Ventilation in Residential Care

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Acknowledgement of Country

SEPHU acknowledges the Traditional Owners of this land, the Wurundjeri and Boonwurrung People, who are part of the Kulin Nation.
We pay our respects to their Elders past, present and emerging whose ancestral land we provide care upon to the community.

Monash Health
South East Public Health Unit

Ventilation in residential care

Infection prevention and control
information for managers and IPC Leads

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About this presentation

Who is it for?

- All types of residential care facility (RCF) managers, administrators, and training managers
- Aged care Infection Prevention and Control (IPC) Leads

What is it about?

How to use ventilation as an effective strategy to improve indoor air quality and reduce the risk of transmission of respiratory infections such as COVID-19.

Outcomes

At the end of this presentation, you'll be able to:

- identify the types of ventilation in your building
- make the best use of your building's systems of ventilation to optimise indoor air quality
- source portable air cleaners
- educate others about ventilation. This includes staff, residents and visitors.

Using this presentation

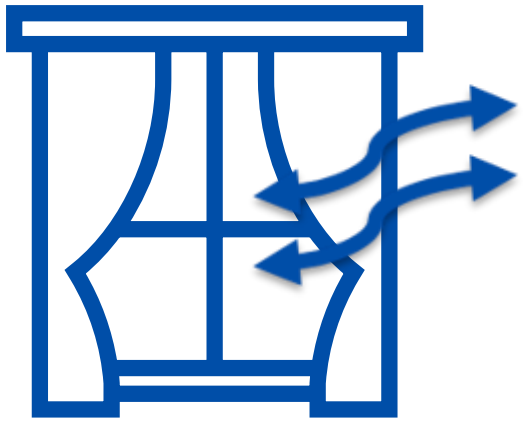
You don't need to look at every slide. After slide 8, you will use the links to jump to the slide/s that are relevant to your building's type of ventilation.

Menu

Ventilation is important

Ventilation is a key strategy to help you breathe easier about COVID-19.

Better ventilation reduces transmission of COVID-19—one study showed that transmission was almost halved by simple improvements to ventilation*.



*** In a study of 169 schools in the USA, opening windows and doors, or using fans reduced the incidence of COVID-19 by 35%. Adding air cleaning by HEPA filtration reduced the incidence by 48%.**

Gettings et al. Mask Use and Ventilation Improvements to Reduce COVID-19 Incidence in Elementary Schools - Georgia, November 16-December 11, 2020. *MMWR Morb Mortal Wkly Rep*. 2021 May 28;70(21):779-784

How airborne infections spread

COVID-19 and other respiratory infections are primarily spread by inhaling very small **respiratory particles** that are produced when infected people sneeze, cough, speak, or sing.

These **particles can float** in the air for many hours. Particles can become trapped in indoor spaces where air does not move.

These particles are **diluted and blown away by fresh air**, so a simple way to reduce the risk of infection is to be outdoors in the fresh air or to **bring more fresh air indoors**.

This can be as easy as opening windows.

The **comfort** of your residents and staff is important, but there are ways to improve indoor air quality in your building without reducing comfort.

This can have a big effect on reducing COVID-19 transmission.

What is ventilation?

Ventilation of indoor spaces provides air movement (fresh or recirculated) to dilute and disperse particles in the air

There are two ways to ventilate:

- **natural ventilation** through doors, windows and vents
- **mechanical ventilation**, where fresh air is pumped in, for example, by centralised heating and cooling or evaporative systems.

Ventilation can also be **augmented** by filtration or other air cleaning devices and fans for air circulation.

Ventilation is measured in ACH (air changes per hour): the number of times the air in a room is replaced each hour.
Aim for 5 air changes per hour.

Did you know?

