



COVID-19 AND PPE WASTE

A catalyst for a reusable personal protective equipment health system

By Kent Waddington, Linda Varangu & Mia Sarrazin

CCOVID-19 was first confirmed in Canada at the end of January 2020. With this came great urgency to respond in a way that embraced existing infection control and treatment protocols while battling a rapidly expanding and unfamiliar enemy, as well as an unprecedented demand for personal protective equipment (PPE). Early in the pandemic, Health Canada predicted an estimated 63,000 tonnes of plastic PPE would end up as waste and ultimately in landfills.

In November 2020, a project — Towards a Safe, Secure and Sustainable Reusable PPE System in Canadian Health Care — was initiated with financial support from

Environment and Climate Change Canada. It set out to demonstrate that hospital-use of PPE and some medical single-use plastic (mSUP) materials could be successfully and safely managed by focusing on the preferred principles of a circular economy: reduction and reuse. First by addressing opportunities to reduce and then by choosing products that can be reused; only after these two have been optimized, recycle as much as possible.

Government of Canada priorities to move Canadians toward zero plastic waste by 2030 were key driving factors for this project. The federal government supports the development of a new, ambitious, legally-binding global agreement that takes a life cycle

approach to addressing plastic pollution and reducing micro plastics in the environment. Other complimentary government priorities include supporting a climate resilient, sustainable and low carbon health system, and moving toward circular economy practices within the Canadian economy.

PROJECT STEPS

Knowledge development steps included an environmental scan of the literature on PPE and mSUP activities within the country's circular economy, followed by one-on-one engagement with more than 75 representatives from a multitude of sectoral stakehold-

ers, including PPE and mSUP users, specifiers, medical practitioners, waste management professionals, manufacturers and reprocessors. Using information gathered from this phase, seven roundtables were developed incorporating four design scenarios — throw away, industrial recycling/disposable, prevention/reduce and redesign, and prolonged service/reusable — which were created to assess participant support for specific elements of the circular economy. Key takeaways from these workshops included support for reduction, reuse and recycling of PPE and mSUP, and participants’ surprise that reuse was a much cheaper alternative to recycling and disposal options.

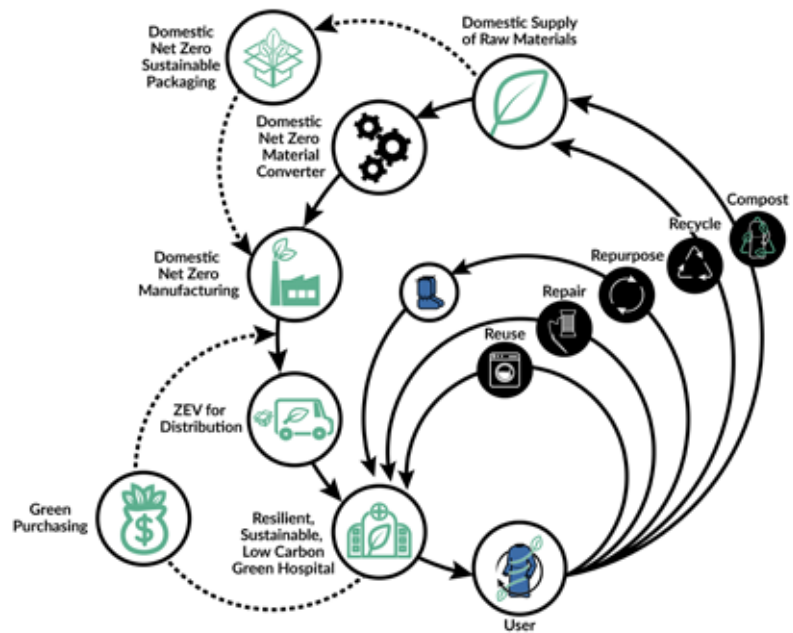
Further outreach to the healthcare workforce occurred through surveys geared to understanding current practice, challenges and opportunities as they related to PPE and mSUP use in Canada’s health system. The individual PPE products of interest in the project were gloves, gowns, medical-grade surgical masks, reusable elastomeric respirators, goggles and face shields.

MAIN OBSERVATIONS

In most instances, when purchasers or the healthcare workforce referred to PPE, they were describing disposable products, not reusables. This aligns with the global trend in healthcare toward increasing use of disposable PPE and mSUP.

“Our health system has developed increasing reliance on single-use items, including disposable N95 respirators and gowns, creating more waste and other emissions. As we experienced in the early days of the pandemic, this is not sustainable,” says Dr. McNeill, surgeon, clinical associate professor and director of the Planetary Health Lab at the University of British Columbia. “It’s a lot easier to scale up your reuse cycles, such as laundering gowns or replacing the filters in reusable respirators, than it is to actually manufacture more of something. And it creates less pollution.”

In the United States health system, an estimated 85 per cent of PPE gowns were disposable in 2020, while more reusables were worn in Europe and Canada. Key Canadian healthcare leaders are starting to buck the disposables trend and many actions were undertaken by members of the healthcare workforce during the pandemic that supported reusables for safety, security and sustainability reasons.



▲ Idealized circular economy system with a future focus on reusable plant-based personal protective equipment gowns.

SAFETY

Most purpose-made reusables used in healthcare have shown to be safe.

“The idea of safety of single-use disposable consumables has been very successfully perpetuated by industry such that the entire landscape has shifted, making it easier for hospitals to be reliant on single-use disposables when in fact there are no data to back up that claim of improved safety from an infection prevention and control perspective,” says Dr. McNeill.

Health Canada provides standards for the material integrity of gowns, protective nature they provide and safe use of reusable PPE. CSA Group has a series of standards dealing with infection prevention and control, and specifically with decontamination, disinfection and sterilization through CSA Z314, Canadian Medical Device Reprocessing.

