

EVIDENCE SYNTHESIS BRIEFING NOTE

TOPIC: N95 MASK STORAGE AND HANDLING BEFORE REPROCESSING

Information finalized as of September 16, 2020.^a

This Briefing Note was completed by the Research, Analysis, and Evaluation Branch (Ministry of Health) based on information provided by a member of the COVID-19 Evidence Synthesis Network. Please refer to the [Methods](#) section for further information.

Purpose: This note provides a summary of evidence on how and for how long used N95 masks should be stored before reprocessing. It also addresses how used masks should be handled prior to reprocessing.

Key Findings:

- The US Centers for Disease Control and Prevention (CDC), World Health Organization, and Public Health England recommend procedures at the organizational level such as appropriate documentation and recording of re-use or reprocessing, quality assurance of reprocessing measures, suitable reprocessing and storage facilities and systems, and staff training regarding safe use and donning or doffing of masks or respirators if re-used or use is extended.
- **Instructions for short-term storage (i.e., for reuse):**
 - Inspect used mask(s) for visible soiling, saturation, or loss of structural integrity; discard masks that do not meet the inspection standards in a separate receptacle using standard institutional procedures followed by safely doffing of gloves and hand-hygiene.
 - Collect used masks for transport to processing in clearly labeled plastic bins that can be disinfected or double-bagged biohazard bags; gently remove from bags and do not compress to prevent aerosolization of contents.
 - Label and hang used respirators in a designated storage area or keep them in a clean, breathable container such as a paper bag between uses. To minimize potential cross-contamination, store respirators so that they do not touch each other and the person using the respirator is clearly identified. Storage containers should be disposed of or cleaned regularly.
 - Masks in three to four-day rotation should be kept at room temperature (21 to 23 Celsius) and 40% humidity.
- **Long-term storage of used masks:** No information on long-term storage of used masks was identified.
- **Long-term storage of unused masks:** Stocks of expired single-use respirators can be used to protect health care personnel provided that: 1) masks were safely stored in a place without exposure to the sun, excess humidity or pests (e.g., insects, rodents); and 2) samples show that they are in good working condition, well-fitting (after a fit check) and without any deterioration (e.g., elastic bands and the nose bridge).
 - Masks are required to be stored in humidity-controlled conditions between 15 to 27 Celsius in locations that minimize physical damage, contamination, dust, and exposure to sunlight and damaging chemicals.

Analysis for Ontario:

- Ontario Health advises that if used masks are not visibly soiled or damaged, they should be collected and stored in disposal receptacles that are clearly labelled, dated, and separated from other types of PPE (e.g., in a biohazard bag, paper bag, or box). Inspection of respirators before reprocessing should be ensured to confirm the condition of the N95 respirators are suitable for reprocessing if they have been stored for a length of time.

^a This briefing note includes current available evidence as of the noted date. It is not intended to be an exhaustive analysis, and other relevant findings may have been reported since completion.

Supporting Evidence

[Table 1](#) below summarizes evidence on the handling and storage of N95 masks. Additional details are provided in the Appendix on the academic literature in [Table 2](#), and jurisdictional information in [Table 3](#), respectively.

Table 1: Evidence on the Handling and Storage of N95 Masks

<p>Scientific Evidence</p>	<ul style="list-style-type: none"> • The US Centers for Disease Control and Prevention (CDC), World Health Organization, and Public Health England recommend procedures at the organizational level such as appropriate documentation and recording of re-use or reprocessing, quality assurance of reprocessing measures, suitable reprocessing and storage facilities and systems, and staff training regarding safe use and donning or doffing of masks or respirators if re-use or extended use.¹ <ul style="list-style-type: none"> ○ <u>Considerations for short-term storage:</u> <ul style="list-style-type: none"> ▪ Inspect used mask(s) for visible soiling, saturation, or loss of structural integrity; discard masks that do not meet the inspection standards in a separate receptacle using standard institutional procedures followed by safely doffing of gloves and hand-hygiene.² ▪ Collect used masks for transport to processing in clearly labeled plastic bins that can be disinfected³ or double-bagged biohazard bags; gently remove from bags and do not compress to prevent aerosolization of contents.⁴ ▪ Storage for reuse involves following one day of use with four day “quarantine” period in labelled breathable sealed container before re-use.⁵ Masks in three to four-day rotation should be kept at room temperature (21 to 23 Celsius) and 40% humidity.⁶ ○ <u>Long-term storage:</u> None of the identified sources provided information on long-term storage of used masks.
<p>International Scan</p>	<ul style="list-style-type: none"> • If reuse of N95 respirators is permitted, the CDC advises to: <ul style="list-style-type: none"> ○ Discard N95 respirators: 1) after use in aerosol generating procedures; 2) when they are contaminated with blood, respiratory or nasal secretions, or other bodily fluids from patients; or 3) after close contact with any patient co-infected with an infectious disease requiring contact precautions. ○ Hang used respirators in a designated storage area or keep them in a clean, breathable container such as a paper bag between uses. To minimize potential cross-contamination, store respirators so that they do not touch each other and the person using the respirator is clearly identified. Storage containers should be disposed of or cleaned regularly. • Considerations regarding the chain of custody of the soiled masks from the point of collection in the health care facility, to the reprocessing facility, through the reprocessing cycle, repackaging, and distribution back to the health care facility include: <ul style="list-style-type: none"> ○ A description of the safety considerations through each step. At the facility where reprocessing will occur, also include a description of the safety considerations which will be in effect. ○ Traceability on the number of times a specific type of mask has been subjected to reprocessing. • <u>Long-term storage of unused respirators:</u> <ul style="list-style-type: none"> ○ Stocks of expired single-use respirators can be used to protect health care personnel provided that: 1) masks were safely stored in a place without exposure to the sun, excess humidity or pests (e.g. insects, rodents); and 2) samples show that they are in good working

