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Nephrology Nurses: Essential Professionals in Sustainable Kidney Care

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Abstract

Purpose: The increasing frequency of extreme climate events underscores the need for urgent action on climate change. The health care system contributes 4.6% of greenhouse gas emissions (GHGs) in Canada; thus, it is a major contributor to the country's carbon footprint. Kidney care in particular can involve high amounts of waste (eg, plastic and consumable waste associated with dialysis, transportation, emissions, energy, and water consumption). Therefore, sustainability initiatives within the health care system, and especially in the context of kidney care, have great potential to make a positive impact on planetary health. Here, we outline ways in which nephrology nurses can expand our duty of care to the environment and incorporate sustainability into our work.

Sources of information: A small advisory group of nephrology nurses in partnership with the Canadian Association of Nurses for the Environment (CANE) assessed ways that sustainable practices can be incorporated into nephrology nursing. Drawing on the Planetary Health Care model used by the Canadian Society of Nephrology: Sustainable Nephrology Action Planning (SNAP) committee, we assessed how the model could be adapted in the context of kidney care using 3 main actionable themes in their work: reducing the demand for health services, matching the supply of health services with demand, and reducing emissions from the supply of health services. We also reviewed and selected real-world examples of initiatives pursued by colleagues.

Key findings: Through this established framework, we provide recommendations and case examples for nephrology nurses to expand our duty of care to the environment. We describe nursing-led strategies used in Canada to improve environmental sustainability in kidney programs and consider their applicability to other renal programs. In 1 case example, we show how a simple nurse-led initiative at a single dialysis clinic can lower plastic waste and associated costs by $2042.59 per year. More broadly, we provide recommendations and actions for nephrology nurses to improve environmental sustainability in kidney care.

Limitations: Nurses in Canada have many responsibilities within limited timeframes, making it essential to choose sustainable practices that do not exacerbate burnout and high workloads. For sustainable practices to be successful, nurses must integrate them into their existing workflows.

Abrégé

Contexte: L'augmentation de la fréquence des phénomènes climatiques extrêmes met en lumière la nécessité de prendre des mesures urgentes pour lutter contre les changements climatiques. Le système de santé est responsable de 4,6 % des émissions de gaz à effet de serre (GES) au Canada et contribue grandement à l'empreinte carbone du pays. Les soins rénaux en particulier peuvent générer de grandes quantités de gaspillage (p. ex., déchets plastiques et consommables associés à la dialyse, transport, émissions, énergie et consommation d'eau). Par conséquent, les initiatives de durabilité dans le système de santé, et en particulier dans le contexte des soins rénaux, pourraient avoir une incidence positive sur la santé de la planète. Dans cet article, nous décrivons comment le personnel infirmier en néphrologie pourrait élargir son devoir de soins à la protection de l'environnement par l'intégration des pratiques durables dans son travail.

Sources de l'information: Un petit groupe consultatif constitué d'infirmières et infirmiers en néphrologie, en partenariat avec l'Association canadienne des infirmières et infirmiers pour l'environnement (ACIIE) et le Sustainable Nursing Action Planning (SNAP) Committee, s'est réuni pour évaluer comment les pratiques durables pourraient être intégrées aux soins infirmiers en néphrologie. Nous avons utilisé un modèle de soins favorisant la santé de la planète et décrit de manière itérative les façons dont celui-ci pourrait être adapté au contexte des soins rénaux. Nous avons également examiné quelques exemples concrets d'initiatives prises par des collègues.

