

INTRODUCING SNAP: SUSTAINABLE NEPHROLOGY ACTION PLANNING A PATHWAY OF CLIMATE ACTION IN KIDNEY CARE

> Tuesday, October 19th, 2021 12:00 pm – 1:00 pm EDT



Canadian Society of Nephrology/ Société canadienne de néphrologie CSN/SCN





The webinar will start shortly.

In the meantime, here are some Zoom tips:



• Your microphone and camera are off



 Click on "Q&A" to ask the panelists questions. Don't wait... ask your questions and the moderator will field them at the end.



 If you have technical questions, click on "chat" in the bottom bar and someone will be there to help







- LEARNING OBJECTIVES -

- Know that a Climate Emergency has been declared in Canada, and is a health issue
- Understand the contribution of health care to the climate crisis, and kidney care's disproportionately large footprint
- 3. Define Planetary Health and problem-solve ways for kidney care delivery systems to mitigate their negative environmental impact.



Dr. Caroline Stigant BSc, MHSc, MD FRCPC



Dr. Tasleem Rajan BSc, MSc, MPH Candidate, MD, FRCPC

Introducing 'SNAP': Sustainable Nephrology Action Planning

A Pathway of Climate Action in Kidney Care



CSN Educational Rounds Drs. Caroline Stigant and Tasleem Rajan October 19, 2021

DISCLOSURES – CS / TR - None

- Member, Canadian Association of Physicians for the Environment
- Co-recipient of South Island Facility engagement Grant (SIFEI) 2021-2022
- Divested personal holdings from fossil fuel investments
- Scientific Advisory Board Otsuka Canada 100% remuneration dedicated to nephrology trainee Planetary Health education fund

<u>Acknowledgement – Island Health Perspective</u> Songhees, Esquimalt, and Wsanec Territories

Healthy land, healthy people

Caring for the environment is caring for patients







Introducing Charlotte 55 F on Home HD Awaiting Transplant

- "CRD...have knocked on our door and told us not to overflow the bin"
- "there has been no opportunity to discuss the large amount of supplies that...dialysis patients use that could be recycled"
- "my existence causes more waste"



THE CLIMATE CRISIS

WHO: 'The greatest threat to global health in the 21st century'





CO₂: 100x faster rate of atmospheric accumulation, & Double the concentration vs. 800,000 years of historic norms

IPCC 6: 'It is unequivocal that human influence has warmed the atmosphere, ocean, and land'



°C



CANADA: 个 1.7 °C CANADIAN NORTH: 个 2.3 °C

Canada.ca

WE ARE ALREADY 'LOCKED IN' TO 个1.5 °C FUTURE EMISSIONS

	Near term, 2021–2040		Mid-term, 2041-2060		Long term, 2081-2100	
Scenario	Best estimate (°C)	Very likely range (°C)	Best estimate (°C)	Very likely range (°C)	Best estimate (°C)	Very likely range (°C)
SSP1-1.9	1.5	1.2 to 1.7	1.6	1.2 to 2.0	1.4	1.0 to 1.8
SSP1-2.6	1.5	1.2 to 1.8	1.7	1.3 to 2.2	1.8	1.3 to 2.4
SSP2-4.5	1.5	1.2 to 1.8	2.0	1.6 to 2.5	2.7	2.1 to 3.5
SSP3-7.0	1.5	1.2 to 1.8	2.1	1.7 to 2.6	3.6	2.8 to 4.6
SSP5-8.5	1.6	1.3 to 1.9	2.4	1.9 to 3.0	4.4	3.3 to 5.7

IPCC 6 Report, Box SPM1

WITH EVERY INCREMENT OF GLOBAL WARMING, ECOLOGIC EFFECTS GET LARGER

c) Annual mean precipitation change (%) relative to 1850-1900

Simulated change at 1.5 °C global warming



Precipitation is projected to increase over high latitudes, the equatorial Pacific and parts of the monsoon regions, but decrease over parts of the subtropics and in limited areas of the tropics.

Simulated change at 2 °C global warming



Simulated change at 4 °C global warming



Relatively small absolute changes may appear as large % changes in regions with dry baseline conditions IPCC 6 Report, Figure SPM5c

WITH EVERY INCREMENT OF GLOBAL WARMING, ECOLOGIC EFFECTS GET LARGER



IPCC 6 Report, Figure SPM8d

'Heat records are usually broken by tenths of a degree, not 4.6° C' Greta Thunberg



- Deaths due to heat and dehydration:
 570 sudden deaths attributable
- Devastating Forest Fires: destruction of Lytton and 860K hectares burned
- Effects on ecology: 1 billion seashore animals "cooked" at low tide; up to 70% of fruit crops lost
- Dislocations: evacuation orders (48) and alerts (96)

earthobservatory.nasa.gov

Our Future?