	<p>condition, well-fitting (after a fit check) and without any deterioration (e.g., elastic bands and the nose bridge).</p> <ul style="list-style-type: none"> ○ Masks are required to be stored in humidity-controlled conditions between 15 to 27 Celsius in locations that minimise physical damage, contamination, dust, and exposure to sunlight and damaging chemicals.
Canadian Scan	<ul style="list-style-type: none"> ● Health Canada advises labelling and storage of used/reprocessed masks for health care facilities as follows: <ul style="list-style-type: none"> ○ Maintain supply separation between reprocessed N95 respirators and certified N95 respirators; ○ Identify and clearly mark separate areas for clean reprocessed and used reprocessed N95 respirators; and ○ Clearly label reprocessed N95 respirators as reprocessed and include instructions that indicate that they: 1) may not meet all the manufacturer's specifications; and 2) are not re-certified as an N95 respirator. ● In Alberta, the recommended handling and storage process includes: <ul style="list-style-type: none"> ○ Before donning PPE, health care providers (HCP) use black sharpie to mark N95 respirator with employee ID, designation, unit number, and tally marks on the front edge of the respirator. ○ Keeping N95 on, HCP doffs PPE following patient care and inspects N95 using a mirror or buddy to assess if the N95 mask is visibly soiled, ripped or has torn elastics. ○ HCP places contaminated N95 in labelled, designated collection bucket (or rigid structure to ensure respirators are not damaged during transport) located in the PPE doffing area. ○ Health care worker (HCW) dons contact and droplet PPE. <ul style="list-style-type: none"> ▪ Puts lids on buckets of contaminated N95 respirators in PPE doffing areas, and ▪ Puts sealed buckets into designated room, wipes outside of buckets with disinfectant wipe.
Ontario Scan	<ul style="list-style-type: none"> ● Ontario Health advises that if used masks are not visibly soiled or damaged, they should be collected and stored in disposal receptacles that are clearly labelled, dated, and separated from other types of PPE (e.g., in a biohazard bag, paper bag, or box). <ul style="list-style-type: none"> ○ Ensure inspection of respirators before reprocessing to confirm the condition of the N95 respirators are suitable for reprocessing if they have been stored for a length of time. ○ Consider the feasibility of individual tracking versus universal pooled supply, as both are safe approaches. In either case, users will continue to wear the same type of N95 respirator for which they have been fit-tested, and appropriate fit is further confirmed through a careful user-seal check at the point of care.

Methods

The COVID-19 Evidence Synthesis Network is comprised of groups specializing in evidence synthesis and knowledge translation. The group has committed to provide their expertise to provide high-quality, relevant, and timely synthesized research evidence about COVID-19 to inform decision makers as the pandemic continues. Ontario Health (Quality) contributed an Excel table of scientific evidence abstracts with the outputs of a MEDLINE database search conducted September 16, 2020 and a Word table of jurisdictional evidence also conducted September 16, 2020. These products were used to develop this Evidence Synthesis Briefing Note.

For more information, please contact the [Research, Analysis and Evaluation Branch \(Ministry of Health\)](#).

