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Resource Guide

Safety

Reusable gown safety:

- **Studies show reusable gowns were as safe or safer than disposables. Advances in textile engineering produce reusable gowns that meet stringent health care standards.**
  - McQuerry M, Easter E, Cao A. Disposable versus reusable medical gowns: A performance comparison. Am J Infect Control. 2021 May;49(5):563-570. doi: 10.1016/j.ajic.2020.10.013. Epub 2020 Oct 20. PMID: 33091509; PMCID: PMC7572274.
  - Baker N, Bromley-Dulfano R, Chan J, Gupta A, Herman L, Jain N, Taylor AL, Lu J, Pannu J, Patel L, Prunicki M. COVID-19 Solutions Are Climate Solutions: Lessons From Reusable Gowns. Front Public Health. 2020 Nov 25;8:590275. doi: 10.3389/fpubh.2020.590275. PMID: 33330335; PMCID: PMC7732643.
  - Overcash, Michael PhD. A Comparison of Reusable and Disposable Perioperative Textiles: Sustainability State-of-the-Art 2012. Anesthesia & Analgesia: May 2012 - Volume 114 - Issue 5 - p 1055-1066 doi: 10.1213/ANE.0b013e31824d9cc3.

- **The CDC recommends a shift toward reusable isolation gowns composed of polyester and polyester-cotton fabrics.**
  - CDC Coronavirus Disease 2019 (COVID-19). Centers for Disease Control and Prevention; (2020). Available online at: https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/isolation-gowns.html (accessed July 18, 2020). [Google Scholar]

- **Support for reusable gowns and appropriate healthcare laundry:**
  - Provincial support for using Reusable Gowns for infection Prevention and Control (IPAC) Purposes. Provincial Infection Control Network for BC. Provincial health Services Authority. www.bccdc.ca/Health-Professionals-Site/Documents/COVID19_ProvSupportReusableGownsIPAC.pdf
  - Switch to reusable isolation gown options whenever possible, reusable eye protection (goggles and face shields)
    - Ontario Health. Optimizing the Supply of Personal Protective Equipment During the COVID-19 Pandemic Recommendations from Ontario Health. Feb 25, 2021. https://www.ontariohealth.ca/sites/ontariohealth/files/2020-05/Ontario%20Health%20Recommendations%20on%20Optimizing%20Personal%20Protective%20Equipment%20During%20the%20COVID-19%20pandemic_rev10May20%20PDF_v2.pdf

- **Reusable gowns are used by some of the most prestigious hospitals across Canada, in the USA and internationally including Vancouver General Hospital, University Health Network, and Manitoba Health (provincial hospital system).**
  - From PPE surveys – reusable gowns are used at various levels throughout Canada's provinces
  - See Baker et all above for US hospital

- **Safety performance at Healthcare laundries – performance guidance and certification:**
  - **CSA standards for healthcare laundry.** THE NEW CAN/CSA Z314-18 CANADIAN MEDICAL DEVICE REPROCESSING - https://camdr.ca/wp-content/uploads/2018/06/CSA-Z314_Summary_Changes-FAQs-pdf.pdf
  - **The Healthcare Laundry Accreditation Council (HLAC) – is a non-profit that accredits laundries that process reusable textiles for hospitals, nursing homes and other healthcare facilities.** https://www.hlacnet.org/
  - **Hygienically Clean – TRSA – is a membership based including businesses, retailers, healthcare facilities, restaurants, government and other organizations. that supply launder and maintain linens and uniforms.** https://hygienicallyclean.org/hygienically-clean-healthcare/application-renewal/
  - **ISO 134856:2016 Medical devices management system.** https://www.iso.org/iso-13485-medical-devices.html

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Safety Cont'd

Reusable Elastomeric Respirators (RER) Safety:

- ·**Reusable elastomeric respirators can provide at least equivalent protection to N95 FFRs. Some types of elastomeric respirators can offer higher assigned protection factors (APFs) than N95 FFRs.**
  - Centers for Disease Control (CDC) Elastomeric Respirators: Strategies During Conventional and Surge Demand Situations. Conventional, Contingency and Crisis Strategies. October 13 2020. https://www.cdc.gov/coronavirus/2019-ncov/hcp/elastomeric-respirators-strategy/index.html