Our colleagues – Kamloops, 2017 cared for 18 HD patients evacuated from Williams Lake (forest fires)



WMO Climate Risks, Extreme Events and Related Impacts



Macro view: Environment / Humankind Interface:

Could drag >100 million into extreme poverty by 2030 (*World Bank, 2016*)

1 in 4 deaths worldwide are related to the environment (WHO)

Expect epidemic of climate refugees

WMO 2018

12.6 million deaths per year (~1/4) are linked to the environment,

2/2 pop communicable Fossil fuel air pollution responsible for 1 in 5 deaths worldwide¹



10.2 million premature deaths annually

US: 350,000 premature deaths 62% of deaths in China (3.9 million) and India (2.5 million) North America age 0-4 LRI attributable deaths: 876



Vohra K et al. Environ Res. 2021 Apr PMID 33577774



ROKE

rd TIONAI

INCERS



Haines A, Ebi K. NEJM 2019

IMPACTS ON AVAILABILITY OF TRADITIONAL FOODS² AND MENTAL HEALTH³ IN THE NORTH

Due to arctic warming (3x Global Rate)4.

CLIMATE CHANGE ITS IMPACT ON HEALTH IN CANADA

Climate change is the biggest global health threat of the 21st century. - Lancet¹

DISPLACEMENT

Climate changeexacerbated drought and famine was one factor in Syrian refugee crisis.24

WILDFIRE-RELATED **ASTHMA⁵ & EVACUATION**

Healthcare facilities evacuated: Fort McMurray: 105 patients^{6,7} Interior BC 2017: 880 patients^{8,9} Anxiety & PTSD following evacuation.¹⁰

FLOOD-RELATED ALLERGIES **DEATHS AND**

Increased severity & duration of pollen seasons.18

TICK-BORNE DISEASE

 Healthcare facilities closed due to flooding.13

DROUGHTS14,15

DAMAGE

5 deaths¹²

2013 Alberta flood11:

uu uuu uu

> Uneven impact on crops.¹⁶ Socioeconomic stress.17

66 people died in Montreal during 2018 heat wave.21,22

HEAT-RELATED

ILLNESS²⁰

Lyme Disease in Ontario than 2012-2016 average.19

ASSOCIATION MÉDICALE

CANADIAN MEDICAL CANADIENNE ASSOCIATION

RELOCATION &

COASTAL EROSION

STRESS FROM

P.E.I. homes at risk.23

1-Costello, The Lancet, 2009; 2-Rosol R, IJCH, 2016; 3-Cunsolo A, Ellis N, Nature CC 2018; 4-Canada's Changing Climate 2019; 5-Yao J et al, 2016; 6-Hampshire, G, CBC 2016; 7-Kirchmeier-Young M 2017; 8-BC Int Health 2017; 9-Kirchmeier-Young M et al, Am Geo Un, 2018; 10-Alberta Health, 2016; 11-Fuefel B et al 2017; 12-CBC Alberta Flood 2013; 13-United Nurses of Alberta 2013; 14-Yusa A, et al, Int J Env Res P H, 2015; 15- Smoyer-Tomic KE, et al. Ecohealth 2004; 16- Agriculture and Agri-Food Canada, 2015; 17-Cryderman K, 2018; 18- Ziska LH, The Lancet PH 2019; 19- Netler MP, 2018; 20-Howard, C et al. The Lancet CH210; 21-Fered Nurses PH, 2015; 12- Smoyer-Tomic KE, et al. Am Geo Union, 2019; 23-Fenech, A, 2014; 24-Kelleya, C, et al. 2015

2017: 3x higher rate

Particle Pollution ('PM_{2.5}')Increases Vascular Events



Brook R et al. Circulation June 2004

AIR POLLUTION CONTRIBUTES TO KIDNEY DISEASE TOO

Global burden of CKD attributable to PM2.5 in 194 countries and territories





Significant Global CKD Morbidity is Attributable to PM2.5



Benjamin Bowe et al. BMJ Glob Health 2020;5:e002063



Particle Pollution (PM_{2.5}) – Linear Increases in Cardiovascular Disease

- Cardiovascular admissions
- Acute Exposure (per $10 \mu g/m^3 \Lambda$ in DM2 5).