APPENDIX

Table 2: Articles that include information about storing or handling N95 masks

Author, Jurisdiction, Date	Focus	Relevant Findings
<p>Czubryt et al., 2020 Winnipeg, Manitoba July 30, 2020</p>	<ul style="list-style-type: none"> N95 mask reuse in a major urban hospital: COVID-19 response process and procedure 	<ul style="list-style-type: none"> To recycle 200–1,000 N95 respirator masks (NRMs) daily, procedures for collection, sterilization and re-distribution were developed to minimize particle aerosolization risk during NRM handling, to reject NRM showing obvious wear, and to promote adoption by staff. <ul style="list-style-type: none"> <u>Handling of masks</u>: NRM collection was initiated in the emergency department (ED) prior to scale-up and a rolling introduction in other hospital units. <ul style="list-style-type: none"> Container for transporting masks: An unlined 75-litre Rubbermaid tote with snap-on lid capable of being disinfected was provided to transport used NRMs from the unit to medical device reprocessing (MDR). Clear labelling and instructions: The totes were marked clearly for NRM collection and deployed in a single location in the ED determined as optimal in consultation with unit staff. NRM collection instructions were provided to unit staff, with accompanying signage noting that only Pleats Plus^b NRMs were being collected. Contact information was provided for reporting problems or requesting tote pick-up, with a primary contact established for the entire hospital to ensure uniform responses. Optional short-term storage bags: In consultation with infection, prevention and control practitioners, units/departments could elect to use additional plastic-lined receptacles to collect used NRMs from staff with consideration of the size and physical layout of each clinical area, and the usual number of doffing locations. If receptacles were used, unit/department staff were informed that compressing such bags may lead to aerosolization of contents and were advised to avoid such handling. Unit staff were responsible for collecting bags and depositing in the MDR tote prior to pick-up. The number of totes and frequency of MDR exchanges was subject to adjustment based upon unit/department usage of NRMs. Transport of containers: Totes containing masks were picked up by MDR staff using a wheeled cart to facilitate transfer and minimize risk of spilling and exchanged with a clean replacement tote. Totes containing contaminated NRMs were transported to the MDR-Main facility, pre-sorted to remove visibly soiled or damaged masks, and placed into an Olympic dryer (45–55°C, up to 66 h) to provide an initial round of sanitation, with the aim of reducing viral load and exposure of workers that subsequently load the autoclave. Decontamination: Following the initial warm air step, NRMs were carefully unloaded to minimize potential aerosol generation, bloomed to maximize surface area, and sorted per the above criteria prior to being arranged in the autoclave. NRMs were suspended by their straps via a string and attached to the autoclave racks to eliminate contact of the mask with metal surfaces, which may adversely affect mask materials. Disinfecting totes: Used totes with their lids were decontaminated in a cart washer including a thermal disinfection at 90°C for one minute prior to subsequent return to collection sites. <u>Long-term storage of masks</u>: no information was identified.⁷

^b Approximately 90% of the NRMs used at the hospital are AO Safety 1054S Pleats Plus ([Czubryt et al., 2020](#)).

Author, Jurisdiction, Date	Focus	Relevant Findings
<p>Toomey et al., 2020 June 5, 2020</p>	<ul style="list-style-type: none"> Extended use or re-use of single-use surgical masks and filtering facepiece respirators: A Rapid evidence review 	<ul style="list-style-type: none"> The rapid review summarizes guidance and systematic review evidence on extended use, re-use or reprocessing of single-use surgical masks or filtering facepiece respirators.⁸ <ul style="list-style-type: none"> <u>Overall findings:</u> All guidance documents depicted extended use, re-use or reprocessing of single-use masks and respirators as extraordinary, last-resort measures to be considered only during critical shortage of equipment and when other strategies for rational use and conservation of supplies have been exhausted (e.g., minimizing need for PPE through administrative and engineering controls, coordinating supply chain management). <ul style="list-style-type: none"> The US Centers for Disease Control and Prevention (CDC), World Health Organization, and Public Health England (PHE) recommend additional procedures at organizational level such as appropriate documentation and recording of re-use or reprocessing, quality assurance of reprocessing measures, suitable reprocessing and storage facilities and systems, and staff training regarding safe use and donning or doffing of masks or respirators if re-use or extended use. <u>Short-term storage for re-use, according to:</u> <ul style="list-style-type: none"> CDC: 1) Ensure safe storage and limit to named user; and b) Follow one day of use with four day “quarantine” period in labelled breathable sealed container before re-use. PHE: Fold and store in labelled sealable bag between uses. Some models cannot be re-used as they deform once being donned. <u>Long-term storage:</u> No information identified.
<p>Perkins et al., 2020 United States May 12, 2020</p>	<ul style="list-style-type: none"> COVID-19 global pandemic planning: Decontamination and reuse processes for N95 filtering facepiece respirators (FFRs) 	<ul style="list-style-type: none"> This article describes the development of processes for selecting and implementing hydrogen peroxide vapor (HPV) as a viable method to reprocess N95 respirators. Details are provided about the prioritization and implementation of processes for collection and storage, pre-processing, HPV decontamination, and post-processing of filtering facepiece respirators. Important lessons learned from this experience include, developing an adequate reserve of personal protection equipment (PPE) for effective reprocessing and distribution, and identifying a suitable location with optimal environmental controls (e.g., an operating room). Collectively, information presented provides a framework for other institutions considering decontamination procedures for N95 respirators. <ul style="list-style-type: none"> <u>Collection and storage of used FFRs:</u> <ul style="list-style-type: none"> Health care personnel (HCP) remove the FFR following the appropriate institutional guidelines. Inspection for visible soiling, saturation, or loss of structural integrity is performed, and FFRs that are structurally intact and not visibly soiled or saturated are placed in a designated foot-pedal receptacle containing a biohazard bag. Those FFRs that do not meet the inspection standards are discarded in a separate receptacle using standard institutional procedures. This process is followed by safely doffing of the gloves and hand-hygiene. Designated personnel retrieve the biohazard bags from the unit when the receptacles become half-full per communication (telephone call) from the originating unit. Information communicated from the unit to the designated pick-up individual includes: unit name, location of bins (e.g., room numbers), and assigned contact person on the unit. The individual retrieving the material follows the designated institutional guidelines for ensuring safety. The biohazard bag being retrieved is placed in another biohazard bag and closed using a zip tie. A sticker is placed on the outside of the bag designating date and unit of origin, followed by transport of material to a locked storage area. <u>Removing stored FFRs for processing:</u> <ul style="list-style-type: none"> The removal of FFRs from their storage container is performed in the same room where the HPV decontamination process occurs. This step is performed by personnel following institutional PPE donning procedures. Based on the