- **Safe implementation, cleaning and sterilization of RER:**
  - **Respiratory Protection Program for Air-Purifying Respirators. September 2013. working group of Occupational Health & Safety Professionals from each of the Health Authorities in the Province of British Columbia. XXXXX**
  - **British Columbia Post SARS lessons on PPE for future pandemics. 2004. Includes discussion about elastomeric respirators.** https://www.paho.org/hq/dmdocuments/2009/Protecting%20the%20faces%20of%20health%20care%20workers.pdf
  - **Province of Manitoba Shared Health. COVID-19 Guidance on the Reuse of Elastomeric (Half Mask) Respirators.** https://sharedhealthmb.ca/files/covid-19-reuse-of-elastomeric-respirators.pdf
  - **McGill University/ Environmental Health and Safety. RESPIRATORY PROTECTION AWARENESS Standard of reference CAN/CSA Z94.4-2011 Selection, use, and care of respirators. Feb 2018.** https://www.mcgill.ca/ehs/files/ehs/respiratory_protection_awareness.pdf
  - **Consider using NIOSH-approved, reusable elastomeric respirators when the supply of disposable N95 respirators is low. If fit-tested and properly cleaned and disinfected between uses, reusable elastomeric respirators (half-mask or full facepiece) are as effective as disposable N95 respirators**
    - Ontario Health. Optimizing the Supply of Personal Protective Equipment During the COVID-19 Pandemic Recommendations from Ontario Health. Feb 25, 2021. https://www.ontariohealth.ca/sites/ontariohealth/files/2020-05/Ontario%20Health%20Recommendations%20on%20Optimizing%20Personal%20Protective%20Equipment%20During%20the%20COVID-19%20pandemic_rev10May20%20PDF_v2.pdf
  - **Implementation guide: Elastomeric half mask respirators (EHMRs) provide similar or higher level of protection as do N95 filtering face-piece respirators (N95 FFRs) and are designed to be reused. Supply chain shortages of respirators at the onset of COVID-19 surge prompted a large, urban, US academic medical centre to rapidly expand use of EHMRs. A scaled fit-testing operation completed over 7000 fit-tests over six weeks. A centralized EHMR decontamination program was established in the Central Sterile Processing department. EHMR users obtained and returned their respirators each day from a central distribution centre using a shared-supply model.**
    - Implementation Guide to Support Use of Elastomeric Half Mask Respirators in Healthcare. Prepared as part of Centers for Disease Control and Prevention (CDC) Contract # 75D30120P09044 Best Practices and Preferred Uses of Reusable Elastomeric Half Mask Respirators (EHMR) in Healthcare. February 3, 2021 Submitted by: The University of Maryland-Baltimore. Hines, Stella E.; THURMAN, PAUL; McDiarmid, Melissa A. https://archive.hshsl.umaryland.edu/bitstream/handle/10713/14748/UMD%20Implementation%20Guide%203Feb2020.pdf?sequence=1&isAllowed=y
  - **Yassi A, Bryce E, Moore D, Janssen R, Copes R, Bartlett K, Fitzgerald M, Gilbert M, Bigelow P, Danyluk Q, Gamage B, Hon C, Perry T, Saunders S, Svirchev L, Thiessen R. Protecting the Faces of Health Care Workers: Knowledge Gaps and Research Priorities for Effective Protection Against Occupationally Acquired Respiratory Infectious Diseases. Report to Change Foundation, March 2004.** https://www.paho.org/hq/dmdocuments/2009/Protecting%20the%20faces%20of%20health%20care%20workers.pdf
  - **Chiang J, Hanna A, Lebowitz D, Ganti L. Elastomeric respirators are safer and more sustainable alternatives to disposable N95 masks during the coronavirus outbreak. Int J Emerg Med. 2020 Jul 20;13(1):39. doi: 10.1186/s12245-020-00296-8. PMID: 32689926; PMCID: PMC7369563.**

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Security

- **Reusable PPE with dedicated cleaning and disinfection processes are more continuously available than disposables.**
  - "Our health system has developed increasing reliance on single-use items, including disposable N95 respirators, and disposable gowns creating more waste and emissions. As we experienced in the early days of the pandemic, this is not sustainable. It's a lot easier to scale up your reuse cycles, such as laundering gowns or replacing the filters in your reusable respirators, than it is to actually manufacture more of something. And it creates less pollution." - Andrea MacNeil, Surgical & Medical Director of Planetary Health, Vancouver Coastal Health, Clinical Associate Professor, UBC, Director, UBC Planetary Healthcare Lab