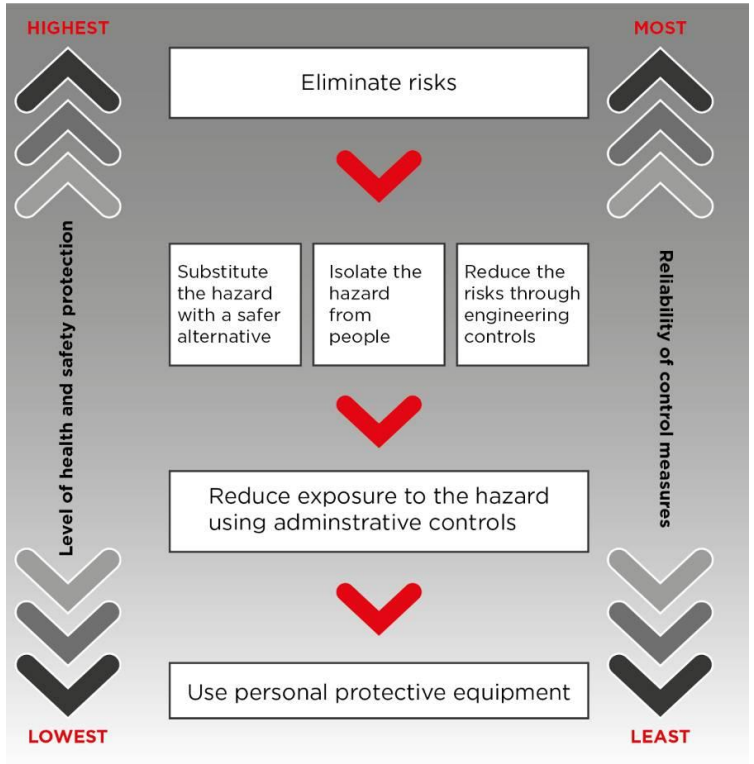
These devices do **not** bring in fresh air:

- ✗ split system air conditioners
- ✗ ceiling fans and pedestal fans

They make the temperature and humidity comfortable, which is important; or they move air around in a room, which is useful—but they do **not** provide ventilation.

A well-sealed house may have only 0.1 air changes per hour if the doors and windows are closed.
That's good for energy-efficiency, but bad for ventilation!

How effective is ventilation?



This Hierarchy of Controls diagram shows ways of controlling hazards, or risks.

The most effective controls are at the top; the least effective are at the bottom.

Examples of ways to control respiratory infections:

use **ventilation** to remove respiratory particles

limit the number of people in a space

wear **masks**

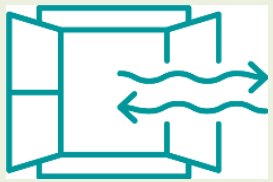
Ventilation is high up the hierarchy. It is **more effective** because it removes particles from the air in the first place.

Wearing masks is lower down the hierarchy. It is **less effective**. It is the last barrier against respiratory particles.

It's a good idea, though, to **control risk in several ways** at the same time.

What are the different types of ventilation?

Inside a building, fresh air can come from:



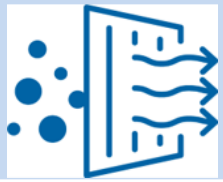
natural ventilation

- ✓ windows and external doors
- ✓ vents

mechanical ventilation

- ✓ centralised HVAC (heating, ventilation and air conditioning) systems
- ✓ evaporative cooling systems
- ✓ exhaust fans
- ✓ certain old-style air conditioner boxes in windows

Air can also be cleaned:



augmented ventilation

- ✓ portable air cleaner
- ✓ filters in HVAC systems

What type of ventilation do you have?

Know your system

Before you can optimise ventilation, you need to know **what type of heating or cooling systems are in your building**.

You may have different types of ventilation in different rooms or sections.

Include your facility's types of ventilation in your Outbreak Management Plan.

Tip

If you're not sure what type of system you have, **ask your maintenance staff**. You may have different systems in different rooms or wings.

Alternatively, look at every slide in this presentation. Pictures and descriptions will help you work it out.

Next slide

Choose the link below that matches your type of ventilation.

