POSITION STATEMENT

Environmental stewardship, sustainability, and planetary health related to infection prevention and control

This position statement was developed by the Standards and Guidelines Committee of IPAC Canada chaired by:

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BACKGROUND

Infection prevention and control (IPAC) practices are both impacted by and contribute to climate change and pollution. The World Health Organization (WHO, 2018) has identified climate change as the greatest global threat of the 21st century. Canada is warming more than twice as fast as the global rate, and the Canadian Arctic almost four times as fast (Rantanen et al., 2022). Extreme weather events from climate change are increasingly impacting the health of Canadians directly, through heat stroke (Adam-Poupart et al., 2014, 2015) and cardiorespiratory issues (Paterson et al., 2012; Levison et al., 2018). Global warming has contributed to the rise in diseases like Lyme disease in Canada, spread by vectors which can now live further north (Ogden et al., 2014; Canadian Medical Association, 2022; Romanello et al., 2024), and the simultaneous emergence of multidrug-resistant *Candida auris* in three continents may be linked to thermal adaptation (Casadevall et al., 2019).

Healthcare, despite its goal of doing no harm, is a significant contributor to climate change (Romanello et al., 2024), and if it were a country, healthcare would have the fifth-largest carbon emissions in the world (Karliner, 2020). The indirect disease burden from air pollution and toxic emissions is now at the level of medication errors that led to the patient safety movement (Sherman et al., 2020, 2024). Environmental deterioration also results from issues beyond carbon, including ecotoxicity, air quality, and water pollution (Fang et al., 2022).

Negative environmental impacts from healthcare begin with raw materials (Statista, 2024) and manufacturing. Disposable medical equipment use more than doubled between 2005 and 2020 and has risen exponentially further since, due to the increased use of personal protective equipment (PPE) during the COVID-19 pandemic (Rizan et al., 2021; WHO, 2022a). About 8 million tons of pandemic-related plastic waste were estimated to have been generated globally as of August 2021, most coming from hospitals – with about 25,000 tons ending up in the oceans (Peng, 2021).

The manufacturing process of metals used in healthcare equipment, especially for single-use metal items, produces toxic by-products. Petrochemicals are used to manufacture most disposable items (e.g., plastic gloves, PPE, wipes) and their packaging (Fang, 2022). Transportation of healthcare products further pollutes the environment, including with microplastics from vehicle tires (Fang et al., 2022; Statista, 2024). Microplastics have been identified throughout the human body, including in the brain (Nihart, 2025), placentas, and breast milk, primarily via inhalation and ingestion, and may increase risks of malignancy (Hamilton & Feit, 2019). Nanoplastics can also infiltrate cells (Dutchen, 2023). The effect of increased plasticization on human health remains largely unknown (WHO, 2022b; Tuvo et al., 2023). In the environment, including hospital wastewater systems (Tuvo et al., 2023), microplastics serve as a platform for biofilm growth, potentially fostering the development of antimicrobial resistance (He et al., 2022), such as in Gram-negative pathogens (Lee et al., 2025; Kaur et al., 2022).

Healthcare professional publications describe the potential negative impact of healthcare on the planet/environment and provide essential steps to mitigate and even prevent these impacts; however, Canadian implementation of these strategies has lagged (Miller & Xie, 2020). A working group from 13 Canadian organizations, including the Canadian Medical

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Association (CMA) and the Canadian Nurses Association (CNA), published a Joint Position Statement on environmentally responsible activity in the healthcare sector in 2005 (updated in 2009), calling on governments, policymakers, healthcare organizations, and individuals working in the sector to take action. The statement emphasized a collaborative approach to environmentally responsible healthcare through greener infrastructure, multidisciplinary green teams/sustainability committees to support ecological stewardship, and other best practices: education, research, energy conservation, environmentally responsible actions from vendors, safer substitutes for toxic substances, reuse and recycling, and safe disposal practices for biomedical and infectious waste, medications, plastics, mercury, and other toxic substances (CMA/CNA, 2009).

Various healthcare professional associations have continued to build on this, including the CMA (2022), CNA and the Canadian Association of Nurses for the Environment (CANE-AIIE, 2024), and most recently, the International Council of Nurses (ICN) in a November 2024 position statement. Individual medical specialties, such as Anaesthesia, have taken the lead internationally (White et al., 2022; McGain et al., 2020), and provincially (Ontario's Anesthesiologists, 2024), advocating for a circular economy in the procurement and use of medical devices and supplies, wisely using valuable resources, viewing waste as a resource instead of a cost, and using innovation to improve both the environment and the economy.

A circular economy (Government of Canada, 2022) in the medical device industry acknowledges that patient safety should not be compromised by sustainable practices but challenges the perception that single-use devices are necessarily safer than reusable ones, reinforcing the need for evidence while addressing environmental sustainability in education, research, and quality improvement (MacNeill, 2020). Medical device consumers, manufacturers, regulators, accreditors, and professional standards organizations have individual and collaborative roles, including identifying and addressing areas in need of design improvement (MacNeill, 2020).

IPAC aims to keep patients safe and reduce costs while enhancing quality improvement. Evidence-based standards need to optimize patient care and environmental performance, focusing on prevention. Prevention itself is a major sustainability initiative – e.g., prevention of *Clostridioides difficile* reduces costs and length of stay (Leal et al., 2019). IPAC policies and procedures may be empirically and/or excessively implemented without exploring the true risk reduction (Sherman et al., 2020) or may differ significantly across institutions. Risk stratification and collaboration across healthcare specialties and professional associations (e.g., IPS, APIC, IFIC, SHEA, The Lancet) can help mitigate this (Lee et al., 2025).