- **Reusable domestically-produced PPE are not subject to the interruptions of the global supply chain seen during the pandemic.**
  - "During the early days of the pandemic, when PPE supply was at risk, Mackenzie Health leadership was laser focused on procuring the PPE and other supplies we needed to ensure our staff and physicians were safe. The reusable isolation gown solution Ecotex provided, at the most challenging time in health care that I can remember 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." – Altaf Stationwala, President and CEO, Mackenzie Health (May 2022)

- **Preparing for the next pandemic, climate emergency or natural disasters:**
  - In a pandemic, stockpiles of single-use products will almost always run out.
    - Stern J. The masks we'll wear in the next pandemic. October 2022. The Atlantic. https://www.theatlantic.com/science/archive/2022/10/pandemic-n95-mask-protection-shortcomings-indoor-air-quality/671723/
  - HHS will also support whole-of-government efforts to accelerate innovations in PPE design and manufacturing for enhanced effectiveness, usability, comfort, affordability, reusability, and fit capabilities, including for use by the general population.
    - The US Department of Health and Human Services (HHS) website. HHS Announces Actions to Counter Biological Threats, Enhance Pandemic Preparedness and Achieve Health Security. Oct 18, 2022. https://www.hhs.gov/about/news/2022/10/18/hhs-announces-actions-to-counter-biological-threats-enhance-pandemic-preparedness-and-achieve-health-security.html
  - **Provides examples of financial benefits of PPE pandemic stockpile**
    - Berkely Public Health. Economic and Health Benefits of a PPE Stockpile. August 2020. William H. Dow, PhD, UC Berkeley School of Public Health Kevin Lee, MPH, UC Berkeley School of Public Health Laurel Lucia, MPP, UC Berkeley Labor Center
  - **Domestically made reusable gowns in Quebec.**
    - CBC Quebec companies aim to dress the province's health workers in a crucial piece of 'armour'. Ainsley MacLellan. April 2020. https://www.cbc.ca/news/canada/montreal/quebec-medical-gowns-ppe-stockpile-covid19-1.5526231
  - **Canada needs a 21st century national security industrial plan that focuses on critical equipment and materials that should be produced at home, not abroad.**
    - CBC Pandemic equipment snarls will rewrite Canada's definition of national security needs, say experts. April 8, 2022. Murray Brewster. https://www.cbc.ca/news/politics/pandemic-covid-coronavirus-procurement-masks-ventilators-1.5525373
  - **The authors believe that the development, implementation, and stockpiling of improved elastomeric respirators around the world should be an international public health priority.**
    - T Andrew Bowdle, S Jelacic, L Silvia Munoz-Price, et al. Elastomeric respirators for COVID-19 and the next respiratory virus pandemic: essential design elements. Anesthesiology, 135 (2021), pp. 951-962 Google Scholar

- **Lack of PPE during the COVID 19 pandemic**
  - At the beginning of the COVID-19 pandemic in March 2020, the World Health Organization projected monthly demand of 89 million medical masks, 76 million gloves, and 1.6 million goggles alone, leading to a 40% increase in disposable personal protective equipment (PPE) production
  - Shortage of personal protective equipment endangering health workers worldwide. News release. World Health Organization; March 3, 2020. Accessed August 23, 2022. https://www.who.int/news/item/03-03-2020-shortage-of-personal-protective-equipment-endangering-health-workers-worldwide

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Security Contin'd

- ·**Delay in securing product during COVID 19 pandemic**
  - **Suggested options to ensure future supplies of medical devices as needed include:**
    - Quality Infrastructure: • Improve mask design, standards, and guidance • Align regulations internationally • Invest in product testing infrastructure • Invest in traceability infrastructure
    - Supply Chain: • Redesign the National Emergency Strategic Stockpile • Facilitate an open procurement marketplace • Inform demand through enhanced scenario planning and forecasting • Develop and maintain diagnostic testing capacity
      - Hancock-Howard, R., D. Jubas-Malz, R. Khurana, P. Sabesan, A. Shanmugam and M. Shanmuganantha. 2021, May. Envisioning a Made-in-Canada Pandemic Response Products Ecosystem: Towards Self Sufficiency and Sustainability. CSA Group. Retrieved July 11, 2022. https://www.csagroup.org/wp-content/uploads/CSA-Group-Research-Envisioning-a-Made-in-Canada-Pandemic-Response-Products-Ecosystem.pdf

