

Role of surgical masks and particulate respirators in healthcare settings

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Acknowledgement of Country and Elders

Before we begin,

I would like to acknowledge the traditional owners of the land where we meet today.

I pay my respects to their Elders past and present.

It is upon their lands that we meet.



Acknowledgements

- Respiratory Protection Program Board
- Health Education and Training
- Australian Sikh Medical Association
- Northern Sydney Local Health District
- Sydney Local Health District
- New South Wales Biocontainment Unit - Westmead Hospital
- Clinical Excellence Commission Data team and IPAC/HAI team

Respiratory Communicable Diseases

COVID-19

Influenza

RSV

Pertussis

Tuberculosis (TB)

Measles

Chickenpox

Legionnaires Disease

Q Fever

Invasive pneumococcal
infection (IPD)

Avian flu

SARS

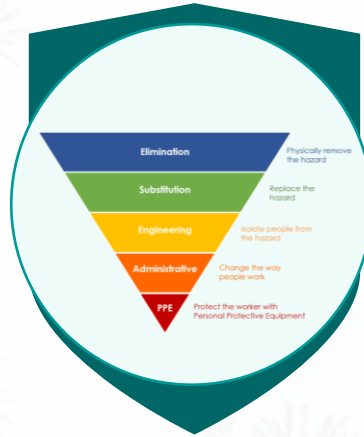
Small Pox

Respiratory Protection

Hand hygiene



Hierarchy of controls



PPE



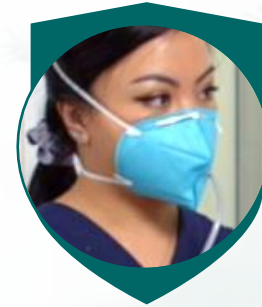
Surgical masks



Respirators



Fit checking



Fit testing

Hand Hygiene Jul-Oct 2021

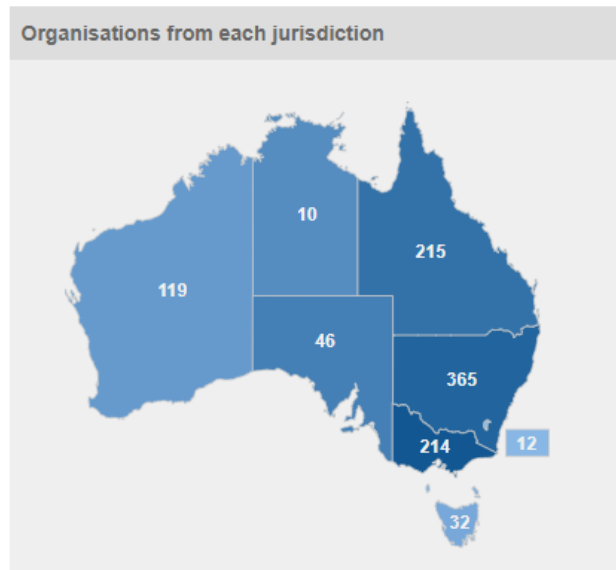
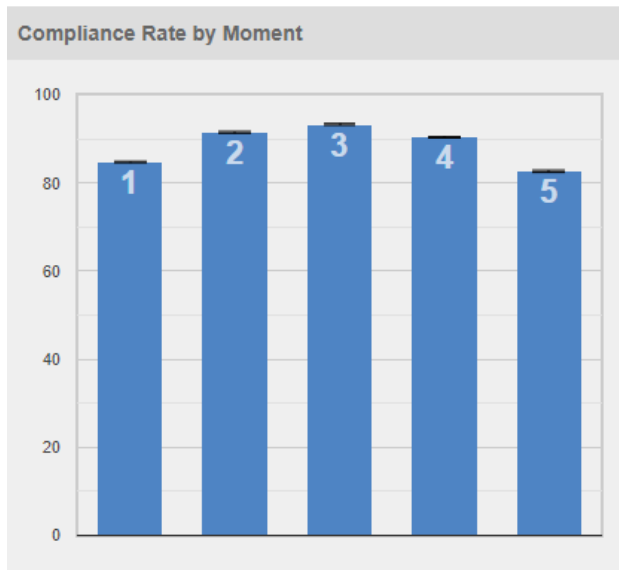
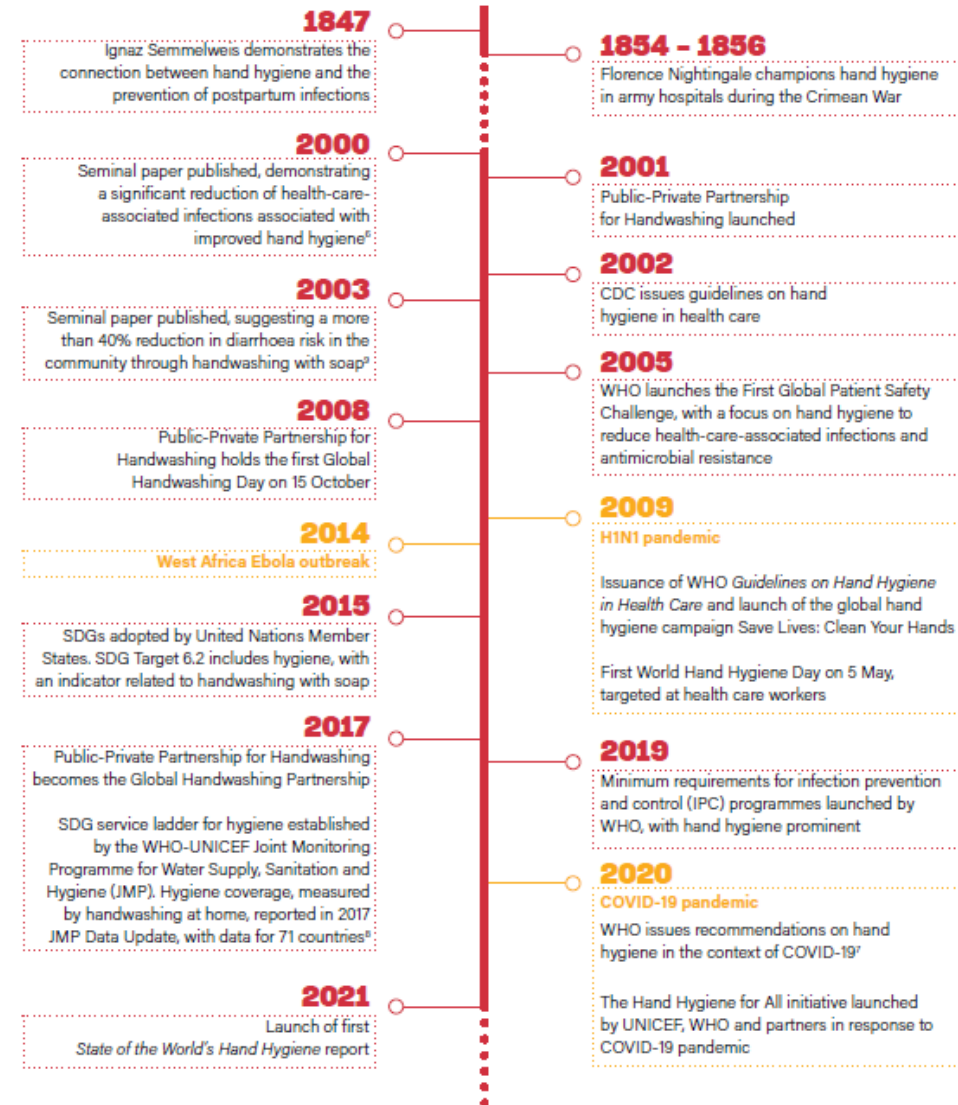
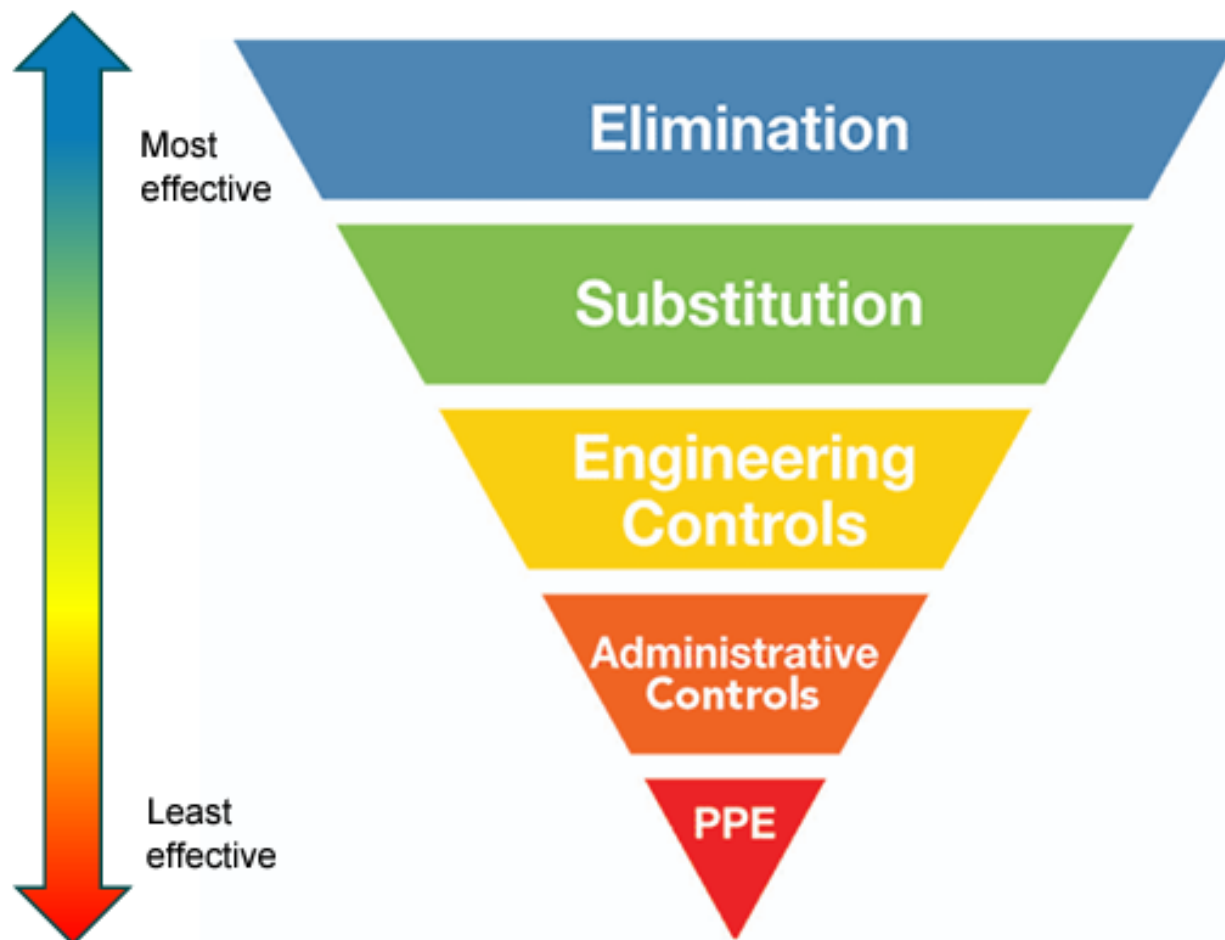