You'll learn what it looks like, what it does, how to make the best use of it and what else you can do.

natural ventilation

HVAC system

evaporative air cooler

split system air conditioner

window-mounted air conditioner

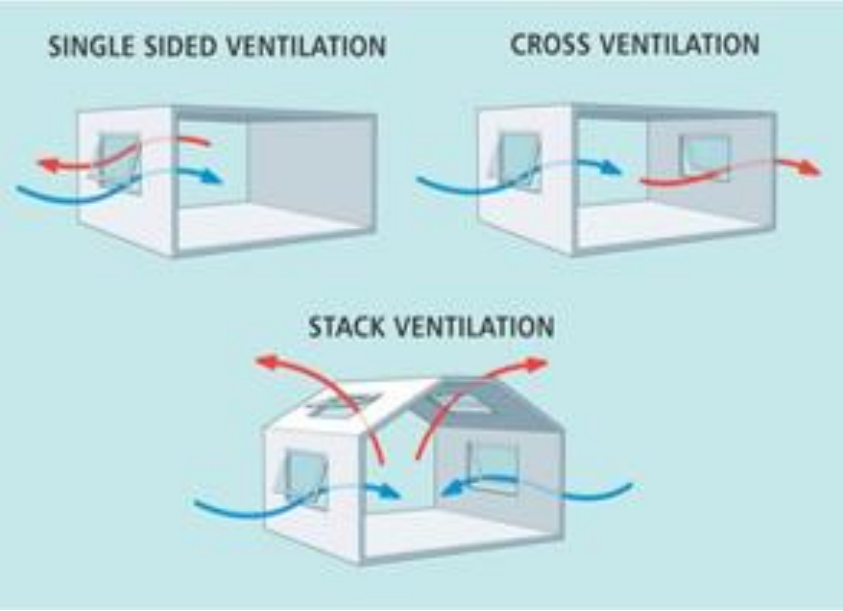
Natural ventilation

What does it look like?

Windows, external doors and vents

What does it do?

- ✓ brings in fresh air
- × does NOT filter or clean the air
- × does NOT control the temperature or humidity



Caution!

Natural ventilation is not suitable for storerooms or for places where sterile stock is kept. Outside air may contain dust, mould and infectious particles.

Making the best use of natural ventilation

Open all windows and external doors, whenever this is safe and comfortable for residents.

- ✓ In **mild weather**, open the windows.
- ✓ In **cold or hot weather**, open the windows slightly, or open them wide for short periods, for example, 10 minutes every hour or 20 minutes every two hours. Open the windows after people use a room.
- ✓ **Cross ventilation** (airflow from one open window or door to another) is best. **If there are two or more different window or vent openings, open them all. It's better to have many small openings than one big opening.**
- ✓ For **shared areas**, open windows and doors.

Tip

If a person has an respiratory infection, **shut their bedroom door** to stop air coming out into shared spaces. Open their windows and any external doors.

Natural ventilation - what else can you do?

Use fans

Fans do not bring in any fresh air, but they do create air movement, so they can help maximise airflow into and out of windows and rooms.

- ✓ Use a **pedestal fan**. Position it facing out of an open window so it acts like an exhaust fan.
- ✓ Run **bathroom and kitchen exhaust fans** continuously, or, if noisy, as much as possible.

> ✓ **Do use exhaust fans** if anyone in the room has COVID-19 or another respiratory infection.

- ✓ Turn **ceiling fans** on to their lowest setting. This will create air movement without blowing air from one person onto another.

> ⚠ **Don't use a ceiling fan** if anyone in the room has symptoms of respiratory infection.

Add a portable air cleaner

Adding a portable air cleaner to your natural ventilation will further reduce the risk of transmission.

- A portable air cleaner removes particles, including viruses, bacteria and mould, out of the air.
- They are particularly useful during outbreaks of respiratory disease.
- Useful if keeping windows open is too hot, cold, noisy or dusty.

Next slide

portable air cleaners

or explore another type of ventilation

Heating, ventilation and air conditioning (HVAC)

What does it look like?

This centralised ducted air-con is used in bigger buildings.

You'll see supply and exhaust vents in the ceiling (or sometimes the wall).

The ducts bring air into the room and return air to a centralised machine in the plant room, basement, or on the rooftop.