Sustainability

Financial:

- ·**Early in the pandemic, prices for disposable PPE saw significant increases. Reusable PPE brings stable pricing.**
  - PPE prices increased dramatically early in the pandemic. The Berkeley public health center reported an increase for N95 masks from $1.27 to $5.90, for surgical masks from $0.05 to $0.55, for isolation gowns from $0.5 to $5, for face shields from $0.50 to $4.50 and for exam glove pairs from $0.04 to $0.12 during pandemic period (Laurel Lucia, 2020)
    - M.P.P. Laurel Lucia Economic and Health Benefits of a PPE Stockpile. Berkely Public Health. August 2020. https://laborcenter.berkeley.edu/wp-content/uploads/2020/08/Economic-Health-Benefits-of-PPE-Stockpile-UC-Berkeley-2020-FINAL.pdf

- ·**Reusable gowns and associated cleaning systems are less expensive than disposables gowns - For example:**
  - University Health Network reported saving 60% cost savings by switching to reusables. These savings can be redirected to patient care.
  - Toronto area hospitals save over $200 million over 2 years of the pandemic.
  - https://www.google.com/maps/d/u/0/edit?mid=1vyUu1Kr9YxeRg6TQGSpnUESuISBJwx8w&usp=sharing

- **Reusable elastomeric respirators are less expensive than disposable N95s.**
  - **Study at an academic hospital in the US found that within 1 month, they were able to reduce the number of N95s needed by their network by 95%. Also found that the cost was 10 times less per month than purchasing disposable N95s, and the cost benefit increases the longer they are needed. These respirators can be stored for future surges and should be considered an essential part of all healthcare facilities' supply of personal protective equipment.**
    - Chalikonda S, Waltenbaugh H, Angelilli S, Dumont T, Kvasager C, Sauber T, Servello N, Singh A, Diaz-Garcia R. Implementation of an Elastomeric Mask Program as a Strategy to Eliminate Disposable N95 Mask Use and Resterilization: Results from a Large Academic Medical Center. J Am Coll Surg. 2020 Sep;231(3):333-338. doi: 10.1016/j.jamcollsurg.2020.05.022. Epub 2020 Jun 11. PMID: 32534935; PMCID: PMC7289096.
  - **Total annual cost of RER compared to single use N95 – RER was 1.84 times cheaper.**
    - Implementation Guide to Support Use of Elastomeric Half Mask Respirators in Healthcare. Prepared as part of Centers for Disease Control and Prevention (CDC) Contract # 75D30120P09044 Best Practices and Preferred Uses of Reusable Elastomeric Half Mask Respirators (EHMR) in Healthcare. February 3, 2021 Submitted by: The University of Maryland-Baltimore. Hines, Stella E.; THURMAN, PAUL; McDiarmid, Melissa A. https://archive.hshsl.umaryland.edu/bitstream/handle/10713/14748/UMD%20Implementation%20Guide%203Feb2020.pdf?sequence=1&isAllowed=y

Social:

- **Creating opportunities for domestic SMEs**
  - **The group purchasing organization HealthPro contracts allow 80-100% spend on contract compliance to allow for members opportunity to purchase up to 20% of their requirements from local market entrants or suppliers of unique or innovative products.**
    - FAQ How does HealthPro support local economic development? https://www.healthprocanada.com/faq
  - **Benefits of domestic manufacturing (including of reusable PPE)**
    - There is now a need and an opportunity for Canada to develop its own pandemic products and associated standards to improve national security via a sovereign supply of essential resources.
    - Hancock-Howard, R., D. Jubas-Malz, R. Khurana, P. Sabesan, A. Shanmugam and M. Shanmuganantha. 2021, May. Envisioning a Made-in-Canada Pandemic Response Products Ecosystem: Towards Self Sufficiency and Sustainability. CSA Group. Retrieved July 11, 2022. https://www.csagroup.org/wp-content/uploads/CSA-Group-Research-Envisioning-a-Made-in-Canada-Pandemic-Response-Products-Ecosystem.pdf