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		<p>exposure risk, appropriate PPE training (or re-training) is provided to the personnel. When processing the FFRs, personnel wear an N95 respirator, eye protection (goggles and face shield), protective disposable clothing that covers their skin and hair, and two pairs of gloves. If a powered air purifying respirator is available, this can be implemented instead of the FFR and eye/face coverings for the personnel performing the procedures. The personnel remove the biohazard bags from their transport container. The zip tie on the bag is cut (bags are not to be cut or torn open) and the contents are gently (and slowly) placed on the processing table. Personnel should not reach into the biohazard bag to retrieve (touch) any items nor should the contents be quickly “dumped” onto the processing table to avoid generating aerosolized particles. FFRs are not be touched by the personnel and large forceps (grippers) should be used to retrieve any FFRs that remain in the biohazard bag. During this process, there is an additional inspection of the FFR so that any visibly soiled (e.g., make-up, lotion, dirt, or biological material) respirators do not undergo the decontamination process and are disposed in a biowaste container. Upon emptying all the contents, the biohazard bag is rolled in upon itself and placed into a biowaste container.⁹</p> <ul style="list-style-type: none"> ○ <u>Long-term storage</u>: No information identified.
<p>Juang & Tsai, 2020 United States April 16, 2020</p>	<ul style="list-style-type: none"> ● N95 respirator cleaning and reuse methods by the inventor of the N95 mask material 	<ul style="list-style-type: none"> ● Proposed methods for cleaning and reusing N95 masks include rotating three to four masks, numbered on the outside as one to four, for each day. They can be used in numerical order. All SARS-CoV-2 viruses on the mask will be dead in three days. <ul style="list-style-type: none"> ○ <u>Short-term storage</u>: Masks in three to four-day rotation should be kept at room temperature (21 to 23 Celsius) and 40% humidity. ○ <u>Long-term storage</u>: No information identified.¹⁰

Table 3: Jurisdictional Information

Jurisdiction, Date	Resource	Policies or Recommendations
<p>Health Quality Ontario (Ontario Health (Quality)) April 15, 2020</p>	<ul style="list-style-type: none"> ● Extended use and layering of N95 respirators and use of expired personal protective equipment: Supplemental information 	<ul style="list-style-type: none"> ● According to Health Canada, the Centers for Disease Control and Prevention (CDC), and the US Food and Drug Administration (FDA), in times of increased demand and decreased supply, such as during the COVID-19 pandemic, consideration can be made to use personal protective equipment (PPE) past its manufacturer-designated shelf life. <ul style="list-style-type: none"> ○ <u>Storage of expired N95 masks</u>: The length of time an N95 respirator is stored beyond its shelf life or recommended conditions of storage may affect its performance. This includes not only the filter media but also the headbands and nose-foam components, which may affect the seal. The user should visibly inspect the PPE item before use, and if there are concerns (i.e., degraded materials, visible holes or tears, or discolouration) the product should be discarded.
<p>Ontario Health May 28, 2020</p>	<ul style="list-style-type: none"> ● Reprocessing of N95 Respirators: Frequently Asked Questions 	<ul style="list-style-type: none"> ● Recommendations include: <ul style="list-style-type: none"> ○ <u>Collection and storage of used masks</u>: Organizations should provide staff and physicians with education on their role in the appropriate collection and storage of used N95 respirators so that as many as possible can be reprocessed. N95 respirators that are visibly soiled or torn, or N95 respirators with ripped elastics, cannot be reprocessed. If they are not visibly soiled or damaged,