What does it do?

- ✓ Brings in fresh air, usually mixed with recirculated air
- ✓ Usually filters the air
- ✓ Gives a comfortable temperature and humidity

Making the best use of your HVAC system

Continue to use your HVAC for comfortable temperature and humidity.

Do not	Instead, …
✘ adjust your own **HVAC system**. Although 100% outdoor air intake is good, changing the air mix yourself may create air pressure problems in the rooms, strain the HVAC motor, or increase your power costs.	Ask an engineer to evaluate or a maintenance technician to adjust and maintain your HVAC system: ✓ adjust the settings to use as much outdoor air as possible. Aim for 5 ACH (air changes per hour) ✓ maintain with regular servicing, including tuning the machinery and cleaning any filters ✓ install or upgrade filters ✓ turn on the 'economy cycle' function. This adds 100% outdoor air if the outside temperature is 12-26° ✓ turn off the 'demand control' function. It limits outdoor air if sensors suggest low room occupancy.

HVAC systems - what else can you do?

Use fans

Fans do not bring in any fresh air, but they do create air movement, so they can help maximise airflow into and out of windows and rooms.

- ✓ Use a **pedestal fan**. Position it facing out of an open window so it acts like an exhaust fan.
- ✓ Run **bathroom and kitchen exhaust fans** continuously, or, if noisy, as much as possible.

  ✓ **Do** use **exhaust fans** if anyone in the room has COVID-19 or another respiratory infection.

- ✓ Turn **ceiling fans** on to their lowest setting and use winter (reverse) mode. This will create air movement without blowing air from one person onto another.

  ⚠ **Don't** use a **ceiling fan** if anyone in the room has symptoms of respiratory infection.

Add a portable air cleaner

Adding a portable air cleaner to your natural ventilation will further reduce the risk of transmission.

- A portable air cleaner removes particles, including viruses, bacteria and mould, out of the air.
- They are particularly useful during outbreaks of airborne disease.
- Useful if keeping windows open is too hot, cold, noisy or dusty.

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portable air cleaners

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Evaporative air cooler

What does it look like?

This system uses water to cool the air. It needs a window to be open to let the humid air out.

You'll see vents in the ceiling…

…connected to a roof-mounted mechanical unit.

What does it do?

- ✓ Most units bring in 100% fresh air
- ✗ Does not have a heating option

Make the best use of your evaporative cooler

Use evaporative coolers as much as possible.

They usually provide 100% outside air and up to 20 air changes per hour.

- Open windows
- If it has 'fan only' mode, use this in cooler weather for air flow.

What else can you do?

In cool weather, add natural ventilation.

In high-risk areas, add a portable air cleaner.

Next slide

portable air cleaners

or explore another type of ventilation

Split system air conditioner

What does it look like?

A room has an individual wall-mounted unit.

It’s connected to an ‘inverter’ outside the building.

Split systems in different rooms may share the same external inverter.

What does it do?

- ✗ Does NOT bring in fresh air
- ✓ Gives a comfortable temperature and humidity.

Making the best use of your split system air conditioner

Continue to use the split system

Although it doesn't bring in fresh air, it's important for comfortable temperature and humidity and it keeps air circulating.

Do not	Instead, …
✘ turn off split system air conditioning. Heat, humidity, or cold may endanger your residents' health.	✓ In hot or cold weather, continue to use split systems for a comfortable temperature. ✓ In mild weather, run on 'fan-only' to keep air moving. ✓ Use the 'on' mode, not 'auto' mode. This will keep the fan on. ✓ Add natural ventilation by opening windows (if it's very hot or cold, open for only 10 minutes per hour) ✓ Add a portable air cleaner in high-risk rooms.

Split systems - what else can you do?

Use fans

Fans do not bring in any fresh air, but they do create air movement. If you can add some natural ventilation, a fan can help maximise airflow into and out of windows and rooms.

- ✓ Use a **pedestal fan**. Position it facing out of an open window so it acts like an exhaust fan.
- ✓ Run **bathroom and kitchen exhaust fans** continuously, or, if noisy, as much as possible.

