ~ **609 tonnes** of $CO_2$ emissions[22]

# Lab Tests and Monitoring - T/F

1) Routine blood work is an efficient way of detecting asymptomatic diseases that often leads to the implementation of management (T/F).
2) The most important biomarkers in routine blood work are cholesterol, glucose, and ALT (T/F).
3) The environmental costs of blood tests can be measured in CO2e (CO2 equivalents).
4) Of all the cardiac stress tests, MRIs are the most ecologically efficient and should be chosen whenever on-par or superior to other testing modalities (T/F).
5) Thyroid function (TSH) testing is no longer recommended in routine screening, and should only be done when a patient is symptomatic or has risk factors for thyroid disease (T/F).

# Lab Tests and Monitoring - T/F

1) Routine blood work is an efficient way of detecting asymptomatic diseases that often leads to the implementation of management (T/F). (Answer: routine blood work is not efficient in case-finding, F)
2) The most important biomarkers in routine blood work are cholesterol, glucose, and ALT (T/F). (Answer: T)
3) The environmental costs of blood tests can be measured in CO2e (CO2 equivalents). (Answer: T)
4) Of all the cardiac stress tests, MRIs are the most ecologically efficient and should be chosen whenever on-par or superior to other testing modalities (T/F). (Answer: echocardiograms are the most ecologically efficient, F)
5) Thyroid function (TSH) testing is no longer recommended in routine screening, and should only be done when a patient is symptomatic or has risk factors for thyroid disease (T/F). (Answer: T)

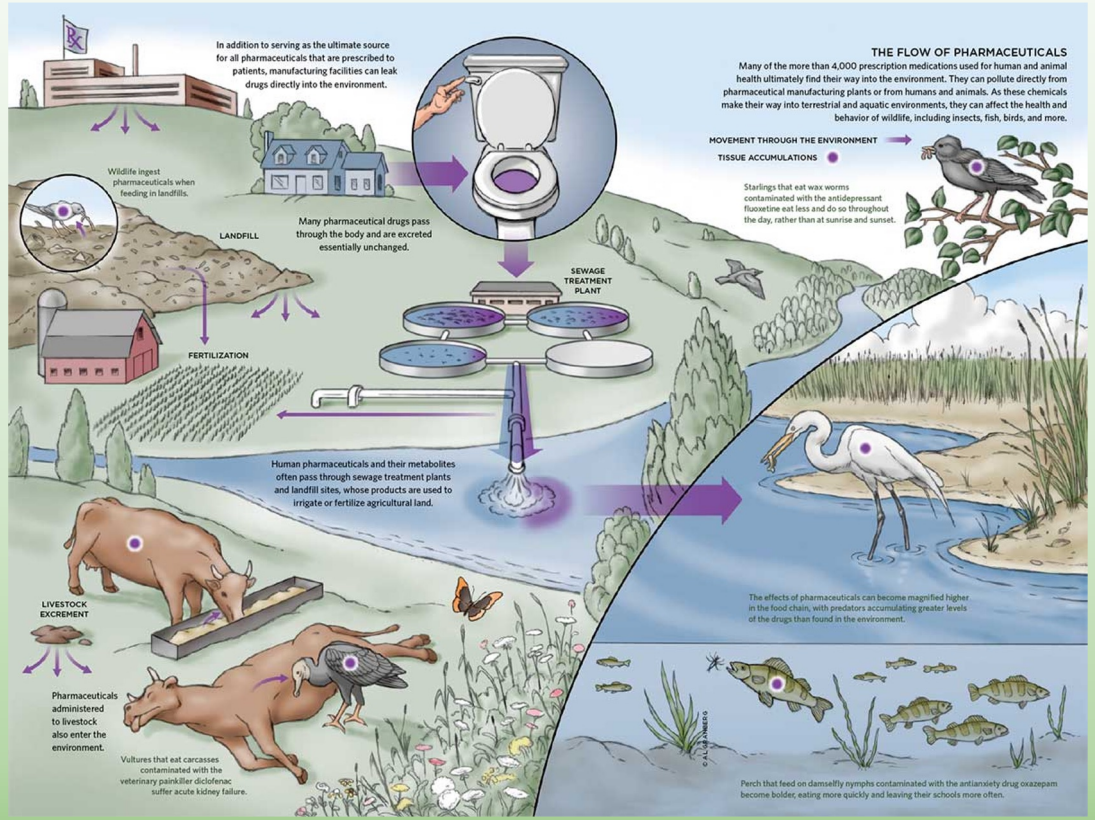
# Section 3: Prescription Medications

# General Impact of Prescription Drugs

“Moreover, over the last two decades, the environmental impact of prescription drugs has been flagged as a significant public health and ecological concern. In 2001, Jameton and Pierce recognized that the carbon emissions from ‘pharmaceutical products with complex manufacturing processes, have environmentally significant precursors…as well as complex and hazardous solid, air and water emissions, including toxic, infectious and radioactive wastes.”[23]