FIGURE 1

A timeline of progress in hand hygiene



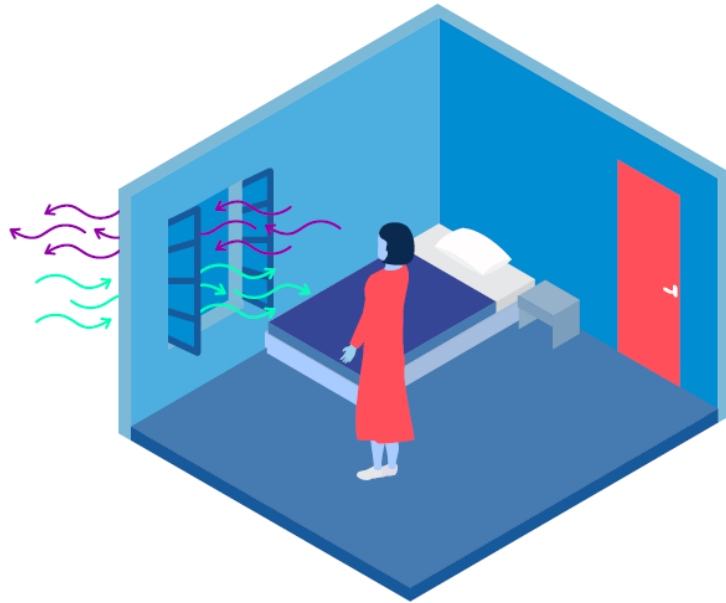
Hierarchy of Controls -IPAC



Hierarchy of Control Ranking	Examples of control measures to prevent transmission
Elimination Reduce the opportunities for the virus to be introduced	<ul style="list-style-type: none"> • Vaccination • Testing and quarantine at borders • Travel restrictions
Substitution Find alternative ways of providing care that reduce the potential for transmission.	<ul style="list-style-type: none"> • Physical distancing • Symptomatic HW and agency group stay home and do not come to work • Remote working • Telehealth
Engineering Controls Use physical barriers and other forms of hazard reduction for example: ventilation controls, patient separation	<ul style="list-style-type: none"> • Ventilation and improved air changes • Registration of all people entering the facility (symptom check, QR code) • Negative pressure rooms • Single room with ensuite • Isolation of patients
Administrative controls Effective and consistent implementation of policies & protocols	<ul style="list-style-type: none"> • Audit and feedback • Hand hygiene • Cleaning and disinfection • Signs, posters, information sheets • IPAC Guidance documents • Training and education of HW
PPE	<ul style="list-style-type: none"> • Symptomatic patients wear surgical mask • Correct transmission-based precautions, PPE worn when in contact with symptomatic patients

Engineering Controls

Air circulation and ventilation



[WHO Roadmap](#) to improve and ensure good indoor ventilation in the context of COVID-19

- Adequate ventilation in all patient care areas plays a key role to help prevent and reduce infections.
- Some risk factors, such as the presence of confirmed and suspected cases, the proximity required to provide medical care, AGP potentially performed, and visitor influx, make these settings particularly vulnerable



Safety Information 009/21 - Updated

26 November 2021

Distributed to:

Chief Executives
Directors of Clinical Governance
Director, Regulation and Compliance Unit

Action required by:

Chief Executives
Directors of Clinical Governance

We recommend you also inform:

Directors, Managers and Staff of:

- Infection Prevention and Control

Recirculating air filtration device use in NSW hospitals

Background

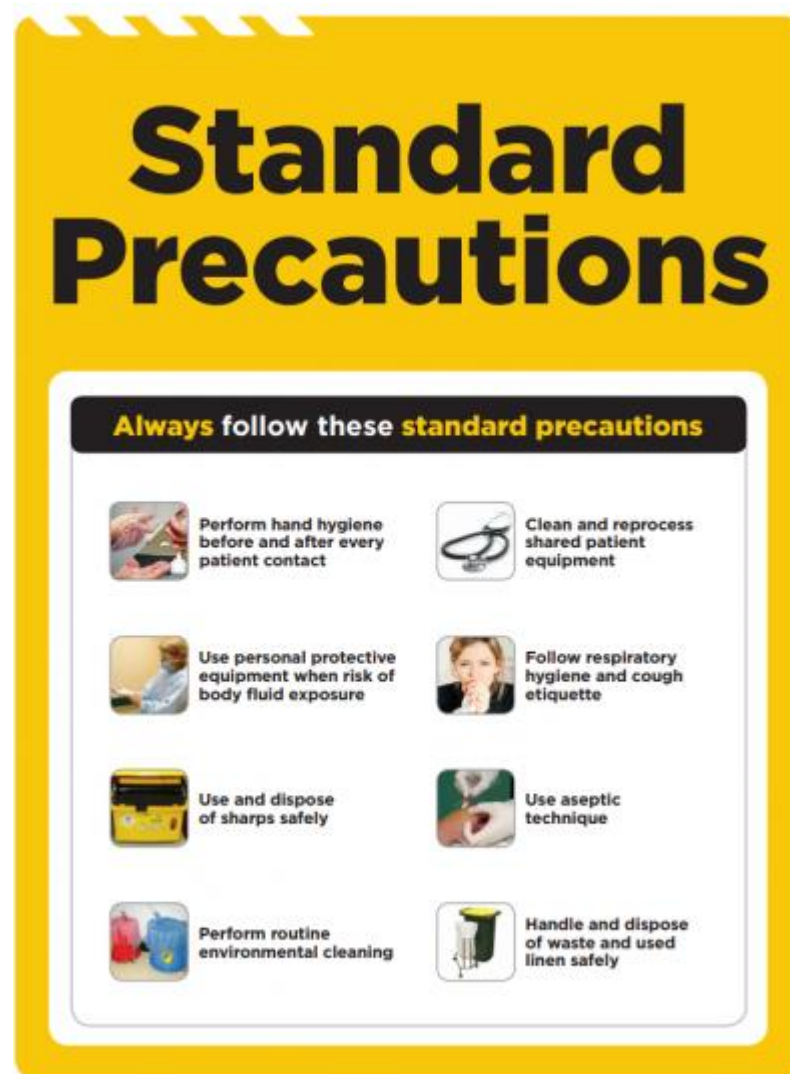
Portable recirculating air filtration devices are being promoted as a way of improving the air quality within hospitals to reduce the transmission of COVID-19. The National COVID-19 Clinical Evidence Taskforce has not provided a recommendation for use of these devices in the hospital environment; however some health services are currently using these devices.

Air filtration devices work by pulling air in through a HEPA-filter which removes particles and returns clean air into the room. These devices do not provide fresh air. Fresh air is provided by the mechanical ventilation system, noting some older hospitals will use natural ventilation.

The purpose of this Safety Information Notice is to ensure:

1. the choice to use these devices is informed by evidence

Standard and Transmission Based Precautions



- **Contact Precautions** protect the HW by minimising the COVID-19 transmission risk from direct physical contact with patients or indirect contact from shared patient care equipment or from contaminated environmental surfaces

Contact Precautions PPE



Hand Hygiene



Disposable
Gloves



Fluid Resistant Apron
or Isolation Gown

- **Droplet Precautions** protect the HWs nose, mouth and eyes from droplets produced by the patient coughing and sneezing

Droplet Precautions PPE



Hand Hygiene



Surgical Mask



Eye Protection

- **Airborne Precautions** protect the HWs respiratory tract from very small and unseen airborne particles that become suspended in the air.

Airborne Precautions PPE



Hand Hygiene

+



P2/N95
Respirator

Respiratory Protective Devices (RPDs)

- RPDs are designed to protect the wearer from inhalation hazards such as airborne infectious agents and in some cases, dusts and other particles
- RPD is one aspect of both infection prevention and control (IPAC) as well as work health and safety (WHS) strategies for ensuring HW safety at work
- A particulate filter respirator (also known as a P2 or N95 respirator) provide respiratory protection from airborne particles

Respiratory Protection Program (RPP)

- The use of fit tested respirators in the workplace is required to protect HWs against airborne pathogens
- The COVID-19 pandemic required rapid upscaling of fit testing, and this was achieved by using the elements of an RPP
- Implementing and sustaining an RPP during a pandemic is challenging and required clear direction and stakeholder engagement

Types of RPDs

SURGICAL masks



RESPIRATORS

Disposable P2/N95



Non-powered (Disposable or Reusable)



Powered air purifying respirators (PAPRs)



Surgical masks for droplet precautions



1. Handle the mask by the straps only



2. Secure loops behind the ears



3. Mould the nose piece to fit your face

Surgical Mask use in the context of COVID-19

- WHO - A respirator or a medical mask should be worn by health workers along with other PPE
- Infection Control Expert Group - the choice between P2/N95 respirator or surgical mask should be based on an assessment of risk of transmission

As source control:



Masks are a two-way street. Masks protect you and me.

**Covid-19
Carrier**

**Healthy
Person**



without mask

RISK OF SPREAD

without mask

HIGH

**Covid-19
Carrier**

**Healthy
Person**



with mask

RISK OF SPREAD

without mask

LOW

**Covid-19
Carrier**

**Healthy
Person**



without mask

RISK OF SPREAD

with mask

MODERATELY HIGH

**Covid-19
Carrier**

**Healthy
Person**



with mask

RISK OF SPREAD

with mask

VERY LOW

Eye protection



Ensure eye protection

- is secure
- doesn't need adjustment after applying

Note: Eye protection is designed to protect the wearer from exposure to splash and fluid from blood and body substances. Prescription glasses are not designed for this purpose. Protecting your prescription glasses will protect your eyes from exposure risks.