Principales observations: Nous décrivons comment le personnel infirmier en néphrologie pourrait appliquer un modèle de soins favorisant la santé de la planète dans le cadre de son travail. Ce concept est présenté sous trois principaux thèmes exploitables: réduire la demande pour des services de santé, adapter l'offre de services de santé à la demande et réduire les émissions liées à l'offre de services de santé. Dans ce cadre, nous formulons des recommandations au personnel infirmier en néphrologie et nous lui présentons des exemples de cas pour élargir son devoir de soins à la protection de l'environnement. Nous présentons des stratégies utilisées au Canada, et menées en soins infirmiers, pour améliorer la durabilité environnementale des programmes rénaux. Nous examinons également leur applicabilité à d'autres programmes rénaux. Dans un des exemples de cas, nous montrons comment une simple initiative dirigée par une infirmière, au sein d'une seule clinique de dialyse, a permis de réduire la quantité de déchets plastiques et les coûts connexes de 2 042,59 $ par année. De manière plus générale, nous formulons des recommandations et proposons des actions qui pourraient être posées par le personnel infirmier en néphrologie pour améliorer la durabilité des soins rénaux.

Keywords
planetary health, sustainable health care, sustainable nephrology, green nephrology, nursing, nephrology nurse

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Introduction

Kidney disease and the environment are closely interrelated. Environmental problems can aggravate kidney diseases, and treatment of kidney disease, especially dialysis, leaves a substantial ecological footprint including water and energy consumption, greenhouse gas emissions (GHGs), and waste production.[1-5] Building a more sustainable health care system will require an all-hands-on-deck approach—but nephrology nurses are frontline workers who are present at many clinical decision points and are well positioned to help implement sustainability initiatives into practice. As well, nurses have strong and valuable voices in health care, and therefore are in pivotal positions to advocate for more sustainable care.

The waste within a hemodialysis unit contributes to a significant portion of a hospital's carbon footprint due to the large consumption of 1-time use consumables. The decisions nurses make about waste, supply, and reduction on the front lines of clinical care can be impactful for the environment and should not be underestimated. With strategic implementation of sustainability programs and actions, it is possible to reduce waste and carbon emissions associated with dialysis, while complementing existing workflow and involving minimal additional steps.

The Sustainable Nephrology Action Planning (SNAP) committee of the Canadian Society of Nephrology (CSN) was created in January 2022 with the mission to educate, innovate, and advocate for sustainable kidney care. The SNAP has adopted the Planetary Health Care Model[6] to achieve this vision, which is based on 3 principles: (1) reduce the demand for health services, (2) match the supply of health services to demand, and (3) reduce emissions from supply of health services. Figure 1 shows how this model can be adapted in the context of nephrology nursing care.

Reduce Demand for Health Services

Dialysis therapies for end-stage kidney disease are associated with a significant environmental impact. A single hemodialysis treatment contributes 58.9 kg CO_2 eq to the carbon footprint, which is the equivalent to driving 238 km.[3] Keeping people healthy—and reducing the carbon and waste footprint of health care—starts with primary prevention of kidney disease. The Kidney Foundation, CAN-SOLVE CKD, and other renal networks across Canada, have developed clinical toolkits aimed at risk identification and diagnosis of CKD.[7] Nurses can advocate for and facilitate implementation of these tools into the clinic, as a form of secondary prevention to reduce the burden of kidney disease on individuals and health systems.

Nurses also play a valuable role in advancing health literacy skills for patients. By explaining complex information in an easy-to-understand manner, nurses can make information more accessible and easier for patients to grasp. Clarity allows patients to follow instructions correctly. As a result, positive medical outcomes are more likely.[8] Systems to support medication compliance, such as reminder tools, blister packs and medication reconciliations, may help patients stay healthy and require less medical care, which could ultimately reduce the environmental footprint.[9] These educational

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Figure 1. The framework for sustainable health systems generated by MacNeill et al[5] adapted within the context of kidney care. Kidney care services have a substantial environmental impact, and there is an opportunity for nephrology nurses to align clinical care and duty of care to the environment. Using the framework's guiding principles for sustainable health systems, nurses can strengthen planetary health and seek to maximize patient outcomes while being cost-efficient and environmentally responsible.

interactions with patients may also present an opportunity to share sustainable practices.