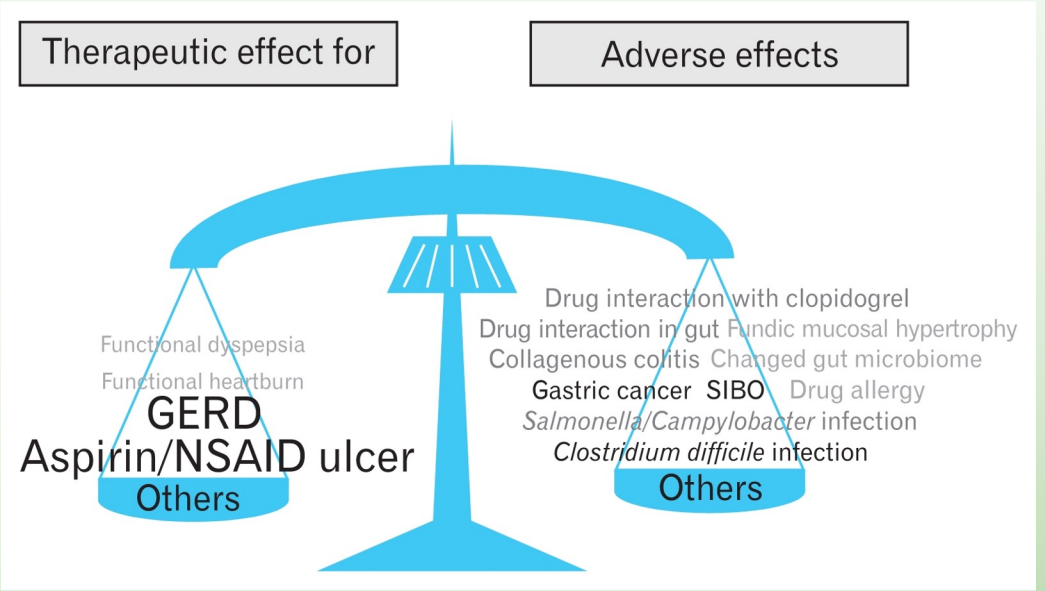
# Aquatic Environment Impact

An infographic on how pharmaceuticals move through the aquatic environment can be found in the following link: https://www.usgs.gov/media/images/pharmaceuticals-move-throughout-aquatic-environment



# Proton Pump Inhibitors (PPIs)

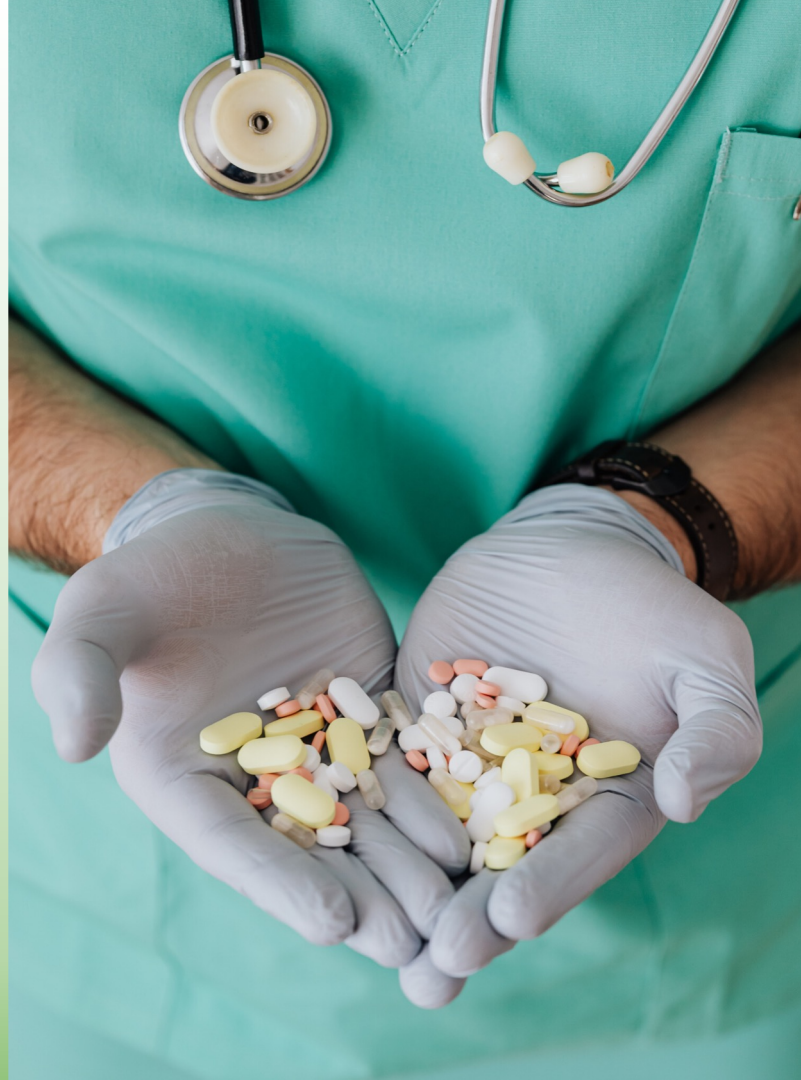
- PPIs are often prescribed for the long-term treatment of gastroesophageal reflux disease (GERD) and prevention of aspirin/non-steroidal anti-inflammatory drug (NSAID)-induced ulcers. However, when used long term they have several adverse effects.



# PPI Environmental Impact

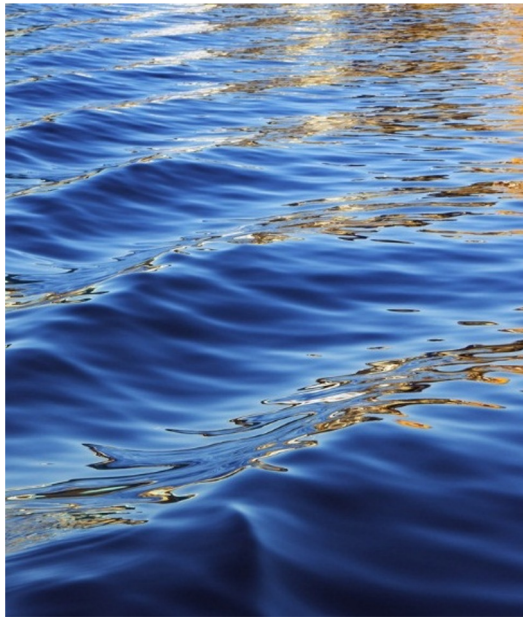
- Use of PPI equates to ongoing emissions of approximately 100 Kg $CO_2$ per annum for 164 patients.[24]

- Adverse effects associated with PPI leads to use of further medication and healthcare resources.