Droplet Precautions and role of eye protection

COVID-19 Critical Intelligence Unit: Ocular transmission of COVID-19

In brief

Ocular transmission

26 August 2022

Background

- Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is transmitted person-to-person through close contact, mainly through respiratory droplets.¹ According to the [World Health Organization](#) infection may occur where respiratory droplets containing virus reach the mouth, nose or eyes of a susceptible person.²
- There is some evidence of SARS-CoV-2 detection in [ocular swab samples](#) however the [prevalence is low](#) (0-17%).³⁻⁶ [Evidence is limited and conflicting](#) about whether SARS-CoV-2 can spread through the mucous membranes of the eye.⁷


Ocular transmission

- While [ocular transmission](#) has been proposed as a transmission route for SARS-CoV-2, via the nasolacrimal duct into the respiratory tract, there is no evidence of definite ocular transmission of SARS-CoV-2.⁷⁻⁹
- SARS-CoV-2 can cause ocular symptoms, in particular conjunctivitis, however prevalence is low (between 0-35%).^{3-5, 7, 8} There is a [potential but unconfirmed risk of transmission](#) from conjunctiva.^{9, 10}

THE LANCET
Microbe


COMMENT | VOLUME 2, ISSUE 5, E173-E174, MAY 01, 2021

SARS-CoV-2: eye protection might be the missing key

Minas Theodore Coroneo  • Peter John Collignon

Open Access • Published: February 23, 2021 • DOI: [https://doi.org/10.1016/S2666-5247\(21\)00040-9](https://doi.org/10.1016/S2666-5247(21)00040-9)




 BMC Part of Springer Nature

Antimicrobial Resistance & Infection Control

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Research | [Open Access](#) | [Published: 04 November 2021](#)

The effect of eye protection on SARS-CoV-2 transmission: a systematic review

[Oyungerel Byambasuren](#)  [Elaine Beller](#), [Justin Clark](#), [Peter Collignon](#) & [Paul Glasziou](#)

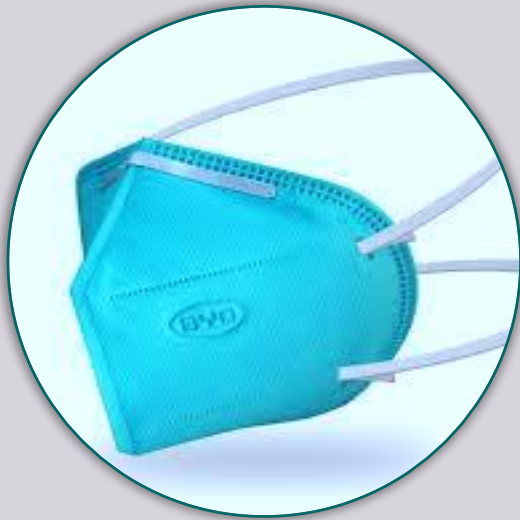
[Antimicrobial Resistance & Infection Control](#) **10**, Article number: 156 (2021) | [Cite this article](#)

14k Accesses | **102** Altmetric | [Metrics](#)

[Evidence of SARS-CoV-2 Transmission Through the Ocular Route](#)

The ocular surface can serve as a reservoir and source of for SARS-CoV-2. SARS-CoV-2 can be transmitted to the ocular surface through hand-eye contact and aerosols, and then transfer to other systems through nasolacrimal route. The possibility of ocular transmission of SARS-CoV-2 cannot be ignored.

Disposable P2/N95 Respirators- Donning and fit checking



P2/N95 masks fit checking



[Education, training, posters and videos](#)

Key terminology

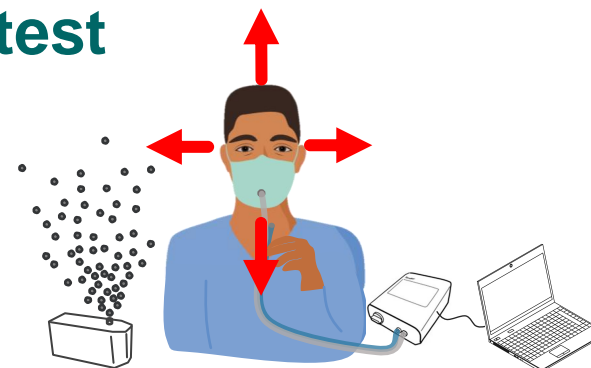
Fit check



Exercise: Side-to-side, up and down, while taking deep breaths and manually feeling for air escaping around the respirator seal.
NO fit tester device.

VS

Fit test



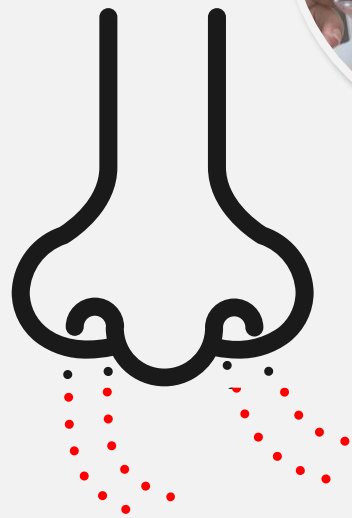
Exercises:
1. Bending over, 2. Talking,
3. Head side-to-side, 4. Head up and down.