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Sustainability Cont'd

- **Reduce risks to human rights issues in supply chains**
  - Embedding social value in the NHS supply chain supports the NHS to deliver its goal of becoming carbon neutral by 2045. The NHS has set out four pillars to its sustainability strategy: i. Tackle climate change, ii Reduce single use plastics, iii Support the circular economy, iv Tackle modern slavery and uphold labour standards. The Labour Standards Assurance System (LSAS) was introduced, in collaboration with the Department of Health, as part of this framework, aiming to continually improve labour standards management and mitigate risks. The LSAS is a unique selling point, part of a pioneering approach to include ethical procurement considerations especially relevant interacting with suppliers of Scope 3 emissions.
    - NHS Supply Chain website. Embedding social value in NHS supply chain. June 2022. https://www.supplychain.nhs.uk/news-article/embedding-social-value-in-nhs-supply-chain/?utm_source=SustainabilityPage11102022&utm_medium=Web&utm_campaign=CNEbedSV
    - National Health Executive magazine. Social Value: The impact on the NHS supply chain. April 2022. https://mag.nationalhealthexecutive.com/?m=62920&i=741633&p=34&ver=html5

Environmental:

- **Reduced plastic waste, GHG emissions and other environmental emissions including use of naturals resources and water, pollutants released to air, water, and land:**
  - The study results showed that selection of reusable gowns rather than disposable gowns reduced natural resource energy consumption (64%), greenhouse gas emissions (66%), blue water consumption (83%), and solid waste generation (84%).
    - Vozzola E, Overcash M, Griffing E. An environmental analysis of reusable and disposable surgical gowns. AORN J. 2020;111(3):315-325. View Article PubMed Google Scholar
  - Karim N, Afroj S, Lloyd K, et al. Sustainable personal protective clothing for healthcare applications: a review. ACS Nano. 2020;14(10):12313-12340. View Article PubMed Google Scholar
  - Baker N, Bromley-Dulfano R, Chan J, Gupta A, Herman L, Jain N, Taylor AL, Lu J, Pannu J, Patel L, Prunicki M. COVID-19 Solutions Are Climate Solutions: Lessons from Reusable Gowns. Front Public Health. 2020 Nov 25;8:590275. doi: 10.3389/fpubh.2020.590275. PMID: 33330335; PMCID: PMC7732643.

- ·**Support for higher value circular economy practices (i.e. reuse before recycling)**
  - Transformation of the medical device industry to a more circular economy would advance the goal of providing increasingly complex care in a low-emissions future. Barriers to circularity include perceptions regarding infection prevention, behaviors of device consumers and manufacturers, and regulatory structures that encourage the proliferation of disposable medical devices.
    - Macneill, B. A. J, Hopf, H, Khanuja, A, Alizamir, S, Bilec, M, Eckelman, M. J, Hernandez, L, McGain, F, Simonsen, K, Thiel, C, Young, S, Lagasse, R. and Sherman, J. D. (2020). Transforming the Medical Device Industry: Road Map to a Circular Economy. Health Affairs, 39 (12), 2088-2097. https://www.healthaffairs.org/doi/10.1377/hlthaff.2020.01118
  - A hybrid approach to the continued use of disposable products instead of a purely circular approach will be beneficial to the sustainability of healthcare.
    - Hüseyin D, Karaer M. A Challenge for Systemic Transformation towards Circular Healthcare Economy: Single-Use or Not?. Gümüşhane Üniversitesi Sağlık Bilimleri Dergisi 11(3):832-847

- **Green healthcare laundry operations**
  - Clean Green TRSA Certification
    - https://www.trsa.org/certification/clean-green/#standards

General Resources

- Video on reusable PPE users in health care across Canada - "The way forward is reusable: Demonstrating Canadian opportunities for safe, secure and sustainable PPE" https://drive.google.com/file/d/1xcjfGlNf70KWKPXMSXQhQjQRenovZ0lV/view?usp=sharing

- Circular economy practices for PPE in health care: A case studies map https://www.google.com/maps/d/u/0/edit?mid=1vyUu1Kr9YxeRg6TQGSpnUESuISBJwx8w&usp=sharing

- Survey circulated to reusable PPE users in health care across Canada - Results: PPE report chapter XXX