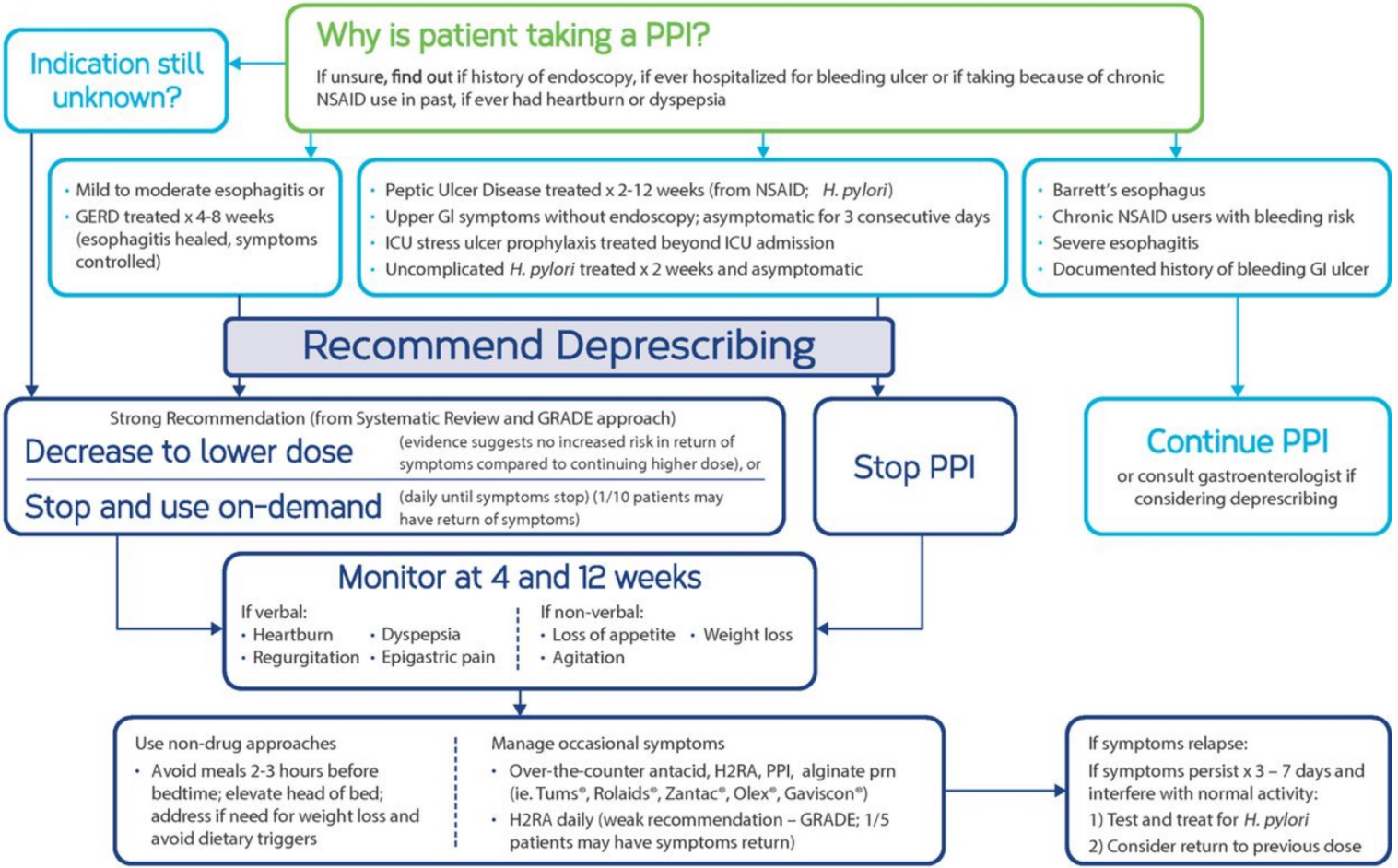
# GI Recommendation #1 - PPI

"Don't maintain long term **Proton Pump Inhibitor (PPI)** therapy for gastrointestinal symptoms without an attempt to stop/reduce PPI at least once per year in most patients."[25]



# Deprescribing PPIs

- These drugs can be deprescribed, which will benefit both the healthcare system and environment
- Deprescribing algorithm published by College of Family Physicians Canada can be found in the following link: [26]
- https://www.cfp.ca/content/63/5/354



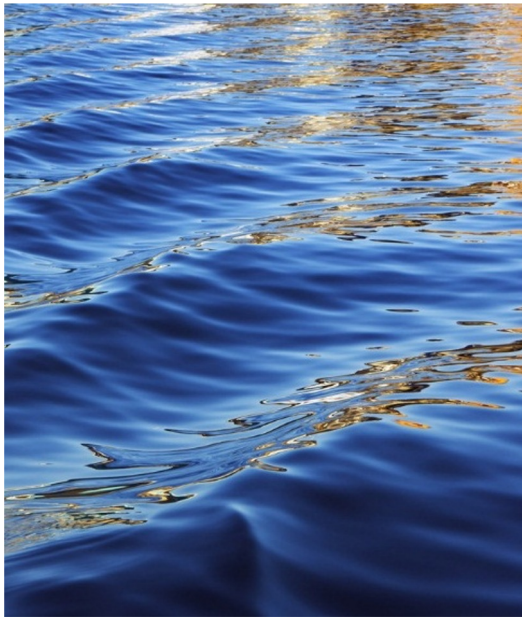



Farrell B, Pottie K, Thompson W, Boghossian T, Pizzola L, Rashid FJ, et al. Deprescribing proton pump inhibitors.