A nurse must tailor educational goals to patients' needs and account for their learning styles. Education should empower patients to positively affect the prevention, management, or modification of illness.[10] Educational opportunities may include home blood pressure and glycemic control monitoring, diet, and medication adherence, reinforcing the benefits of exercise, and smoking cessation. Patient education for those on dialysis should include ongoing reinforcement of infection control practices, dialysis regime compliance, and activities that will aid in the motivation to stay healthy. Recommended practice includes providing patients with a solid knowledge base to support improved health outcomes and result in higher levels of health knowledge.[7] Nursing assessment that includes signs of mood alterations such as depression, anxiety, failure to thrive, and other conditions that may affect motivation and compliance should be completed on an ongoing basis.[9,11]

Table 1. Depicts Cost Savings by Reducing the Weight of Waste in a Small Community Hemodialysis Unit With 9 Stations.

Yearly cost of biohazard waste	
Year 1 (pre-intervention)	Year 2 (post-intervention)
$6726.11	$4683.52
Cost savings	$2042.59

Note. Waste is billed according to weight. The impact would be much more significant for a sizeable in-center dialysis unit. CORR Canadian Organ Replacement Register Directory: as of 2020, there are 325 dialysis units in Canada.[18] An opportunity for a nationally coordinated infrastructure for biohazard waste would result in a substantial cost savings and a substantial reduction in biohazard waste.
Source. Table 1 was created from the Clinical Waste Reduction Project, Duncan Community Dialysis Facility, Kennett (2019).

Notably, transplantation involves the lowest environmental burden of all renal replacement therapies.[4,12-14] Thus, education should also include actions to increase uptake of transplantation, including education on organ donation and efforts to increase participation in living donor paired exchange registries. Furthermore, kidney care nurses and teams should adopt programs to promote pre-emptive transplantation, such as the Transplant First Initiative in British Columbia.

Match Supply With Demand

One way to avoid excessive use of resources is to match supply to demand. Notably, both underuse and overuse of resources are important to avoid, as both result in suboptimal patient outcomes with the potential for higher impacts on the environment.[9]

Goal setting is the process that allows the nephrology nurse to gather information and work with the patient to set specific goals for the patient to live well. The focus is on what matters to the patient and may reduce the ecological burden due to misaligned modality selection, such as in-center hemodialysis rather than home-based dialysis.

The trajectory of chronic kidney disease (CKD) varies substantially as age and life situations occur. The goals of chronic care are generally not to cure, but to enhance physical, cognitive, and social functionality, and quality of life; prevent secondary conditions; and minimize distressing symptoms.[14,15] In Canada, most patients with CKD glomerular filtration rate (GFR) categories 4 and 5 (G4-G5) are older than 65 years with 5-year survival while receiving dialysis being ~38.9% for those who initiated at 65 to 74 years old and 25.3% for those who initiated at older than 75 years.[15] As a person ages and face sentinel events, decisions about medical care become a more challenging. Embedding regular goal-setting discussions with patients into the nurse workflow can avoid unnecessary treatments and medical procedures. This routine practice will benefit both the patients and the environment.

Table 2. Depicts Key Considerations for a Clinical Waste Trial Within a Hemodialysis Unit.

Key considerations:
1. Perform a baseline data audit to understand current state and identify areas for improvement.
2. Involve staff, identify 2 or more champions to lead the change.
3. Enlist the help of the Sustainability Management team of your organization to meet with community partners and identify who is responsible for the recycling program in the region.
4. Identify items that are recyclable.
5. Ensure appropriate items are placed in collections bins. If the collected recyclables reach more than 10% contamination with non-recyclable items, the whole collection gets sent to the landfill.
6. Make recycling easy and convenient, for example. Locate blue bins close to the hemodialysis machine that collects soft plastics and replace large plastic bags that hang on the bedside table with paper brown bags for garbage. Photo (E)

Photo (D)
Photo D portrays pre-intervention bedside plastic waste bag.