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		they should be collected and stored in disposal receptacles that are clearly labelled, dated, and separated from other types of PPE.
Ontario Health September 22, 2020	<ul style="list-style-type: none"> Optimizing the Supply of Personal Protective Equipment During the COVID-19 Pandemic: Recommendations from Ontario Health 	<ul style="list-style-type: none"> In conjunction with obligations outlined in Directive #5 and other requirements to ensure the health and safety of workers and patients, organizations are advised to consider various conservation strategies to extend the supply of PPE and to ensure the long-term sustainability of PPE during the COVID-19 pandemic including: <ul style="list-style-type: none"> Collection and storage of used masks: <ul style="list-style-type: none"> Used N95 respirators (disposable) that are unsoiled and undamaged should be collected and stored in disposal receptacles that are clearly labelled, dated, and separated from other types of PPE (e.g., in a biohazard bag, paper bag, or box). Ensure inspection of respirators before reprocessing to confirm the condition of the N95 respirators are suitable for reprocessing if they have been stored for a length of time. Consider the feasibility of individual tracking versus universal pooled supply, as both are safe approaches. In either case, users will continue to wear the same type of N95 respirator for which they have been fit-tested, and appropriate fit is further confirmed through a careful user-seal check at the point of care.
Sunnybrook Health Sciences Center April 6, 2020	<ul style="list-style-type: none"> Some hospitals planning to sterilize and reuse N95 masks to stretch out supplies during COVID-19 pandemic 	<ul style="list-style-type: none"> In April 2020, Sunnybrook announced it had started collecting used N95 masks. They are placed in clean self-sealing pouches which are transparent on one side and porous on the other. Staff members are writing their names on the outside of the pouches and on the masks they used.
Alberta Health Services (AHS) No date	<ul style="list-style-type: none"> Process for reuse of 3M N95 respirators in emergent respiratory pandemic event 	<ul style="list-style-type: none"> The handling and storage process recommended by AHS includes: <ul style="list-style-type: none"> Before donning PPE, health care providers (HCP) use a black sharpie to mark N95 respirator with employee ID, designation, unit number, and tally marks on the front edge of the respirator. Keeping N95 on, HCP doff PPE following patient care and inspect N95 using a mirror or buddy, to assess if N95 mask is visibly soiled, ripped or has torn elastics. HCP place contaminated N95 respirator in labelled, designated collection bucket (or rigid structure to ensure respirators are not damaged during transport) located in the PPE doffing area. Health care workers: <ul style="list-style-type: none"> Don contact and droplet PPE; Put lids on buckets of contaminated N95 respirators in PPE doffing areas; and Put sealed buckets into designated room, wipes down outside of buckets with disinfectant wipe.
Saskatchewan Health Authority (SHA) July 22, 2020	<ul style="list-style-type: none"> Covid-19 PPE Bulletin 	<ul style="list-style-type: none"> PPE Reprocessing Strategy: <ul style="list-style-type: none"> The SHA has been collecting N95 respirators in specific facilities as part of our contingency plan to reprocess respirators to ensure that we continue to have a supply of essential PPE. Reprocessed respirators will be inspected and tested for safety before being put into use. Provided the respirators are confirmed safe, they will be stockpiled and only used in a circumstance where new N95s or equivalent respirators are not available.