"Clinicians have a responsibility to educate their patients, their colleagues, and their communities...on the connection between air pollution and cardiovascular disease risk"

- Ch Joint statement January 2021 WHF, ACC, AHA, ESC
 - 23% ↑ IHD mortality
 - 24%↑ cerebrovascular mortality
 - 13% ↑ incident stroke
 - 8% ↑ incident myocardial infarction (Alexeeff S et al. JAHA 2021)
 - 20-30% incidence kidney disease (GFR <60, eGFR decline >30%, ESKD) Bowe B. JASN 2018
- Lung Cancer: for every \uparrow 10 $\mu g/m^3$
 - \uparrow ~20% in never-smokers Turner MC et al Am J Respir Crit Care Med 2011

Greenhouse Gases add up and are more than CO2 Stays in atmosphere for 300-1000 years



Greenhouse Gas	Formula	100-year GWP (AR4)
Carbon dioxide	CO2	1
Methane	CH ₄	25
Nitrous oxide	N ₂ O	298
Desflurane Sevoflurane Isoflurane Andersen et al. J Phys Chem A	25 13 51 A <i>2011</i>	40 0 .0
remuoroethane	C216	12,200
Perfluoropropane	C ₃ F ₈	8,830
Perfluorobutane	C ₄ F ₁₀	8,860
Perfluorocyclobutane	c-C ₄ F ₈	10,300
Perfluoropentane	C ₅ F ₁₂	13,300
Perfluorohexane	C ₆ F ₁₄	9,300

It takes ~50 mature trees 1 year to absorb 1 tonne of CO2

Billions of Tonnes of CO2 are emitted yearly



Source: Our World in Data based on the Global Carbon Project Our WorldInData.org/co2-and-other-greenhouse-gas-emissions • CC BY Note: 'Statitistical differences' included in the GCP dataset is not included here.

The Environmental Cost of Health Care - GHG

- 4.6% of <u>global</u> GHG emissions (2.4Gt CO₂e)¹
- 10% of US GHG emissions²

= 614,000 DALYs \approx impact of medical error

- 4.2% of Canada GHG emissions = 31Mt CO₂³
 - 200,000 tonnes other pollutants (primarily other respiratory irritants)
 - 21,500 DALYs per annum

"Health care pollution is a patient safety issue and pollution prevention ought to be included in ongoing efforts to improve health care safety and quality overall²"

> Lenzen M et al. Lancet Planetary Health 2020;4(7):e271-e279 Eckelman MJ,Sherman J. PLoS ONE 2016;11(6):e0157014 Eckelman MJ et al. (2018) PLoS Med 2018;15(7):e1002623

Environmental Impact of Medical Care - Examples

Medical Care Realm	Impact (kg CO2e)		
1 mg Morphine ¹ Steam Sterilization	0.002 (10 mg TID liquid Rx → yearly ≈ driving 175 km)		
1 Metered Dose Inhaler ² Propellant	25 ≈ driving 115 km		
Treating ICU patient with septic shock for 1 day ³	178 (≈ driving 800 km)		
HVAC	Canadian per capita daily CO2 emissions = 55 kg		
Daily ER solid waste generation ⁴ 1.99 kg per encounter 672 kg in 24 hrs	3110		
Daily emissions from OR (VGH) ⁵ approx. 2/3 contribution is anesthetic gases	8819		
Daily emissions from regional renal service ⁶ approx. ¾ from procurement	 8236 1. McAlister S. BMJ Open 2016 2. Jeswani. J Cleaner Production 3. McGain F. Crit Care Resusc. 4. Hsu S. West J Emerg Med 200 5. MacNeill A. Lancet Plan Heat 6. Connor A. OLM 2010 		

2017

Global environmental impacts of hemodialysis



Stenvinkel P, Fouque D, Wanner C. Life/2020-the future of kidney disease. Oxford University Press; 2020.

By 2030, 5.4 million people will be receiving kidney replacement therapy



A renal service produces over **3000 tonnes of CO₂ equivalents per year!**



Connor A, Lillywhite R, Cooke M. The carbon footprint of a renal service in the United Kingdom. QJM: An International Journal of Medicine. 2010;103(12):965-75.

3.8 to 10.2 tonnes of CO₂ equivalents per year for each HD patient!