Photo (E)
Photo E portrays post-intervention bedside paper waste bag and soft plastics recycling.

Source. Table 2 was created from the Clinical Waste Reduction Project, Duncan Community Dialysis Facility, Kennett, A. (2019).

When appropriate, nephrology nurses should use a palliative approach to care that may reduce the ecological impacts of dialysis practices while enhancing patient care and aligning with the patient's wishes. This approach can assist in transitioning the patient to end of life when required, de-prescribing medications when appropriate, and avoiding unnecessary hospital visits and procedures.

Reducing Emissions From the Supply of Health Services

Frontline nursing staff have the best understanding of workflow issues that impede proper recycling and sorting at the bedside and can advocate for unit flow design changes that would facilitate safe waste disposal and recycling strategies. These small changes can be adapted into daily operations to ensure efficiency with limited disruption to hemodialysis routines or patient care. Four tactics that can reduce emissions from the supply of health services include green commuting, recycling and sorting waste, stock management, and advocating for safer environmental alternatives.

In terms of green commuting, the vast geography in Canada means that many people living with kidney disease in rural and remote areas must travel to urban centers to receive care. Nephrology nurses can educate patients on modality options such as transplantation and home therapies, which may improve health outcomes while reducing the carbon footprint. Furthermore, virtual care appointments can minimize patient and staff travel and should be optimized when appropriate. Some remote patients require travel from a distance by bus, car, or airplane to receive care in tertiary hospitals; nurses can advocate for virtual health clinics to minimize emissions as well as the disturbance and financial burden to the patient.[16]

This focus is warranted given that transportation of people and goods contributes significantly to overall health sector carbon (CO_2) emissions. The National Health Service (NHS) in the United Kingdom attributes approximately 9% of its total carbon footprint to "personal travel," which includes trips made by employees (4%), patients (5%), and visitors (1%) to care facilities.[4] Reducing unnecessary journeys should be optimized when appropriate. The carbon footprint savings may range between 0.70 and 372 kg CO_2e or more per consultation.

Historically, there is a high rate of single driver commuting among nurses, for various reasons such as long shifts, over night shifts, or personal safety. Some nurses commute from a distance to their workplace, and often transit or biking

options are not feasible. However, many health care organizations across Canada are now offering incentives to go green when commuting to work. The nursing leadership role to improve commuter options may include subsidies for transit, secure bike lockers with associated clothing lockers, showers with towels, air pumps, and repair tools. Furthermore, promoting a "walk to work" campaign may provide nurses with the recommended 10 000 steps per day including the psychological benefits of daily walking.[17]

To help reduce waste, nurses should aim to reduce the volume of supplies, reuse supplies when infection control standards allow, rotate stock to avoid discarding expired supplies, and handling supplies with care to avoid cross contamination, or damage, that may result in items going to the landfill. Review workplace space management allocation vs actual needs to detect excess supply stocking.

Nurses can advocate for more sustainable options, including supplies that contain less packaging, dialysis vendors with the goal of working toward carbon neutral operations, and switching to products that are made of safer environmental alternatives. Supply waste is especially burdensome in dialysis, where most items that are sterile must be discarded if expired or handled inappropriately. Unit-based efforts to cut down on wasted supplies can help to reduce both waste and cost.

Supply Waste: A Case Example

A community dialysis unit on Vancouver Island in British Columbia, undertook a small-scale initiative to reduce waste, which illustrates how easily changes can be made into the nurses' workflow to reduce waste and cost.

Pre-intervention

Pre-intervention Base-Line Audit

- The maximum supply ordering amount for each item on the hemodialysis unit was not in line with the unit's actual needs.
- Renal technicians placed all dialysis supply orders with very little input from the nurses on unit requirements.
- No standardized process for placing orders.
- No system in place to flag products that are about to expire.
- Some stock was rotated, other stock was not.
- Some of the supplies are supplied in large quantities, more than what the unit requires.