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		<ul style="list-style-type: none"> ○ There may be some variation across the province as this process is put into place. It is important to ensure the respirators placed in the collection bins are not damaged. Check the following: <ul style="list-style-type: none"> ▪ Elastics are still in good condition; ▪ They do not have visible gross contaminants (including makeup); and ▪ They have not been used in the preparation of cytotoxic drugs. ○ The bins will be collected on a regular basis for reprocessing.
New Brunswick August 20, 2020	<ul style="list-style-type: none"> ● Covid-19: guidance for long-term care facilities 	<ul style="list-style-type: none"> ● If re-wearing masks is recommended, staff must remove their masks by the ties or elastics taking care not to touch front of masks, and carefully store the masks in a clean dry area, taking care to avoid contamination of the inner surface of the masks, and perform hand hygiene before and after mask removal and before putting it on again.
Health Canada August 31, 2020	<ul style="list-style-type: none"> ● COVID-19 Medical masks and Respirators: Reprocessing N95 Respirators 	<ul style="list-style-type: none"> ● Considerations for labelling and storage of used/reprocessed masks, health care facilities should: <ul style="list-style-type: none"> ○ maintain supply separation between reprocessed N95 respirators and certified N95 respirators ○ identify and clearly mark separate areas for clean reprocessed and used reprocessed N95 respirators ○ clearly label reprocessed N95 respirators as reprocessed and include instructions that indicate that they: <ul style="list-style-type: none"> ▪ may not meet all the OEM specifications ▪ are not re-certified as an N95 respirator, that is, they will not be considered NIOSH-approved
Centers for Disease Control and Prevention (CDC), The National Institute for Occupational Safety and Health (NIOSH) March 27, 2020	<ul style="list-style-type: none"> ● Recommended Guidance for Extended Use and Limited Reuse of N95 Filtering Facepiece Respirators in Healthcare 	<ul style="list-style-type: none"> ● Respirator reuse recommendations: <ul style="list-style-type: none"> ○ If reuse of N95 respirators is permitted, respiratory protection program administrators should ensure adherence to administrative and engineering controls to limit potential N95 respirator surface contamination (e.g., use of barriers to prevent droplet spray contamination) and consider additional training and/or reminders (e.g., posters) for staff to reinforce the need to minimize unnecessary contact with the respirator surface, strict adherence to hand hygiene practices, and proper PPE donning and doffing technique, including physical inspection and performing a user seal check. Health care facilities should develop clearly written procedures to advise staff to take the following steps to reduce contact transmission: <ul style="list-style-type: none"> ▪ Discard N95 respirators following use during aerosol generating procedures. ▪ Discard N95 respirators contaminated with blood, respiratory or nasal secretions, or other bodily fluids from patients. ▪ Discard N95 respirators following close contact with any patient co-infected with an infectious disease requiring contact precautions. ▪ Consider use of a cleanable face shield (preferred) over an N95 respirator and/or other steps (e.g., masking patients, use of engineering controls), when feasible to reduce surface contamination of the respirator. ▪ Hang used respirators in a designated storage area or keep them in a clean, breathable container such as a paper bag between uses. To minimize potential cross-contamination, store respirators so that they do not touch each other and the person using the respirator is clearly identified. Storage containers should be disposed of or cleaned regularly. ▪ Clean hands with soap and water or an alcohol-based hand sanitizer before and after touching or adjusting the respirator (if necessary, for comfort or to maintain fit). ▪ Avoid touching the inside of the respirator. If inadvertent contact is made with the inside of the respirator, discard the respirator and perform hand hygiene as described above.

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		<ul style="list-style-type: none"> ▪ Use a pair of clean (non-sterile) gloves when donning a used N95 respirator and performing a user seal check. Discard gloves after the N95 respirator is donned and any adjustments are made to ensure the respirator is sitting comfortably on your face with a good seal.
CDC August 4, 2020	<ul style="list-style-type: none"> • Decontamination & Reuse of N95 Respirators 	<ul style="list-style-type: none"> • One strategy to reduce the risk of contact transfer of pathogens from the FFR to the wearer during FFR reuse is to issue five N95 FFRs to each health care staff member who care for patients with suspected or confirmed COVID-19. The health care staff member can wear one N95 FFR each day and store it in a breathable paper bag at the end of each shift with a minimum of five days between each N95 FFR use, rotating the use each day between N95 FFRs. This will provide some time for pathogens on it to “die off” during storage [8]. This strategy requires a minimum of five N95 FFRs per staff member, provided that health care personnel don, doff, and store them properly each day.
ECRI April 16, 2020	<ul style="list-style-type: none"> • Safety of Extended Use and Reuse of N95 Respirators 	<ul style="list-style-type: none"> • Hang used respirators in a designated storage area or keep them in a clean, breathable container such as a paper bag between uses. To minimize potential cross-contamination, store respirators so that they do not touch each other and the person using the respirator is clearly identified. Storage containers should be disposed of or cleaned regularly.
OSF HealthCare, ^c Illinois No date	<ul style="list-style-type: none"> • N95 User Guide 	<ul style="list-style-type: none"> • Keep respirators in a clean, breathable container such as a paper bag between uses. To minimize potential cross-contamination, store respirators so that they do not touch each other and the person using the respirator is clearly identified. Paper bags should be disposed of between uses, and a clean paper bag used with each storage.
Georgia Department of Public Health June 12, 2020	<ul style="list-style-type: none"> • Interim Guidance for Extended Use and Limited Reuse of N95 Respirators in Healthcare Settings during the COVID-19 Pandemic 	<ul style="list-style-type: none"> • When practicing reuse of N95 respirators, health care personnel should: <ul style="list-style-type: none"> ○ Hang used respirators in a designated storage area or keep them in a clean, breathable container such as a paper bag between uses. ○ Store respirators so that they do not touch each other and the person using the respirator is clearly identified. Storage containers should be disposed of or cleaned regularly. ○ Label containers used for storing respirators or label the respirator itself (e.g., on the straps) between uses with the user’s name to reduce accidental usage of another person’s respirator. ○ Clean hands with soap and water or an alcohol-based hand sanitizer before and after touching or adjusting the respirator.
Genesee County Health Department, Michigan March 25, 2020	<ul style="list-style-type: none"> • Reuse or Extended Use of N95 Respirators 	<ul style="list-style-type: none"> • Storage and Donning of Used N95 Respirators: <ul style="list-style-type: none"> ○ Hang respirators in a designated storage space or store them in a clean and breathable container (such as a paper bag) between uses. ○ Respirators should be stored so they do not touch and so that the person using the respirator is clearly identified ○ All storage containers should be cleaned regularly or disposed of ○ Clean hands with soap and water OR alcohol-based sanitizer before and after touching/adjusting the respirator for wear ○ Do not touch the inside of the respirator – if contact occurs, wash hands as described above