Typical UK person = 12.7 tonnes CO₂ equivalents per year







Medical Equipment		Building Energy Use	Transportation	
In-centre	27 - 37%	21% - 28%	20% - 22%	
Satellite	23.4%	18.6%	8.8%	
HHD	43%	37.9%	1%	

Connor A, Lillywhite R, Cooke MW. The carbon footprints of home and in-center maintenance hemodialysis in the United Kingdom. Hemodialysis International. 2011;15(1):39-51. Lim AE, Perkins A, Agar JW. The carbon footprint of an Australian satellite haemodialysis unit. Australian Health Review. 2013;37(3):369-74.. Mtioui N, Zamd M, Ait Taleb A, Bouaalam A, Ramdani B. Carbon footprint of a hemodialysis unit in Morocco. Therapeutic Apheresis and Dialysis. 2020.



Carbon Footprint of the Pharmaceutical Industry

"Significantly worse than the automotive industry"



Source: Belkhir L, Elmeligi A. Carbon footprint of the global pharmaceutical industry and relative impact of its major players. J Clean Prod [Internet]. 2019;214:185–94. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0959652618336084

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Carbon Footprint of the Pharmaceutical Industry

"Significantly worse than the automotive industry"



THE CLIMATE EMERGENCY

Declared by 1.886 iurisdictions in 34 countries (Dec/20, climateemergencydeclaration.org)

WHAT IF WE ADAPTED THIS LENS TO KIDNEY CARE PROVISION?

intended to focus governing bodies toward climate action, mobilize resources, and generate a mindset of urgency

Editorial Published Sept 2021 in 200 Medical Journals Atwoli L, Baqui AH, Benfield T et al.

- 'The greatest threat to global public health is the continued failure of world leaders to keep the global temperature rise below 1.5°C and to restore nature'
- <u>Call for governments and other leaders to act</u>, marking 2021 as the year the world finally changes course
- As health professionals, we must do all we can to aid the transition
 - Proactively contribute to global prevention of further damage and to action on the root causes of the crisis
 - Hold global leaders to account and continue to educate others about the health risks of the crisis
 - Join in the work to achieve environmentally sustainable health systems before 2040, recognizing that this will mean <u>changing clinical practice</u>



Slide Credit: Dr. A. MacNeill

PLANETARY HEALTH

- A field focused on characterizing the human health impacts of human-caused disruptions of Earth's natural systems
- Planetary Health isn't an abstract idea, it's almost an attitude for living. PH is about people, not diseases, it's about equity, not accepting injustice. It's about knowledge as one source of social transformation, and it's about the right to the highest attainable standard of health, not only for people, but also for the planet.

Richard Horton, Editor-in-Chief, The Lancet

'Interdisciplinarity'



'We need a fundamental shift in how we live on Earth, what we are calling the Great Transition'

'We can no longer safeguard human health unless we change course'

https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(20)30200-X/fulltext#sec1

THE MAJORITY OF HEALTH CARE GHG EMISSIONS OCCUR 'UPSTREAM' OF DIRECT PATIENT CARE



NHS – 1st medical system to pledge and devise PATHWAY TO NET ZERO (by 2040)





ISN: 'Kidney disease is often not included in major chronic disease control strategies, presenting an obstacle when engaging with governments to address kidney diseases'

Opportunities:

- Focused PCP education a cornerstone of prevention
- Canadian Task Force on Preventive Health Care / other guidelines
- Adapt ISN podcast 'A Beginners Guide to Kidney Health'
- World Kidney Day engagement ? social media 'champions'
- Government: WHO 'Health in All Policies' framework



Planetary Health Care: A Framework for Sustainable Health Systems, Lancet Planetary Health 2021

Opportunities:

- PCP education and outreach
- Prioritized funding
 - Transplantation and preventative pharmacotherapy
- Choosing Wisely

'Don't initiate chronic dialysis without ensuring a shared decision-making process between patients, their families, and their nephrology health care team'

'Don't initiate dialysis in outpatients with Stage 5 CKD in the absence of clinical indications'

? Labwork frequency

• Procurement: Environmentally preferable purchasing



Planetary Health Care: A Framework for Sustainable Health Systems, Lancet Planetary Health 2021

Opportunities:

- Work with industry partners
- Work with transit authorities
- Innovation:
 - New materials packaging, supplies
 - On-site sterilized mixed dialysis waste plastic
 - Novel dialysis systems



Beyond segregation...