deprescribing.org
INSTITUT DE RECHERCHE Bruyère
open

# Opioids

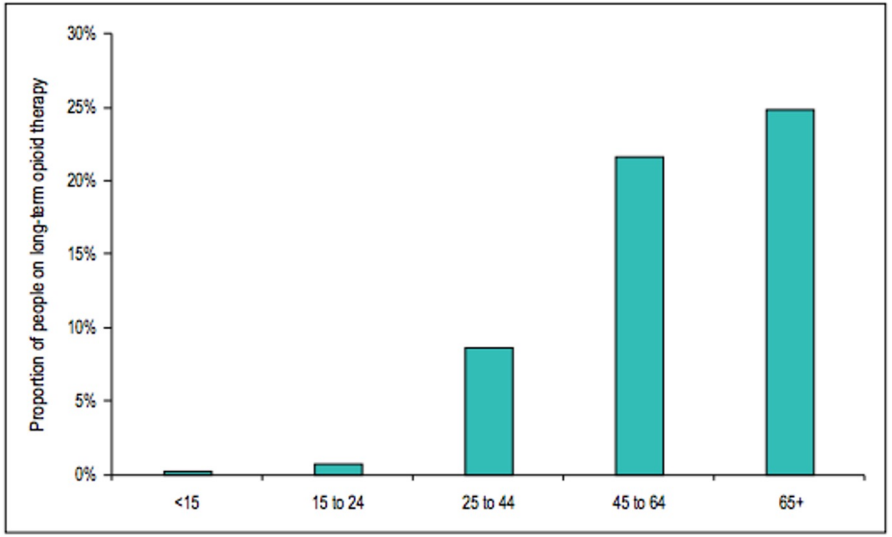
"Don't continue opioid analgesia beyond the immediate postoperative period or other episode of acute, severe pain."[3]



# How many people are prescribed opioids long term?


- Opioid use comes with an increased risk of harms, including addiction, dependence and death, especially at high doses. It has been found that 1 of every 550 people on long-term opioid therapy die within roughly 2.5 years of their first opioid prescription.[27]

# Proportion (%) of people prescribed long-term opioid therapy, by age group,* 2018




**Note**

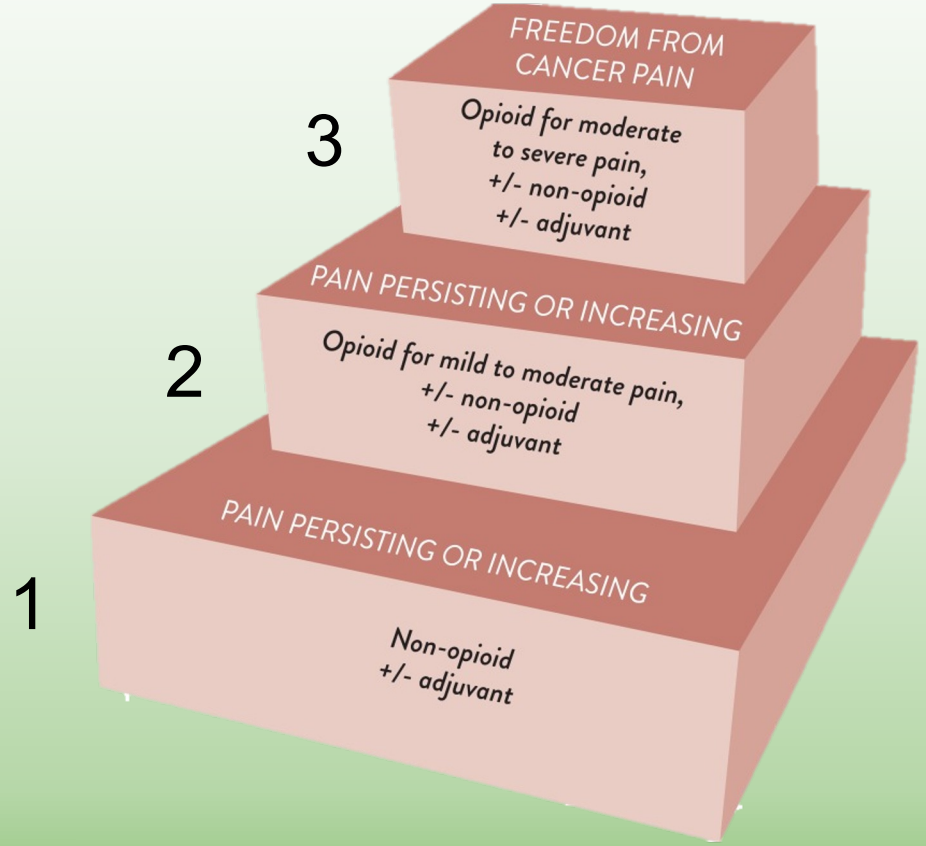
* Includes data from Ontario, Manitoba, Saskatchewan and British Columbia.

**Sources**

National Prescription Drug Utilization Information System, Canadian Institute for Health Information; Ontario Narcotics Monitoring System.

- Seniors are more likely to use opioids long term due to a higher prevalence of chronic pain. However, they are also more likely to experience opioid-related harms. Non-opioid pain medications need to be further explored in this population.[27]

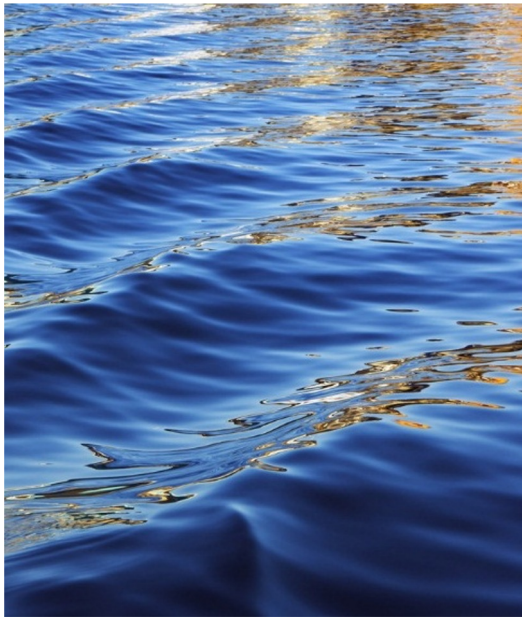
# WHO Analgesic Ladder




- WHO Analgesic ladder provides a guideline on prescribing pain medications for cancer pain[28]
- More information can be found in the following link: https://www.ncbi.nlm.nih.gov/books/NBK554435/