Actions Taken to Reduce Supply Waste

- A standardized ordering processes which include minimum and maximum amounts to order of each item.
- Every 3 months, nurse leader to review supplies with technician and adjusts min/max amounts. More often, if there a shift in patient population/needs.
- Rotate all stock without having to move the stock. The use of flags that say "use first" to notify whoever is requiring supplies to use the flagged next to expire items. (Avoids products from expiring).
- Ensure proper handling of stock, to avoid damage resulting in products entering the landfill.

Clinical Waste: A Case Example

A second small-scale initiative illustrates how easily changes in practices can reduce waste and cost.

Photo A. Photo A provides a close-up portrait containing a mixture of non bio-hazardous waste in the bio hazard containers.

Photo B. Photo B portrays a snapshot of 3 bio hazard containers collected daily.

Post-intervention

Diverting clinical waste, which is expensive to dispose of into the cheaper, domestic stream resulted in an annual cost savings.

Photo C. Photo C portrays appropriately sorted biohazard waste and reduced to 1 biohazard container daily.

Financial Considerations

Over the course of 1 year, actively targeting waste management and changing habits of disposing all non-biohazard waste in biohazard bins reduced costs by $2042.59. Figure 2 describes the cost savings for year 1 and year 2.

Of note, intravenous medications, oxygen, and other life-saving interventions come at a steep environmental cost due to improper disposal of Poly Vinyl Chloride (PVC) plastics. In Canada, approximately 211 057.55 kg of PVC is consumed annually by dialysis patients.[19,20] Most plastic waste is discarded into landfills instead of adequately recycled. At a national level in Canada, recycling PVC from dialysis alone would reduce CO_2 emissions by 485 060 lbs per year.[9]

Notably, nurses can report concerns to the Sustainability Manager or Sustainability Coordinator in the health region about excessive plastic packaging or mishandling of waste under the supply chain "product investigation center" by citing "environmental concerns" and are therefore well positioned to advocate for more sustainable disposal of plastic.

Discussion

Position statements from the Canadian Nurses Association (CNA) and the International Society of Nursing suggest that nurses should play a crucial role in supporting 2 critical climate issues through nursing practice, research, administration, education, and policy. This includes adaptation, which refers to "responding to climate change's effects," and mitigation, which refers to "taking action to reduce climate change."[21]

As nurses are typically in close proximity to the communities and individuals they serve, sometimes being the only health care professional in the area, and as trusted health experts, the nursing profession in particular can play a large role in helping communities adapt to climate change, toward the goal of fostering a sustainable and climate-resilient future.[22] To support this goal, the Canadian Nurses for the Environment (CANE) provides eco-literacy information on climate change and believes that nurses should be at the forefront of advocacy to support best nursing practice in environmental health.[23]

It is important to note that some barriers may exist in implementing these practices. Health care systems in Canada are limited in staff and resources. It is therefore essential to look for solutions that can be integrated into the system using existing infrastructure. As well, nurses have numerous responsibilities to complete in limited timeframes, underscoring the need to choose sustainable practices that do not exacerbate burnout and high workloads. Administrators should consider funded hours for nurses who take on a supernumerary role of planetary health leaders in the field to avoid adding to their existing high workloads. This role could leverage the nurse's voice to reduce the carbon footprint by teaching, practicing, and leading fellow nurses toward sustainability in health care.

Creating a sustainable health care system is a shared responsibility, so it is important to engage all renal network partners—doctors, patients, administrators, and other care providers—in the journey to reduce GHGs and waste and improve planetary health as a whole. Although it may be helpful to identify champions who can help lead sustainability initiatives in care, who will be vital for maintaining traction and encouraging staff engagement, each team member must understand that there is a shared responsibility to take action—a commitment that does not belong to 1 discipline.