> **Do** use **exhaust fans** if anyone in the room has COVID-19 or another respiratory infection.

- ✓ Turn **ceiling fans** on to their lowest setting. This will create air movement without blowing air from one person onto another.

> ⚠ **Don't** use a **ceiling fan** if anyone in the room has symptoms of respiratory infection.

Add a portable air cleaner

Adding a portable air cleaner will further reduce the risk of transmission.

- A portable air cleaner removes particles, including viruses, bacteria and mould, out of the air.
- They are particularly useful during outbreaks of airborne disease.
- Useful if keeping windows open is too hot, cold, noisy or dusty.

Next slide

Choose…

natural ventilation

portable air cleaners

or explore another type of ventilation

Window-mounted air conditioner

What does it look like?

The room has a box unit in the window.

What does it do?

? Usually does NOT have the option to bring in outdoor air

✓ Gives a comfortable temperature and humidity

Make the best use of your window-mounted air conditioner

- Maintain with regular servicing, including changing any filters.
- If it has ‘fan only’ mode, use this in cooler weather for air flow.

What else can you do?

- Add natural ventilation if you can
- In a high-risk room, add a portable air cleaner.

Next slide

Choose…

natural ventilation

portable air cleaners

or explore another type of ventilation

Adding a portable air cleaner

Portable air cleaners are also called portable filtration units, air purifiers or air scrubbers.

Air cleaner disadvantages

- does not ventilate with fresh air
- must be the right size for the volume of the room and is less effective in rooms with very high ceilings (over 3 metres)
- needs a power source
- can be noisy
- the unit and its cord can be a trip hazard
- filters must be changed after a certain numbers of hours of use

Air cleaner benefits

- useful in rooms with a high risk of transmission (busy shared rooms or a room housing a person with COVID-19)
- also removes dust, pollen and animal allergens

Next slides

The next slides will help you choose

- the right air cleaner
- the right room
- the right position
- the right settings

Choose the right air cleaner

Choose an air cleaner that is big enough for the room or rooms it will be used in.

Ceiling height affects room size. Include ceiling height when calculating room volume.

To find out…	go to this link…
general information	Melbourne University's Guide to air cleaners (unimelb.edu.au) <https://sgeas.unimelb.edu.au/engage/air-cleaner-guide>.
advice on how to choose an air cleaner	not-for-profit organisation Clean Air Stars <https://cleanairstars.com/>
about any grants	your local public health unit (LPHU) <https://www.health.vic.gov.au/local-public-health-units>

Choose the right room

High priority rooms	Low priority rooms
Place the air cleaner in a room • used by people at **high risk** of transmitting infection • shared by **many people** for a long time • where people are **close together** • **without much ventilation** For example: • living rooms • dining rooms • kitchens • shared bedrooms, especially 4-bed share rooms • the bedroom of a person with COVID-19.	Don’t choose a room • used by fewer people • used for less time. For example: • offices and clinical rooms • single bedrooms.
The bedroom of a person with COVID-19 is a transmission risk, so place an air cleaner in the bedroom, or in the corridor outside, to capture virus particles at their source.	**Read the manufacturer’s information** to check that the portable air cleaner is big enough for the room.

Choose the right position

Place the cleaner here…	Not here…
Place the portable air cleaner in the part of the room that has the least air movement: ✓ **near a wall or corner** (but leave a gap of 60cm in front for air intake and 25cm on the sides and back for airflow) ✓ **away from open doors** and windows	Choose a spot that won't disturb people's comfort or safety: × **away from a person's bed** or chair, for noise and safety reasons × **away from water** and well clear of exit pathways × make sure the electrical cord or the unit itself is **not a trip hazard**.
If the room has an HVAC system, position the air cleaner …	
✓ **in a dead spot** or near HVAC supply grilles (vents that blow air into the room)	× **away from HVAC return grilles** (vents that take air out of the room: the HVAC filters will clean this air)

Use the right settings

It's best to…

- run the air cleaner on **high setting** while people are in the room…
- … but if it's too noisy, turn it down or don't use it continuously
- turn it on for **30 minutes before and 30 minutes after** using the room.