# Antibiotics

"Don't use antibiotics for upper respiratory infections that are likely viral in origin, such as influenza-like illness, or self-limiting, such as sinus infections of less than seven days of duration."[3]



# Antibiotics

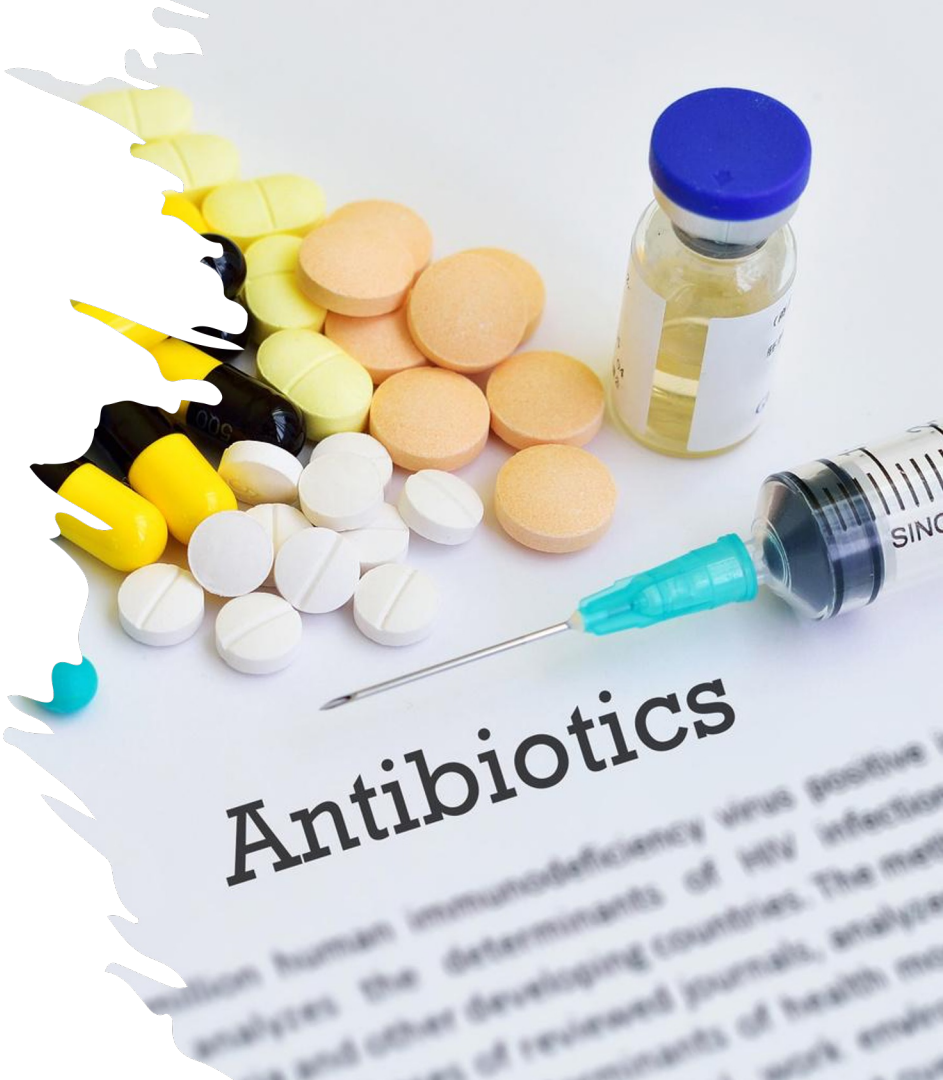
## Physiological Effects on Wildlife

- Macrolides and quinolones have been detected in chlorinated drinking water and have been shown to induce malformations in zebrafish. Sulphonamides, quinolones, and tetracycline have also **induced malformations in several fish species.** Tetracycline was found to be **teratogenic to amphibians** such as certain frog species.[29]

*Xenopus tropicalis*

*Danio rerio*

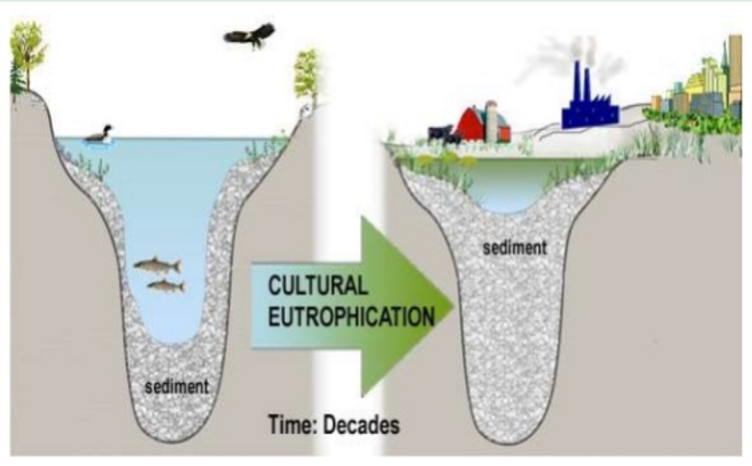
- Triclosan has been detected in streams and rivers around the world and also human serum, urine, and breast milk of people not currently taking the antibiotic. Possible health effects of this exposure includes reproductive problems and muscle weakness.[30]