Conclusions

The need to create a sustainable health care system only increases as climate change progresses, and renal nurses are particularly well positioned to help integrate more environmentally friendly approaches into practice. This includes 3 major methods, by: reducing demand for health services, matching supply to demand, and reducing emissions from the supply of health services. Together, as a team with other health care providers, patients, and stakeholders, renal nurses can be leaders in creating a more sustainable health care system.

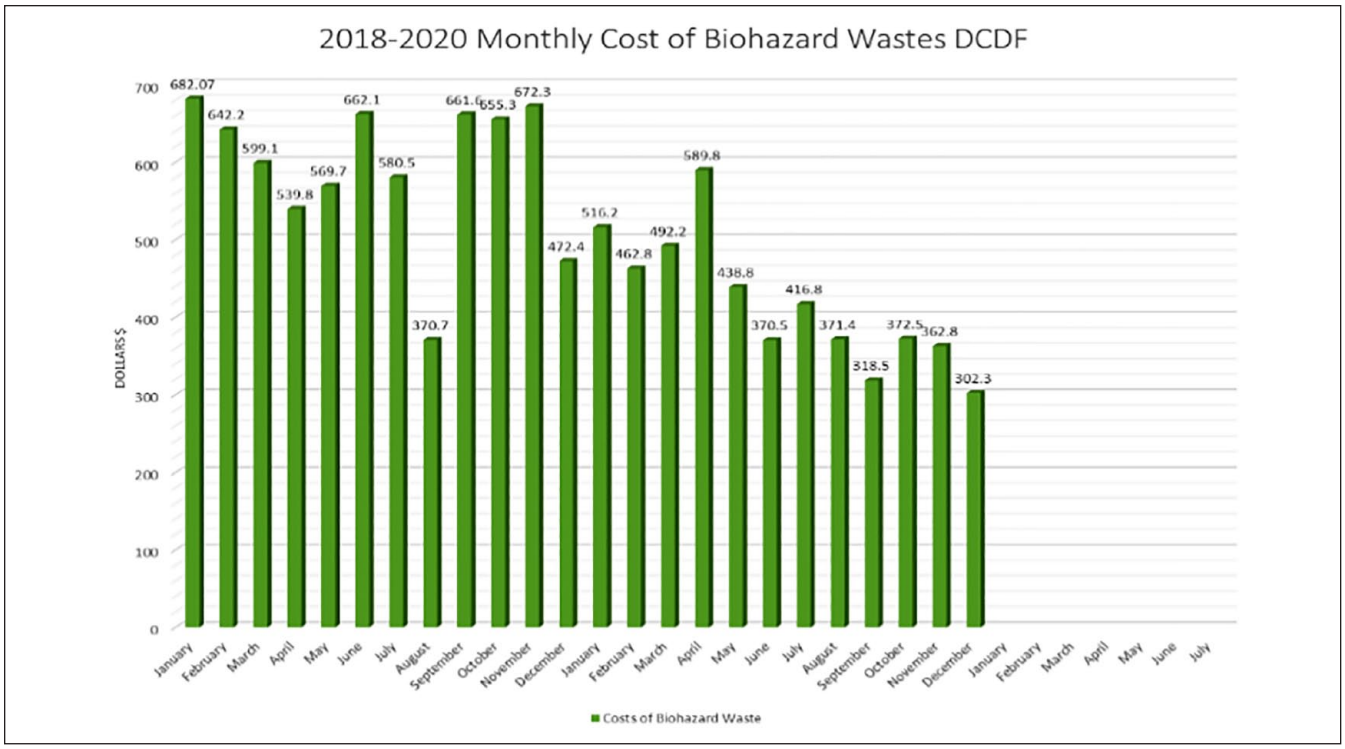

Figure 2. Monthly cost of bio hazard waste disposal in Vancouver Island Community Dialysis Unit from 2018-2020.

Ethics Approval and Consent to Participate

Not applicable.

Consent for Publication

Not applicable.

Availability of Data and Materials

Not applicable.

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