Continue to…

- **open windows and external doors** for ventilation
- **use air conditioning** for thermal comfort.

Service it regularly

Clean or replace the filter after the number of hours of use recommended by the manufacturer.

- First, move the air cleaner outdoors or to a well-ventilated workshop
- Follow manufacturer's instructions
- Wear an N95 mask and gloves when you change the filter. Wrap used filters and discard them into general waste

Next slide

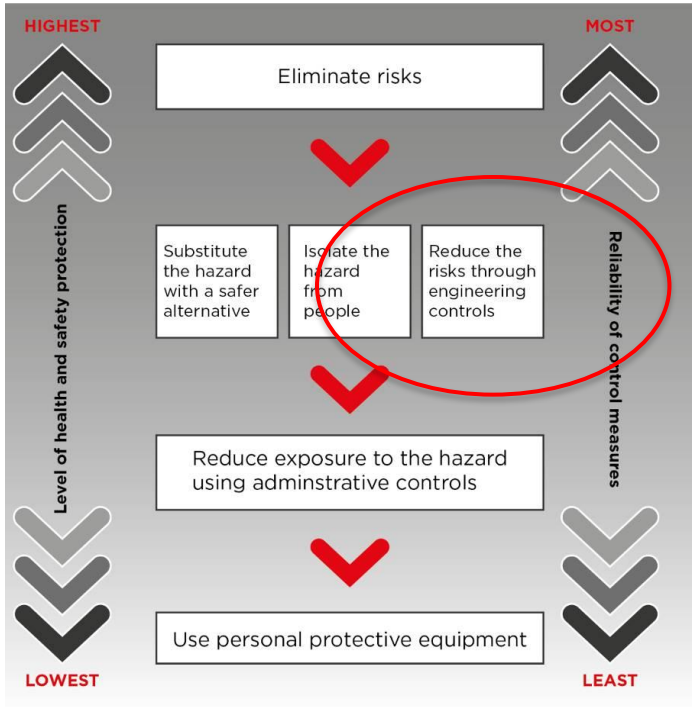
Summary

or explore another type of ventilation

Summary 1

Using engineering controls

Remember the Hierarchy of controls diagram that showed ways of controlling risks?
Here is a summary of ways to control the risk of COVID-19 using ventilation.