Respirator Fit testing

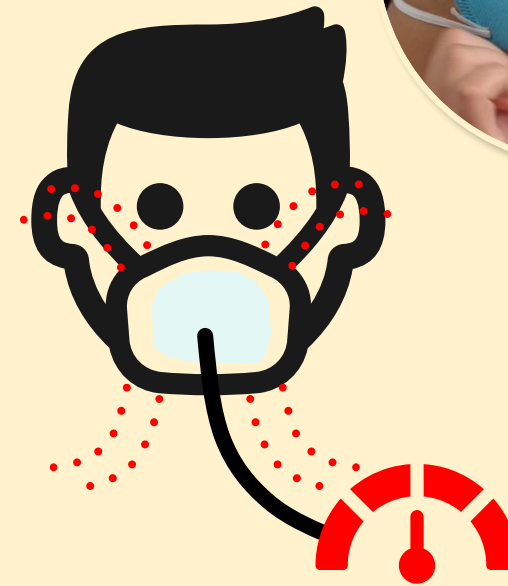
- Fit testing is a validated process of determining the type and size of respirator that achieves an adequate seal on an individual's face
- Fit testing may be conducted using two different methods; the qualitative fit test method which results in a pass or fail response, and a quantitative test, providing an estimate of the number of particles that leak into a respirator

