

Possible Alternatives to Surgical N95 Respirators (in the United States and Canada): Healthcare

Background

During disease outbreaks recommendations are often made to provide healthcare workers with respirators at least as protective as an N95, FFP2, or equivalent particulate respirator. Healthcare facilities often standardize on surgical N95 respirators, sometimes also referred to as healthcare respirators or medical respirators, during typical operations. However, during outbreaks availability of surgical N95 respirators may become limited, and organizations should evaluate whether other, more readily available, respirators would be appropriate for use. The U.S. CDC, in their Interim Infection Prevention and Control Recommendations for the 2019 novel coronavirus, recommend respirators at least as protective as an N95, FFP2, or equivalent particulate respirator and indicates that reusable respirators and powered air purifying respirators are appropriate in healthcare settings. These 2019 novel coronavirus recommendations do not specify the need for a surgical N95 respirator.

All disposable filtering facepiece respirators that are certified as an N95, FFP2, or equivalent can effectively filter airborne biological particles such as viruses and bacteria.¹²³⁴ There is no difference in the filtration effectiveness between standard N95 respirators and surgical N95 respirators. Both are certified as particulate respirators by the U.S. National Institute for Occupational Safety and Health (NIOSH).¹ Surgical N95 respirators are also cleared as surgical masks by the U.S. Food and Drug Administration (FDA). These respirators are meant to be used during surgery and nursing tasks during which both of the following are true: the wearer requires respiratory protection and either fluid resistance (as defined by the ASTM standard) is required or expelled particles must be contained (to help maintain a sterile field, for example).

In normal circumstances when disease outbreak is not a concern, most healthcare facilities do not have high usage rates for respirators and often choose to standardize across one or two models of surgical N95 respirators for all tasks. While these respirators typically have wide availability in normal conditions, unusually high demand for surgical N95 respirators during outbreaks can result in the availability of these respirators becoming limited. During times when organizations are not able to obtain surgical N95 respirators, alternative respirator options may need to be considered for certain healthcare tasks.

Prioritizing Respirator Use

Prioritization of respirator use can help ensure that surgical N95 respirators are available for those healthcare workers who are in surgery, need to work in a sterile field, or may be exposed to high-velocity streams of bodily fluid. If a healthcare facility is prioritizing respirator use, workers' expected tasks and exposures should be evaluated to determine whether it's necessary for them to use surgical N95 respirators or whether a different type of respirator may be acceptable instead. **All certified N95 or higher-rated particulate respirators can filter airborne biological particles such as viruses and bacteria.**²³⁴

It may be appropriate for healthcare workers who will not be performing particular medical procedures or do not need to maintain a sterile field to use respirators other than surgical N95 respirators. Examples of tasks requiring respiratory protection, but likely not requiring surgical respirators, include triage and evaluating patients with respiratory symptoms, as well as caring

1. Particulate respirators are designed to help reduce the wearer's exposure to airborne particulate hazards. NIOSH tests and certifies respirators based on their physical and performance characteristics, including filtration efficiency. N95-rated filtering facepiece respirators have a filtration efficiency of at least 95% against non-oily particles when tested using the NIOSH criteria. The particles used to test the filtration are in a size range that is considered the most penetrating. Therefore, the test methods ensure that the filter media can filter particles of all sizes with at least 95% efficiency.

for patients with known viral or bacterial infections. Below is an example of selection guidelines that healthcare organizations may choose to consider adding to their respiratory protection program.