^c OSF HealthCare, an integrated health system owned and operated by [The Sisters of the Third Order of St. Francis](#), Peoria, Illinois, employs more than 23,600 Mission Partners in 147 locations, including 14 hospitals – 10 acute care, four critical access – with 2,097 licensed beds, and two colleges of nursing throughout Illinois and Michigan (<https://www.osfhealthcare.org/about/>, 2020).

Jurisdiction, Date	Resource	Policies or Recommendations
		<ul style="list-style-type: none"> ○ Wear a pair of non-sterile gloves when re-donning the respirator and checking the seal, discard gloves when finished
NHS Public Health England May 18, 2020	<ul style="list-style-type: none"> ● COVID-19: Infection Prevention and Control Guidance 	<ul style="list-style-type: none"> ● Important requirements for reuse of masks are: <ul style="list-style-type: none"> ○ The mask should be removed and discarded if soiled, damaged, or hard to breathe through. ○ Masks with elastic ear hooks should be re-used (tie-on face masks are less suitable because they are more difficult to remove). ○ Hand hygiene should be performed before removing the face mask. ○ Face masks should be carefully folded so the outer surface is held inward and against itself to reduce likely contact with the outer surface during storage. ○ The folded mask should be stored between uses in a clean sealable bag/ box which is marked with the person's name and is then properly stored in a well-defined place. ○ Hand hygiene should be performed after removing the face mask. ○ Some models of PPE cannot be physically reused as they deform once being donned and do not go back to original condition (meaning it would be difficult to re-don and achieve a fit check) – fit checks should be performed each time a respirator is donned if it is reused.
European Centre for Disease Prevention and Control June 8, 2020	<ul style="list-style-type: none"> ● Options for the Decontamination and Reuse of Respirators in the context of the COVID-19 Pandemic 	<ul style="list-style-type: none"> ● <u>Long-term storage of unused respirators:</u> Stocks of expired single-use respirators can be used to protect health care personnel provided that: <ul style="list-style-type: none"> ○ The FFPs were safely stored in a place without exposure to the sun, excess humidity or pests (e.g., insects, rodents); ○ Samples from the equipment boxes show that they are in good working condition, well-fitting (after a fit-check) and without any deterioration for example on the elastic bands and the nose bridge.
Federal Agency for Medicines and Health Products, Belgium 06/04/2020	<ul style="list-style-type: none"> ● Guidance for the reprocessing of surgical masks and filtering facepiece respirators (FFP2, FFP3) during the Coronavirus disease (COVID-19) Public Health Emergency 	<ul style="list-style-type: none"> ● Recommendations for reprocessing of surgical masks and filtering facepiece respirators (FFP2, FFP3) <ul style="list-style-type: none"> ○ Description of chain of custody and safeguards to prevent inadvertent exposure, including: <ul style="list-style-type: none"> ▪ Details regarding the chain of custody of the soiled masks from the point of collection in the health care facility, to the reprocessing facility, through the reprocessing cycle, repackaging, and distribution back to the health care facility. ▪ A description of the safety considerations through each step. At the facility where reprocessing will occur, also include a description of the safety considerations which will be in effect. ▪ Traceability on the number of times a specific type of mask has been subjected to reprocessing.
NSW Clinical Excellence Commission, Australia August 2020	<ul style="list-style-type: none"> ● Infection Prevention and Control Application of PPE During COVID-19 	<ul style="list-style-type: none"> ● Appropriate storage of disposable respirators according to manufacturer's specifications (e.g., temperature and humidity) and stock should be controlled and rotated based on a use by date, expiry date or manufactured date