Fit test methods

Qualitative



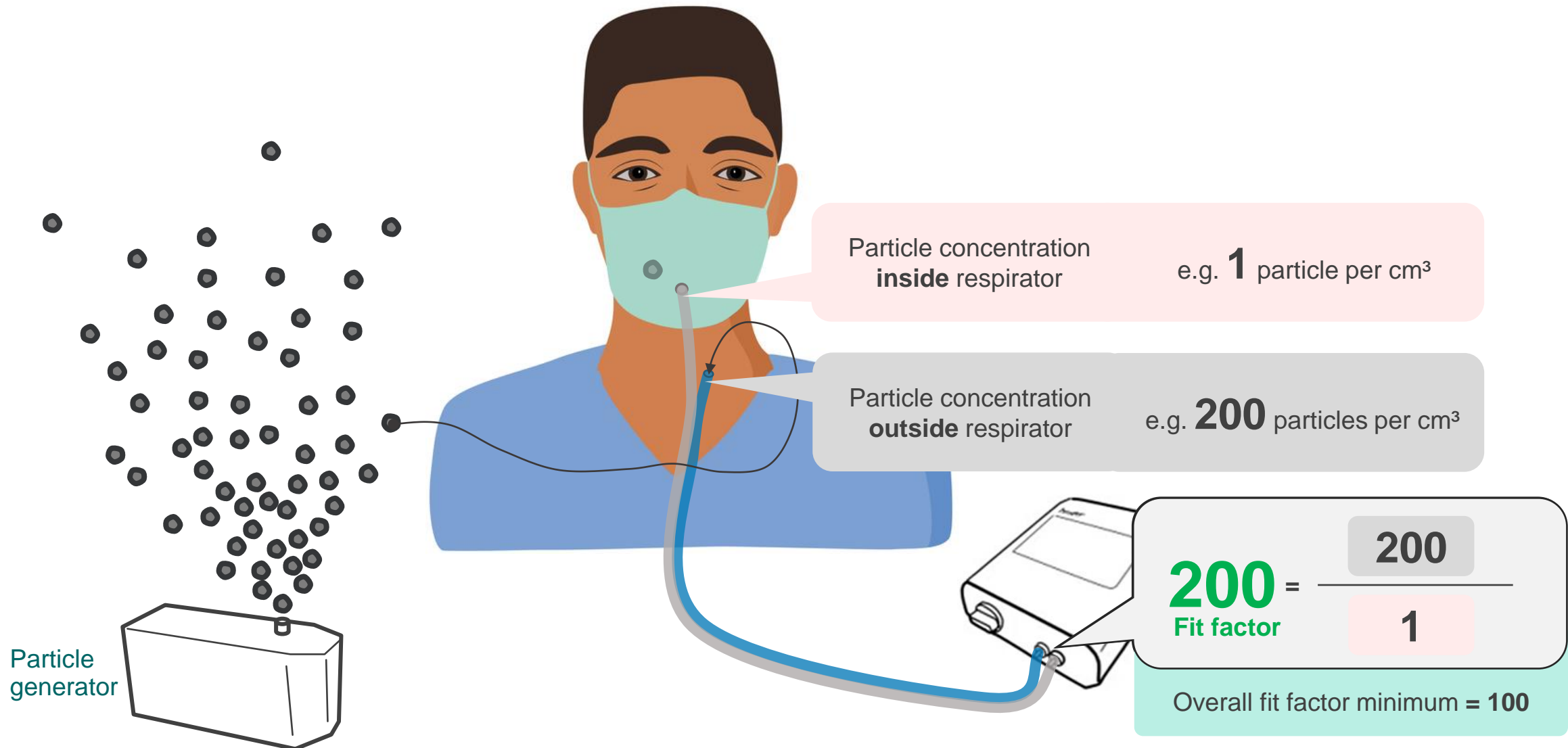
Quantitative



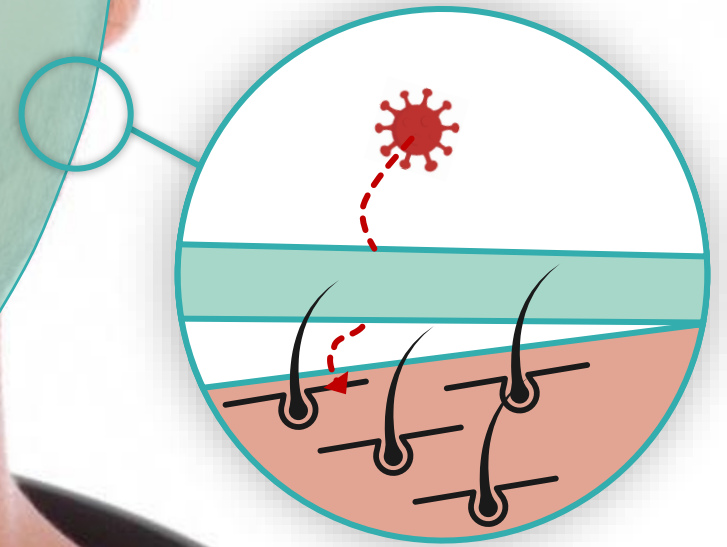
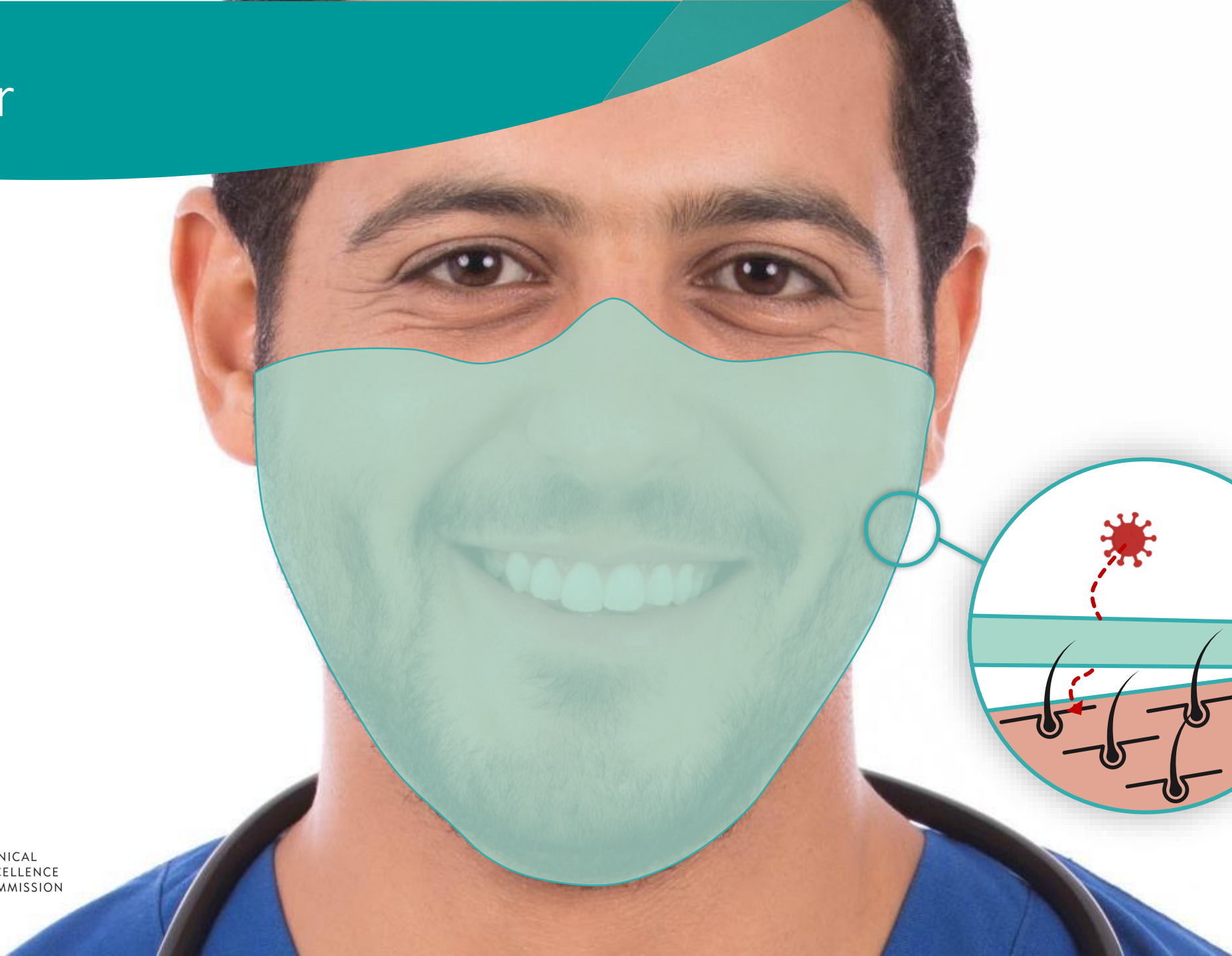
P2/N95 Quantitative Fit testing



How it works



Facial hair



Facial Hair Exemption

- Workers who are unable to be clean shaven due to medical reasons or religious observance can seek an exemption for the use of a beard cover technique when wearing a tight-fitting respirator

Elastic band technique



Balaclava technique



Facial skin injury due to tight fitting respirators

Use of prophylactic dressings under tight fitting respirators

HWs need to be fit-tested with a respirator and have passed prior to application of the prophylactic dressings

Step 1	Step 2	Step 3
		
Perform Hand Hygiene. Apply skin barrier film/wipe to the face where the dressing will be applied. Allow to dry before applying the dressing.	Use 1 single Mepilex® Lite dressing 4cm x 5cm for the bridge of the nose.	Peel backing. Apply Mepilex® Lite dressing 4cm x 5cm to the bridge of the nose.