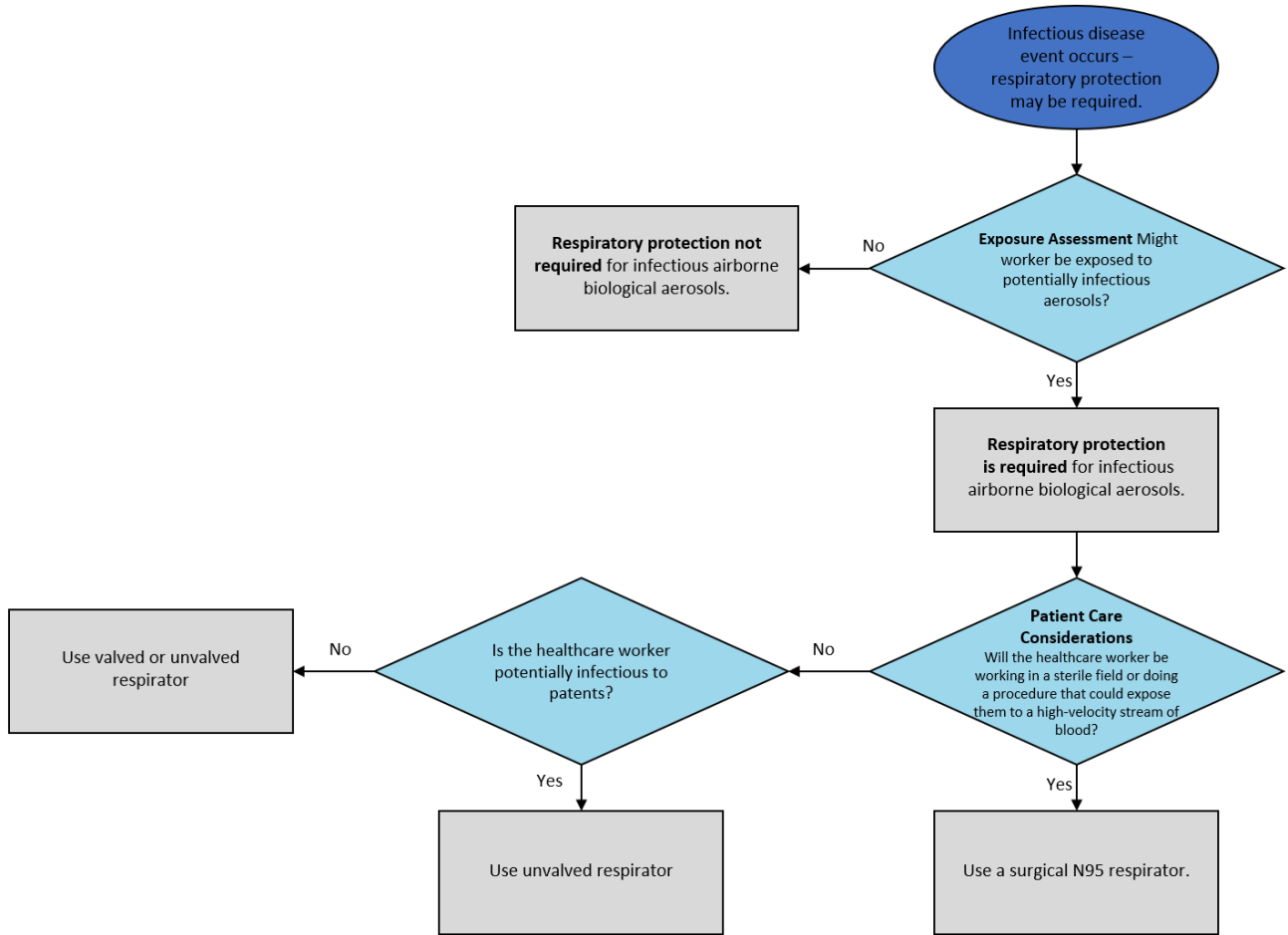






Figure 1: Flowchart: Respiratory Protection Considerations for Infectious Airborne Biological Aerosols

Evaluating Available Respiratory Protection Options

Examples of respirator types that may be available when availability of surgical N95 respirators is limited include:

		
<p>Non-surgical filtering facepiece respirators</p>	<p>Reusable (elastomeric) respirators</p>	<p>Powered air-purifying respirators (PAPRs)</p>

Here are some considerations to help organizations determine whether any of these other respirator types might work within their respiratory protection program. Please note that none of these have the additional properties required of a surgical respirator, and so would not be appropriate for use in a surgical setting.

	Key Attributes	Key Potential Advantages	Key Potential Limitations
Non-surgical filtering facepiece respirators 	<ul style="list-style-type: none"> Effectively filter airborne biological particles such as viruses and bacteria Designed to fit tightly to the face Wide variety Certified as particulate respirator 	<ul style="list-style-type: none"> Cost Minimal care and maintenance 	<ul style="list-style-type: none"> No facial hair – daily shaving required Fit with certain safety glasses
Elastomeric respirators 	<ul style="list-style-type: none"> Effectively filter airborne biological particles such as viruses and bacteria Designed to fit tightly to the face Multiple sizes Cleaned and reused 	<ul style="list-style-type: none"> Cost Reusable – longevity / replacement parts Eye protection (Full-face only) 	<ul style="list-style-type: none"> Facial hair – daily shaving required Fit with certain safety glasses (half face) Communication Storage, cleaning, maintenance Prescription eyewear (Full-face)
Powered air-purifying respirators (PAPRs) 	<ul style="list-style-type: none"> Effectively filter airborne biological particles such as viruses and bacteria Designed to fit over some facial hair Variety of styles and facepiece/headtop offerings 	<ul style="list-style-type: none"> Wide variety of head-tops <ul style="list-style-type: none"> Limited facial hair permitted for loose-fitting headgear Eye protection (certain head-gear) More of face visible 	<ul style="list-style-type: none"> Storage, cleaning, maintenance Care, charging, and life of PAPR batteries Weight and size Communication

References

- 1) Brosseau, L.M., Schaffer, R. [Do We Need to Challenge Respirator Filters With Biological Aerosols?](#) NIOSH Blog; 2014.
- 2) Chen, S.K., Vesley, D., Brosseau, L.M., and J. H. Vincent. Evaluation of single-use masks and respirators for protection of health care workers against mycobacterial aerosols. *Am. J. Infect. Control.* 22:65-74; 1994.
- 3) Brosseau, L.M., McCullough, N.V. and D. Vesley. Mycobacterial aerosol collection efficiency of respirator and surgical mask filters under varying conditions of flow and humidity. *Appl. Occup. Environ. Hyg.* 12(6):435-445; 1997.
- 4) McCullough, N.V., Brosseau, L.M. and D. Vesley. Collection of three bacterial aerosols by respirator and surgical mask filters under varying conditions of flow and relative humidity. *Ann. Occup. Hyg.* 41(6):677-690; 1997.
- 5) EN 14683:2019 Medical face masks - Requirements and test methods. European Committee for Standardization, Brussels

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