Slide credit: Dr. K. Barraclough

Machines exist that can sterilize and shred clinical waste on site

- \rightarrow Reduced waste volume by up to 90%
- ightarrow Reduction in waste disposal cost
- ightarrow Potential for use of sterile end-product



WHAT CAN I DO? THINK AND FUNCTION IN PH FRAMEWORK

- Calculate your own carbon footprint & challenge yourself to reduce it
 - Carbonfootprint.com
 - Carbonzero.ca allows offset purchase
- Nature 'PaRx' (parkprescriptions.ca) and exercise prescribe
- Practice preventively
- Educate
- Adjust work flow:
 - Reduce materials use, reusable when possible ie gowns, EMR, reduce travel (tele- / video health, e-attend conferences)
- Involve your health care setting every provider should have a sustainability plan
- Update emergency plans patient and health system levels

WHAT CAN I DO ? Access and Learn Planetary Health Resources

- Health Authority sustainability resources IH Sustainability 'Green Island Health'
- Sustainability training Green+Leaders Certification (BC Greencare)
- Canadian Coalition for Green Healthcare annual awards
- Canadian Association of Physicians for the Environment 'Climate Change Toolkit'
- Planetary Health Alliance planetaryhealthalliance.org yearly conference
- Centre for Sustainable Health Care (UK), Centre for Sustainable Health Systems (Canada)
- Journals Lancet Planetary Health, Journal of Climate Change and Health
- NGO materials World Bank Climate-Smart Healthcare Report

Examples: <u>Past 3 Months</u> Using the SIFEI Grant to Engage our Hospital Community Broadly (get a network!)















Environmentally Sustainable Healthcare: Our Priority Planning Process



Conduct environmental review of each clinic / area

Provide correct recycling signs / containers in all areas

Reduce routine labs on HD patients q4 \rightarrow q6 weeks

Vendors:

- local suppliers when possible
- Advocate for recycling dialysis supplies for home patients
- Environmentally preferable purchasing

Advocate to pharmacare to fund preventive meds

Advocate for green transport to work / care

SNAP: Actionable Items per Centre for Sustainable Health Systems approach) - 1 Privilege of CSN 'Umbrella'

- Education
 - Optimize prevention tools
 - Increase green workforce: part of fellowship training +/- Green Nephrology fellowship
 - Partner with Royal College (CPD resources) serve as a framework for other specialties
 - Partner with international professional societies to expand green agenda
 - Add sustainability focus to annual meeting

• Policy & Regulation

- Prioritize funding for preventive pharmacotherapy and increase transplantation
- Universal uptake of environmentally preferable purchasing
- Advocate for green transport to / from kidney care services



SNAP: Actionable Items - 2 *Privilege of CSN 'Umbrella'*

- <u>Quality Improvement</u>
 - Sustainability KPIs create, and implement system of national reporting
 - Inventory control best practices
 - Standardize med rec initiative (including deprescribing when appropriate)
- <u>Research & Innovation</u>
 - Network of Canadian nephrology programs as innovation 'labs' for green technologies
 - Central repository of projects / contacts / lessons learned
 - Interdisciplinary partnerships (ie. engineering) toward new technologies
- <u>Patient & Community Partnership</u>
 - Opportunity to involve and engage patients ideas & voice, renal diet
 - Industry: expectation that climate action be part of operations
 - Waste management systems: optimize circular waste processing



Now It's Your Turn!

CHALLENGE TO ALL, a call to Action!

****** Think and function in PH framework ******

Find 3 areas needing improvement in each clinical setting and take on a project!

- New CSN committee dedicated to environmental and systems sustainability in Canadian kidney care
 - Searching for motivated members with representation across Canada
 - <u>Frequency</u>: Monthly meetings
 - <u>Across care spectrum</u>: Ideally transplant, managerial, QI expertise, pediatrics
 - <u>Multidisciplinary</u>: Pharmacists / Nursing / dietitians / techs / patient care representatives / administrative
 - Report directly to CSN executive
 - Central resource / registry / coordination for community in sustainability

QUESTIONS? COMMENTS? INSPIRATION? snap@csnscn.ca

'There's no good thing that can be said about despair and pessimism. The whole thing is on the line right now, the entire meaning of the evolution of Homo sapiens. We either show that our power of invention is tremendous, or we show that the development of imagination in the hominin line was maladaptive.' *Barry Lopez*

THANK YOU!