The COVID-19 pandemic challenged healthcare environmental stewardship initiatives. Post-emergency reflection clearly illustrates the capacity of healthcare in general (Griffiths, 2024) and IPAC programs in particular (WHO, 2022a) to generate vast amounts of medical waste. The appropriate use of healthcare resources is a critical component of patient-centred care (Choosing Wisely Canada, 2019) and occupational health and safety (Occupational Medicine, 2021), and impacts the planet, especially through the environmental impact of waste (e.g., single-use products [Keil et al., 2023], plastics from PPE [Parveen et al., 2022], and chemicals [Cubas et al., 2023]).

Sustainability and IPAC are often perceived as being at odds (Otter, 2022), with IPAC opting for single-use items due to cleanliness or sterility challenges (Balch, 2022). However, the IPAC Canada Program Standard (2024) recognizes that IPAC practices have a global impact and responsibility, including stewardship of resources, and the time is ripe for IPAC to take a leading role in supporting sustainability in healthcare.

POSITION STATEMENT

- The healthcare organization shall have IPAC program policies, procedures, and protocols that are current, based on local/provincial/territorial regulations, evidence, and best practices, including resource stewardship (IPAC Canada Program Standard, 2024).
- The organizational leadership and the IPAC program should:
  - Recognize that sustainability is inherent in quality and better care;
  - Include environmental impact and sustainability in risk-benefit analyses of materials and processes within the organization;
  - Establish a Sustainability Committee/Team;
  - Acknowledge the contributions of IPAC to ecosystem damage, and the importance of implementing strategies to address these;
  - Include IPAC Team representation on all sustainability projects, from inception to completion;
  - Support IPAC input into the multi-facility buyer groups;
  - Identify barriers and opportunities to implement sustainable IPAC practices,
  - Adhere to government environmental policies; and,
  - Work to improve staff literacy in planetary health.
- The IPAC program must provide input into supply chain and procurement processes regarding product selection, (e.g., product evaluation committee, or similar), working with colleagues to source products which support ethical purchasing, as well as organizational and planetary health and sustainability, including but not limited to the following considerations:
  - Awareness of the impact of products and processes on the ecosystem (e.g., medical devices, sharps containers, medications [e.g., antibiotics], linens and detergents; and related processes such as recycling [especially plastics], disposal [e.g., antimicrobials], incineration, landfill [pollutants, bioaerosols].

- Recognition that reuse is often the best strategy, while recycling where possible that which cannot be reused effectively, and including separation of hazardous (infectious or toxic) from non-hazardous waste (McGain, 2020).
- Selection of chemicals (e.g., for environmental cleaning) based on appropriateness to remove or kill the prevalent organisms while protecting surfaces, occupational health and patient safety, and the environment.
- Review of manufacturers' instructions for use (MIFUs) to ascertain the ability of the item to be reprocessed, and to consider products that can be safely reprocessed over those which, by their structure and function, could be reused but are not supported for this in the MIFUs. Reprocessing should be the default choice where possible.
- Requesting clear and consistent reprocessing guidelines, environmental performance metrics/disclosure of a product's environmental emissions through life cycle assessment for entering into a service contract, and details of ongoing service and availability of replacement parts.
- Collaboration with external partners to support extended producer responsibility.

· The IPAC professional should consider the environmental impact of all products considered for, or currently in use in the organization, in particular any items or devices used in the delivery of IPAC best practices, including:

- Using recent evidence, including environmentally preferable and waste-sparing practices (e.g., Choosing Wisely) (CMA, 2022) to balance the desire to remove all infection risk at all costs with the need to protect planetary and population health,
- Focusing on prevention to conserve natural resources and reduce pollution through unnecessary clinical care,
- Evaluating costs and benefits to both the environment and people, internally and externally,
- Reflecting on practices and looking to support sustainability, e.g., personal risk assessment for use of PPE especially gloves and gowns,
- Identifying opportunities to minimize waste, e.g., reducing overuse of PPE, and reducing disposal of unused clean (Otter et al., 2013) or expired PPE,
- Reinforcing strategies such as hand hygiene and no-touch techniques to avoid contamination in preference to glove use (e.g., UK no glove initiatives) (Dunn & Harkus, 2021),
- Monitoring reprocessing, including cleaning, disinfection, and sterilization practices for quality and efficacy, and
- Engaging, where possible, in innovation to reduce waste and pollution (e.g., participating directly in research in waste-reduction strategies, holding manufacturers accountable for reducing pollution).

GLOSSARY

Circular economy: Economy that retains and recovers as much value as possible from resources by reusing, repairing, refurbishing, remanufacturing, repurposing, or recycling products and materials.

Ethical purchasing: Ensuring that the products or services procured do not involve any form of exploitation, whether it's of human beings, animals, or the environment.

– Government of Canada, 2024

Sustainable health system: One that "improves, maintains, or restores health, while minimizing negative impacts on the environment and leveraging opportunities to restore and improve it, to the benefit to the health and well-being of current and future generations."

– World Health Organization, 2017

Sustainability: A guiding principle that meets the needs of the present generation without compromising the ability of future generations to meet their own needs.

Ethical procurement: Safeguarding federal procurement supply chains from forced labour, child labour and human trafficking, and doing business with ethical suppliers (Government of Canada, 2024); Commitment to fair business practices, respect for human rights, considering environmental impact and ensuring that all workers within the supply chain are treated equally.

Planetary Health: The health of human civilization and the natural systems on which it depends; a fundamental concept which incorporates a multidisciplinary approach to balancing human needs with the preservation of the Earth to sustain the health and well-being of future generations (Lancet Commission on Sustainable Healthcare, 2024; The Joint Commission, 2024; Rockefeller Foundation, 2017).

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