Jurisdiction, Date	Resource	Policies or Recommendations
Queensland University of Technology, Australia April 2, 2020	<ul style="list-style-type: none"> • N95 Respiratory Masks for COVID-19: A Review of the literature to inform local responses to global shortages 	<ul style="list-style-type: none"> • <u>Storage and shelf-life of N95 masks</u> <ul style="list-style-type: none"> ○ While N95 masks are certified to have a specific shelf-life, studies have demonstrated that the efficacy of masks, when stored properly, may extend for many years after their 'use by' date. This provides the opportunity to store masks in stockpiles for longer so more can be deployed for use in the event of a shortage. The key aspect which must be preserved during storage is the filtration performance. Specifically, electrostatic charges are imparted onto the filtration textile during manufacturing which play a critical role in attracting and capturing particles. This approach enables the filtration material to be lighter and more comfortable than with purely mechanical filtration mechanisms. <ul style="list-style-type: none"> ▪ <u>Conditions of storage</u>: The conditions under which N95 masks are stored are fundamental to preserving the critical material properties. Masks are required to be stored in humidity-controlled conditions between 15°C to 27°C in locations which minimise physical damage, contamination, dust, and exposure to sunlight and damaging chemicals. For example, exposure to solvents (e.g., ethanol, isopropanol), radiation and heat have been shown in laboratory experiments to significantly decrease the efficacy of N95 mask filters. UV radiation and water, however, were not shown to compromise functionality.

References

- ¹ Toomey, E., Conway, Y., Burton, C., Smith, S., Smalle, M., Chan, X. H., ... & Devane, D. (2020). [Extended use or re-use of single-use surgical masks and filtering facepiece respirators: A rapid evidence review](#). *medRxiv*.
- ² Perkins, D. J., Villescas, S., Wu, T. H., Muller, T., Bradfute, S., Hurwitz, I., ... & Langsjoen, J. (2020). [COVID-19 global pandemic planning: Decontamination and reuse processes for N95 respirators](#). *Experimental Biology and Medicine*, 1535370220925768.
- ³ Czubryt, M. P., Stecy, T., Popke, E., Aitken, R., Jabusch, K., Pound, R., ... & Pierce, G. N. (2020). [N95 mask reuse in a major urban hospital: COVID-19 response process and procedure](#). *Journal of Hospital Infection*, 106(2), 277-282.
- ⁴ Perkins, D. J., Villescas, S., Wu, T. H., Muller, T., Bradfute, S., Hurwitz, I., ... & Langsjoen, J. (2020). [COVID-19 global pandemic planning: Decontamination and reuse processes for N95 respirators](#). *Experimental Biology and Medicine*, 1535370220925768.
- ⁵ Toomey, E., Conway, Y., Burton, C., Smith, S., Smalle, M., Chan, X. H., ... & Devane, D. (2020). [Extended use or re-use of single-use surgical masks and filtering facepiece respirators: A rapid evidence review](#). *medRxiv*.
- ⁶ Juang, P. S., & Tsai, P. (2020). N95 Respirator Cleaning and Reuse Methods Proposed by the Inventor of the N95 Mask Material. *Journal of Emergency Medicine*. [N95 Respirator Cleaning and Reuse Methods Proposed by the Inventor of the N95 Mask Material](#)
- ⁷ Czubryt, M. P., Stecy, T., Popke, E., Aitken, R., Jabusch, K., Pound, R., ... & Pierce, G. N. (2020). [N95 mask reuse in a major urban hospital: COVID-19 response process and procedure](#). *Journal of Hospital Infection*, 106(2), 277-282.
- ⁸ Toomey, E., Conway, Y., Burton, C., Smith, S., Smalle, M., Chan, X. H., ... & Devane, D. (2020). [Extended use or re-use of single-use surgical masks and filtering facepiece respirators: A rapid evidence review](#). *medRxiv*.
- ⁹ Perkins, D. J., Villescas, S., Wu, T. H., Muller, T., Bradfute, S., Hurwitz, I., ... & Langsjoen, J. (2020). [COVID-19 global pandemic planning: Decontamination and reuse processes for N95 respirators](#). *Experimental Biology and Medicine*, 1535370220925768.
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