# Antibiotics

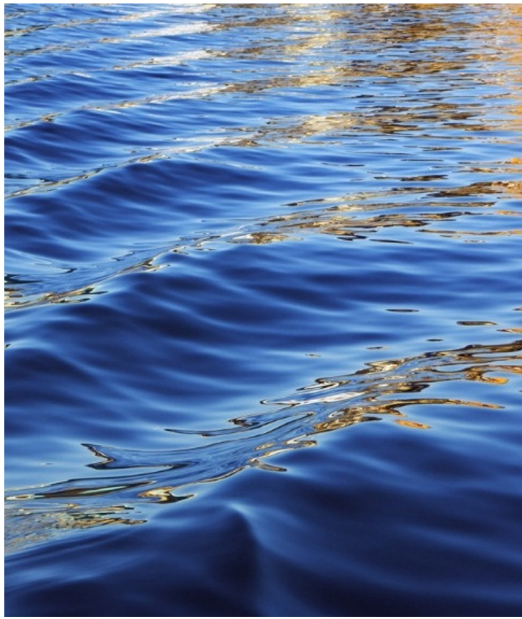
## Effects on Microbial Diversity and Ecosystems

- Antibiotic pollution has been shown to lead to **increased abundance of parasites and pathogens** (such as *Cyanobacteria)* in soil and water environments, leading to eutrophication in freshwater ecosystems.[30]
- Eutrophication sets off a chain reaction starting with excessive algae and plant growth which eventually reduces aquatic habitats and **kills aquatic animals**. *Cyanobacteria* also produces toxins that are **hazardous to human health**.[31]
- Antibiotic disruption of aquatic environments was found to **reduce overall microbial diversity**, including taxa responsible for carbon cycling.[32]



# Benzodiazepines

"Don't use benzodiazepines or other sedative-hypnotics in older adults as first choice for insomnia, agitation or delirium."[33]



# Benzodiazepines

**What are Benzodiazepines clinically used for?**

They are used in the treatment of

- Anxiety, Panic Attacks & Acute Alcohol Withdrawal
- Seizures & other Neurological Diagnoses
- General Anaesthesia/Sedation
- Insomnia or Trouble Sleeping

# Benzodiazepines

**Recommendations specific to the older adult:**

- **Canadian Geriatrics Society, Choosing Wisely Canada Recommendation #2**
  Don't use benzodiazepines or other sedative-hypnotics in older adults as first choice for insomnia, agitation or delirium.[33]

- **Canadian Pharmacists Association, Choosing Wisely Canada Recommendation #6**
  Don't prescribe or dispense benzodiazepines without building a discontinuation strategy into the patient's treatment plan (except for patients who have a valid indications for long-term use).[34]

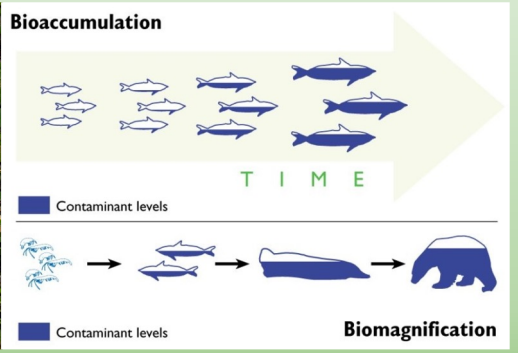
# Benzodiazepines

**Environmental Impacts of Benzodiazepines.**

- During the waste management process, wastewater treatment plants do not completely degrade contaminants, resulting in contamination of aquatic ecosystems by chemicals that resist biotic degradation - resulting in accumulation in plankton and small fish, with harmful health upstream effects onto larger aquatic animals.[35,36,37]

*Mysidopsis juniae*

*Rutilus rutilus*



# Benzodiazepines

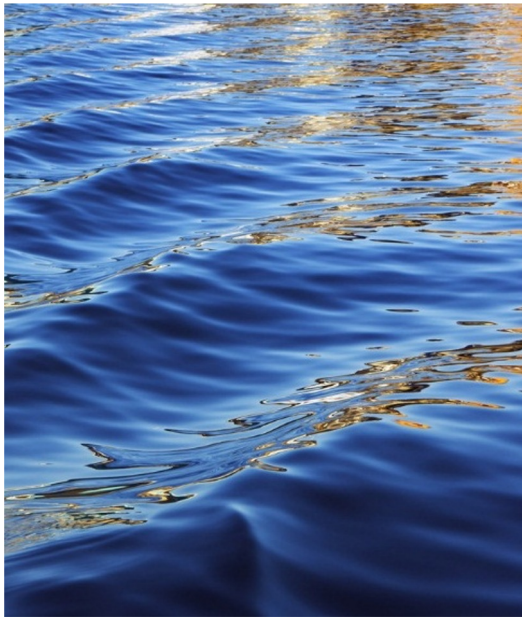
## *Green & Choosing Wisely Recommendation*

By deprescribing and eliminating first line usage of sedative-hypnotics of benzodiazepines, you will not only help lower the risk of falls and adverse effects in the older adult but also lower the need for medication disposing.

# Section 4: Waste Disposal

# Pap Smears

"Don't screen with Pap smears if under 21 or over 69 years of age."[3]



# Pap Smears

## Single-Use Items

- Plastic single-use speculums, and alternatively, reusable metal speculums, are widely used in clinics across Canada for vaginal exams, including Pap tests.
- Currently, there is debate on which option is best. Harsh chemicals may be required for disinfecting reusable metal specula, including **ethylene oxide** which is a **toxic air pollutant** and a **carcinogen** (other disinfectants such as glutaraldehyde may be biodegradable but still hazardous to human health).[38, 39]

# Pap Smears

## Single-Use Items

- On the other hand, in one recent study, the **steel grade 304 speculum** was shown to have a **smaller carbon footprint** than steel grade 316 speculum and disposable specula, taking into account different sterilization techniques.[40]
- With newer eco-friendly and non-hazardous disinfectants,[39] single-use medical supplies (vaginal speculums, nasal speculums, exam table paper, etc) can be eliminated.