<https://pubmed.ncbi.nlm.nih.gov/35245647/>

Adverse effects of prolonged respirator use

There are two basic principles relevant to respirator use:

- Work cannot usually be performed as long or as hard while wearing a respirator compared to when respirators are not worn.
- There is a great deal of wearer variability. Some wearers can tolerate respirator high inspiratory or expiratory resistance or pressure levels, while others cannot.

Prolonged use of N95 and surgical masks by healthcare professionals during COVID-19 has caused adverse effects such as headaches, rash, acne, skin breakdown, and impaired cognition in the majority of those surveyed

The magnitude of discomfort does appear to increase significantly over time with prolonged wear

J Biol Eng. 2016; 10: 4.

Published online 2016 Feb 9. doi: [10.1186/s13036-016-0025-4](https://doi.org/10.1186/s13036-016-0025-4)

PMCID: PMC4748517

PMID: [26865858](https://pubmed.ncbi.nlm.nih.gov/26865858/)

Respirator masks protect health but impact performance: a review

Arthur T. Johnson[✉]

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Acta Neurol Scand 2006; 113: 199–202 DOI: [10.1111/j.1600-0404.2005.00560.x](https://doi.org/10.1111/j.1600-0404.2005.00560.x)

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ACTA NEUROLOGICA
SCANDINAVICA

Headaches and the N95 face-mask amongst healthcare providers

Lim ECH, Seet RCS, Lee K-H, Wilder-Smith EPV, Chuah BYS, Ong BKC. Headaches and the N95 face-mask amongst healthcare providers. Acta Neurol Scand 2006; 113: 199–202
© 2006 The Authors Journal compilation © 2006 Blackwell Munksgaard.

Background: During the 2003 severe acute respiratory distress syndrome epidemic, healthcare workers mandatorily wore the

**E. C. H. Lim¹, R. C. S. Seet¹,
K.-H. Lee¹, E. P. V. Wilder-Smith¹,
B. Y. S. Chuah², B. K. C. Ong¹**

¹Department of Medicine and ²Department of Hematology-Oncology, National University Hospital, Singapore

Controlled Clinical Trial > J Occup Environ Hyg. 2012;9(1):59–64.

doi: [10.1080/15459624.2012.635133](https://doi.org/10.1080/15459624.2012.635133).

Discomfort and exertion associated with prolonged wear of respiratory protection in a health care setting

Brian V Shenal¹, Lewis J Radonovich Jr, Jing Cheng, Michael Hodgson, Bradley S Bender

Affiliations + expand

PMID: 22168256 PMID: [PMC7196691](https://pubmed.ncbi.nlm.nih.gov/PMC7196691/) DOI: [10.1080/15459624.2012.635133](https://doi.org/10.1080/15459624.2012.635133)

Free PMC article



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Citation

Rosner E (2020)
Adverse Effects of Prolonged Mask Use among Healthcare Professionals during COVID-19. J Infect Dis Epidemiol 6:130.
doi.org/10.23937/2474-3658/1510130

SURVEY | OPEN ACCESS

DOI: [10.23937/2474-3658/1510130](https://doi.org/10.23937/2474-3658/1510130)

Adverse Effects of Prolonged Mask Use among Healthcare Professionals during COVID-19

Elisheva Rosner, MSN, RN-C*

Morgan Stanley Children's Hospital of New York-Presbyterian, USA

Abstract

Background

In March 2020, New York City encountered its first official case of COVID-19 (coronavirus disease 2019). This novel coronavirus, referred to as SARS-CoV 2, originated in Wuhan, China in December 2019. Within a short amount of time, hundreds of thousands of cases were diagnosed around the world and the United States, causing the World Health Organization to announce it as an official infectious disease pandemic on January 30, 2020.

COVID-19 is spread by respiratory droplets, and healthcare professionals are mandated to wear personal protective equipment (PPE) for a prolonged period of time when caring for COVID-19 patients.

Objective

Impact of RPDs on patient care and safety

- Face masks, particularly, muffle sounds and cover facial expressions during live communication
- Interpersonal communication issues
- Time need to don, fit check etc
- Staff fatigue due to extended use of PPE, unpleasant feeling due to moistness, heat, foggy glasses etc
- Missing hand hygiene moments
- Potential for increased healthcare associated infection
- Increased adverse events e.g. falls, medication error, lack of attention

COVID-19 Infection Prevention and Control

COVID-19 IPAC Manual



For healthcare settings



Respiratory Protection Program



For healthcare settings



Education, training, posters and videos



For healthcare settings



Aged and residential care



Quarantine program, borders and airports



National and international resources



More information

CEC

Medication Safety

Safety Fundamentals

Human Factors

NSW Health

COVID-19 general info

Clinical resources

Communities of Practice

Feedback on
our webpage?