The evidence for gown safety is further supported by the fact many large Canadian hospitals and health systems have safely deployed reusable isolation and surgical gowns, elastomeric respirators, a variety of clinical products like rigid sterilization containers (to replace plastic ‘blue wrap’), laryngoscopes blades and handles, and anesthesia breathing circuits.

Increased domestic manufacturing of PPE will help provide greater assurance that reusable PPE meet strict Canadian medical device standards, as some imported products during the pandemic were found not to meet them.

SECURITY

The pandemic is believed to have helped reverse some of the disposable trend in Canada, particularly in locations where hospital laundry service was accessible to clean and sterilize reusable PPE, such as gowns, and medical device reprocessing capabilities or localized sterilization were available for reusable elastomeric respirators.

In the case of Mackenzie Health, reduced availability of disposable PPE contributed to the Ontario health authority’s decision to use reusable PPE to increase security and access to these critical supplies.

“During the early days of the pandemic when PPE supply was at risk, Mackenzie Health leadership was laser focused on procuring PPE and other supplies we needed to ensure our staff and physicians were safe,” says Mackenzie Health president and CEO Altaf Stationwala. “The reusable isolation gown solution Ecotex provided — at the most challenging time in healthcare for basic supplies of commodities — was fundamental to delivering patient care. Not only was the initial supply timely, it also immediately introduced a predictable supply of product for the foreseeable future. The fact that it also reduced our environmental footprint was an added benefit.”

It is important to support domestic manufacturers striving to develop and refine safe, high-quality PPE, which can provide security in the supply chain. New domestic development of PPE during the pandemic

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includes Canadian companies developing isolation gowns, plant-based medical masks and healthcare-specific reusable elastomeric respirators to replace disposable N95s. Homegrown PPE solutions mean less reliance on the unstable global supply chain and its unpredictable price swings, increased access to local supplies, such as raw materials, enhanced local/on-site reprocessing and disinfection — all of which support improved resilience of Canada’s healthcare system.

SUSTAINABILITY

Sustainability encompasses financial, social and environmental aspects. A reusable PPE system supports all three of these dimensions.

With respect to cost savings, BC GreenCare estimates the per use price for a reusable gown is approximately nine times cheaper than that of a disposable one, resulting in \$2 million in savings over a six-month period, as well as nearly \$50,000 in avoided waste disposal costs. Similarly, Toronto’s University Health Network claims a 60 per cent savings after switching to reusable gowns. Reduced costs for reusable elastomeric respirators have been made by users, too.

Social benefits also accrue from increased use of reusable PPE, including support for local jobs and growth in regional manufacturing companies (enhanced research and development/innovation and new job creation/opportunities), safe domestic workforces, growth in both on-site and off-site cooperative and commercial laundries, as well as medical device reprocessing facilities. This is in contrast to the offshore manufacture of PPE where some facilities were identified as using forced labour.

The environmental benefits of utilizing reusable gowns include reduced use of fossil plastics, decreased healthcare-generated plastic waste and lower overall greenhouse gas emissions. One study that evaluated a number of science-based life cycle studies reported that reusable surgical gowns and

drapes demonstrated substantial sustainability benefits over the same disposable product in natural resource energy (200 to 300 per cent), water (250 to 330 per cent), carbon footprint (200 to 300 per cent), volatile organics, solid wastes (750 per cent) and instrument recovery. These sustainability benefits exist even in comparison with the required cleaning and sterilization of the reusable PPE, and support a more robust circular economy and enhanced planetary health.

KEY FINDINGS

An optimal reusable PPE gown system within the context of a circular economy was envisioned by the project team. Various components need to be in place to ensure a circular economy, including at the hospital, followed by the user and various reuse (cleaning/sterilizing, repair and repurpose) and recycling/composting options, sourcing of domestic raw materials, the converter, packaging plant, manufacturer and distributor. All of these will have minimized their use of fossil plastic and energy. What drives these activities is healthcare green purchasing, resulting in a safe, secure and sustainable reusable PPE system that provides maximum benefit on many levels of the health system. While no reusable gown made of domestically grown plant-based fibres exists yet, there’s no need to wait for it to start reaping the many benefits of a reusable PPE system now.

A circular economy approach for PPE gowns is just one of many opportunities for hospitals to engage in reduction and reuse practices to curtail the use of single-use plastics. Others include: virtual care, which cuts down on the use of PPE and transportation emissions; optimizing the use of gloves according to infection prevention and control guidelines, resulting in a reduction of glove use with enhanced hand hygiene practices; asking patients with scheduled admissions to bring in their own

garment bags; requesting removal of unneeded items in pre-packed trays for surgeries; encouraging manufacturers to replace fossil plastic with plant-based plastics as a raw material for reusable products and packaging; cleaning and sterilizing purpose-built reusables (PPE isolation and surgical gowns, elastomeric respirators, goggles and face shields, underpads and bibs, sharps containers and clinical products like anesthesia breathing circuits) within appropriate supporting infrastructure; employing patch kits like CleanPatch for damaged patient touch surfaces, such as vinyl/polyurethane mattresses; sharing products with other hospitals when they’re no longer required; and repurposing spent surgical gowns as PPE for non-sterile clinical applications or using them to make smaller reusable PPE, such as shoe covers used in surgery.

PPE use is expected to increase several-fold over the next five years, particularly after COVID-19 caused pent-up demand for surgeries. Hospitals can lead by purchasing safe, secure and sustainable reusables, which will save the Canadian healthcare system money, help protect the environment by reducing consumption of fossil plastics and waste generated, cut down on climate emissions, create domestic jobs to build thriving communities and help establish a resilient health system.

For more information on this project, got to <https://greenhealthcare.ca/ppe-msup/>. ■

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