# Pap Smears

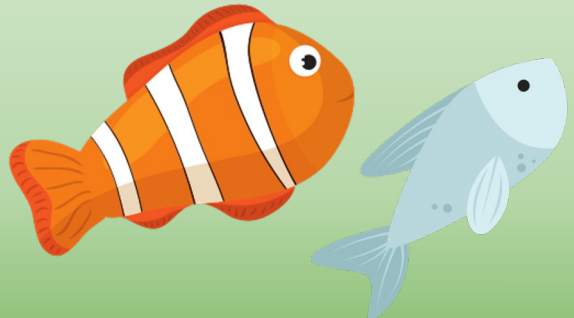
## Environmental Impacts & Health Impacts of Pap Tests

- Xylene waste can be **found in soil and water** and eventually vaporizes into air. Xylene also percolates into groundwater where it can remain for months. Xylene exposure, especially chronic high dose exposure in the workplace, can cause **detrimental effects to human health** including respiratory dysfunction, liver toxicity, renal abnormalities and neurological disturbances.[41]

# Pap Smears

## Environmental Impacts & Health Impacts of Pap Tests

- Ammonia, another reagent used in Pap tests, is also an unfortunate environmental waste. Ammonia contributes to the **nitrification and eutrophication** of aquatic systems,[42] and is one of the main sources of nitrogen pollution alongside nitrogen oxides. Ammonia affects freshwater ecosystems through direct agricultural run-off and has demonstrated **toxic effects on aquatic animals**. Ammonia toxicity also occurs in plants, thus **herbivorous animals** are also susceptible to effects of ammonia pollution.[43]



# Pap Smears

## A New Eco-friendly Solution

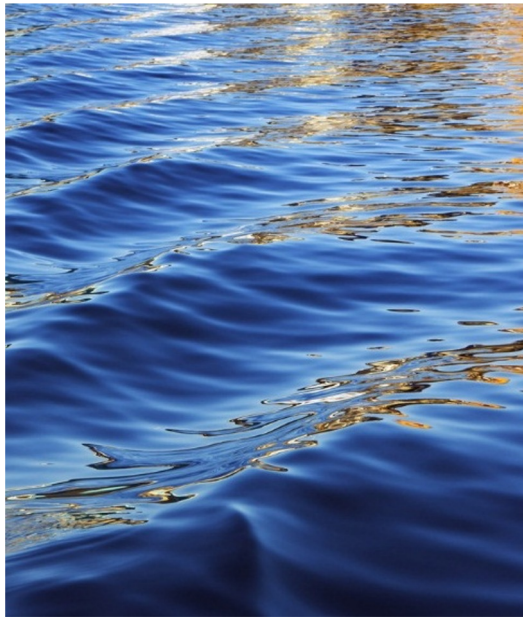
- To understand the amount of waste produced by Pap tests, the USA for example, stains over 60 million cervical smears/year. By replacing the conventional Pap test with the Eco-Pap test, the USA can prevent the use and waste of **~64,000 L of xylene** as well as **~4,500 L of hydrochloric acid and ammonia** per year.[44]

- The Eco-Pap test does not use xylene, and therefore **eliminates the use of carcinogenic elements** in the Pap smear and greatly **reduces the disposal of toxic agents** into the environment. Also, the exposure of laboratory personnel to these dangerous chemicals is significantly reduced.[45]

- The Eco-Pap is designed to be used in cytological laboratories of all levels of performance. Details of the method can be found here.

# Diabetes — Monitoring Blood Glucose

"Don't advise non-insulin requiring diabetics to routinely self-monitor blood sugars between office visits."[3]



# Diabetes

Blood glucose test strips were the **3rd largest public pharmaceutical expenditure** in Ontario in 2007/2008, costing *Ontario Public Drug Programs* **over $100M,** and this cost was expected **exceed $500M/year by 2013**[46]

## POTENTIAL AREAS FOR WASTE REDUCTION:

- *Blood glucose test strips in patients who do not use insulin*
  - Measuring blood glucose levels before every meal is important for calculating how much insulin should be taken, and therefore, **not necessary in patients who are not taking insulin**[47]
  - **Educating patients** around the signs and symptoms of hypoglycemia can help prevent hypoglycemic events, in addition to test strip use.

# Waste - T/F Questions

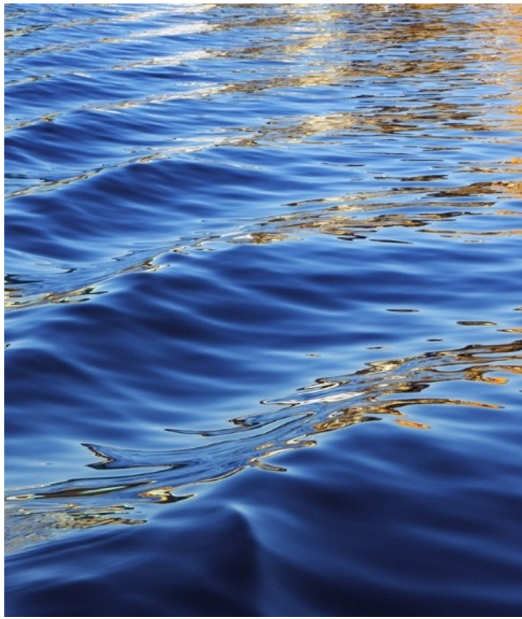
1) Blood glucose test strips are not costly to our healthcare system because they are inexpensive and most patients have their own insurance anyway (T/F).
2) People with diabetes need to check their blood sugars before every meal to know if they are eating frequently enough (T/F).

# Waste - T/F Questions

1) Blood glucose test strips are not costly to our healthcare system because they are inexpensive and most patients have their own insurance anyway (T/F). (Answer: blood glucose test strips are the 3rd largest public expenditure in Ontario, F)
2) People with diabetes need to check their blood sugars before every meal to know if they are eating frequently enough (T/F). (Answer: only patients who take insulin should be checking their blood sugars so that they may correctly dose their insulin, F)

# Travel/Virtual Care in COVID-19

"Don't offer non-essential services to patients in person, if virtual tools such as telephone or online visits are available. Delay non-essential care and laboratory testing when possible."[48]



# Virtual Care

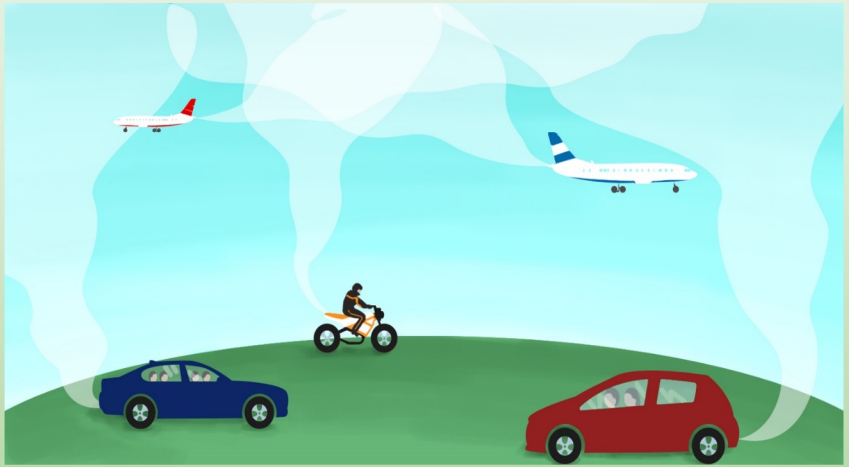
- **Virtual care** can often meet patient's needs in a safer way. Furthermore, delaying non-essential care or laboratory testing may free capacity for sicker patients. However, it is imperative to maintain continuity of care for patients with chronic medical conditions[48]

- These articles from BMJ[49] and UOttawa Med[50] are great resources describing how to do remote consultations during the pandemic

- Examples of visits that are appropriate for telemedicine includes: coughs and colds, simple UTI, dermatology, contraception and STI screening counselling, mental health, routine screening and diabetes follow-up

# What is the Environmental Impact?

- It is estimated that approximately **6% of all greenhouse gases in healthcare is due to travel.**[51] This includes a combination of commercial travel by truck/air and travel by patients and healthcare practitioners.



# What is the Environmental Impact?

- A study in Nature found that worldwide **carbon emissions went down in 2020 worldwide by almost 6.5%, or 2.3 billion tonnes of CO2.**[52] This has shifted to an increase in virtual care, that will continue play a role in both supporting patients during the pandemic, and promoting environmental sustainability.

# Travel/Virtual Care - T/F Questions

1) “Don’t offer non-essential services to patients in person, if virtual tools such as telephone or online visits are available. Delay non-essential care and laboratory testing when possible” (T/F)

1) It was estimated in 2020 that global carbon emissions decreased by 0.065%, or 2.3 billion tons of CO2, largely due to reductions in travel. (T/F)

1) Virtual care will continue to have a key role to play post-pandemic in ensuring environmental sustainability of our healthcare system. (T/F)

# Travel/Virtual Care - T/F Questions

1. “Don’t offer non-essential services to patients in person, if virtual tools such as telephone or online visits are available. Delay non-essential care and laboratory testing when possible” (T/F) **Answer**: (T)

1. It was estimated in 2020 that global carbon emissions decreased by 0.065%, or 2.3 billion tons of CO2, largely due to reductions in travel. (T/F) **Answer**: (6.5%, a modest decrease!, F)

1. Virtual care will continue to have a key role to play post-pandemic in ensuring environmental sustainability of our healthcare system. (T/F) **Answer**: (T)

# Key Takeaways

- Imaging machines, especially MRIs and CT scans, use significant amounts of energy (eg. 1 MRI machine = 150,000 pounds of coal burned each year alone!). Reduce the environmental impact by limiting imaging to when red flags are present.
- Before ordering an electrocardiogram to screen for coronary artery disease, consider a patient's age and Framingham score. When electrocardiogram results indicate the need for stress testing, an echocardiogram (ECG) is a more energy efficient choice over MRI and SPECT.
- TSH testing should not be a part of routine screening for patients who are not pregnant, who do not have risk factors, and who do not have symptoms/warning signs of thyroid disease.

# Key Takeaways Part 2

- Benzodiazepines are drugs that already have a choosing wisely recommendation. They are not to be used in the older adult. Disposing of them incorrectly and in abundance can have detrimental effects to the environment and ecosystems through bioaccumulation.
- DPIs (dry powder inhalers) are a safe, cost-effective and greener alternatives to MDIs (metered-dose inhalers), and can be considered for asthma treatment in patients over 5 years old.
- The COVID-19 pandemic has placed a new emphasis on telemedicine, which can be used effectively in several conditions (eg. simple coughs/colds, routine diabetes screening) and reduce the emissions by travel.

# Key Takeaways Part 3

- Antibiotic pollution is toxic to several wildlife species and hazardous to human health. To reduce the environmental impact, don't prescribe antibiotics for upper respiratory tract infections that are likely viral in origin.

- Blood glucose test strips (and associated materials such as lancets) are costly, wasteful, and only necessary in patients who self-administer insulin.

- A single full blood chemistry test produces the equivalent of 109g of $CO_2$, and yet an estimate of 30% of all blood tests are unnecessary. Routine blood work (screening patients who are asymptomatic for diseases detected in blood chemistry) rarely leads to the implementation of management, however, when routine screening does uncover disease, most diagnoses can be made from the values of cholesterol, glucose, and ALT alone.

# Acknowledgements

We would like to acknowledge the *Project Green Healthcare/Project Vert La Santé* team for the funding and for supporting this project! We also want to give a huge thank you to the leads Owen Luo and Jacob Carson, for their unwavering support and contributions to helping us achieve our goals for this project.

PROJECT GREEN HEALTHCARE

PROJET VERT LA SANTÉ

# Relevant Disclaimers

- While this project has been created in consultation with those from Choosing Wisely Canada, the creators of this project want to emphasize that they do not work for Choosing Wisely Canada and that this module is not officially endorsed by Choosing Wisely Canada; this module is simply our interpretation of how the Choosing Wisely Canada family medicine recommendations can align with an environmental sustainability lens!

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