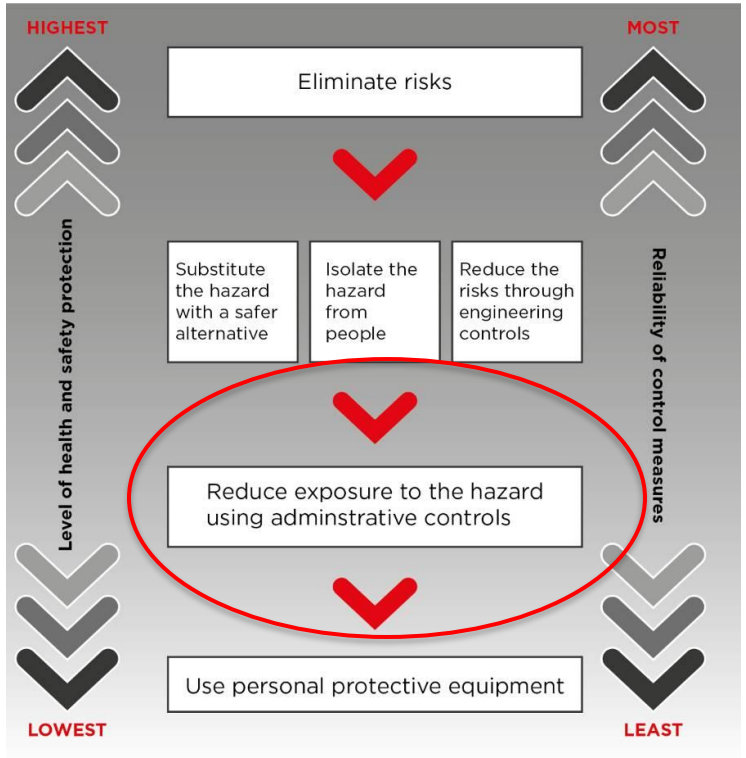
Engineering controls

Do some minor capital works

- **Repair any windows** that are stuck closed. You may need to add flyscreens or security screens
- In outdoor spaces, add shade and wind protection and more seating. Consider setting up **outdoor dining areas**
- **Service and maintain** any HVAC system or window-mounted air conditioners. You'll need a maintenance technician for this job.
- Add **portable air cleaners** in high-risk rooms
- Add **pedestal fans** in rooms with poor air flow (position facing out of the window so it becomes an exhaust fan.)
- get a ventilation engineer to assess your ventilation systems and give **advice**, including on best placement of air cleaners

Summary 2

Using administrative controls



Administrative controls

Change how space is used in the building

- Provide more choices in where residents can spend time; for example, by providing a variety of activities in rooms or areas that were previously under-used. This will encourage residents and staff to **spread out and use all the available spaces**
- Encourage residents and staff to **spend time outside**
- Continue to **use air conditioning** to keep the temperature comfortable
- **Educate** staff, residents and visitors about ventilation
- Encourage and **explain** why windows should be opened
- Educate staff about choosing the best room and best position for a **portable air cleaner**
- Ensure portable air cleaners are **not too noisy** for residents.

Summary 3

Troubleshooting

Problem	Solutions
It uses a lot of power to run the air conditioners with the windows open or increase the outdoor air in the HVAC system.	• Only an engineer or maintenance worker should adjust your HVAC system, so you get the best balance between cost and ventilation. • If you have a split system and it is too hot or too cold to open doors and windows regularly, then you may need to use a portable air cleaner.
Residents and staff do not want to open windows: it is too breezy, hot, cold or noisy.	• If your facility is at low risk, don't open the windows so wide that it makes people uncomfortable. A small opening is better than nothing, or open for a short time (10 minutes every hour). • Open windows and doors between uses of room. • If you are at higher risk but the room occupants can't tolerate much natural ventilation, you may need to use a portable air cleaner. • Educate people on the importance of ventilation.
The portable air cleaner is too noisy.	• Turn it down to a lower setting. This will make it less effective, so you may need to add more air cleaners or increase ventilation by other methods. • Check if the filters need cleaning or replacing.
The portable air cleaner is a trip hazard.	• Always put staff and resident safety first. Don't place it where residents might not see it and might trip, or where the cord is in the way. • You may have to compromise on where it is placed (see Choose the right position).

Further resources

General information on ventilation

- Ventilation | Coronavirus Victoria <https://www.coronavirus.vic.gov.au/ventilation>
- Optimising ventilation for infection prevention and control in healthcare settings | Australian Commission on Safety and Quality in Health Care <https://www.safetyandquality.gov.au/publications-and-resources/resource-library/optimising-ventilation-infection-prevention-and-control-healthcare-settings>
- Ventilation | health.vic.gov.au <https://www.health.vic.gov.au/covid-19-infection-prevention-control-guidelines/ventilation>

Infographics

- Use and placement of portable air filter units Ventilation in the workplace | Coronavirus Victoria <https://www.coronavirus.vic.gov.au/ventilation-in-the-workplace>
- WHO Good ventilation protects you from COVID-19 infection Coronavirus disease (COVID-19): Ventilation and air conditioning (who.int) <https://www.who.int/news-room/questions-and-answers/item/coronavirus-disease-covid-19-ventilation-and-air-conditioning>

Buying portable air cleaners

- Information about air cleaners: Melbourne University Guide to air cleaners (unimelb.edu.au) <https://sgeas.unimelb.edu.au/engage/air-cleaner-guide>.
- How to choose an air cleaner, from the not-for-profit Clean Air Stars <https://cleanairstars.com/>

Education on Infection prevention and control (IPC)

- For short, simple eLearning modules on basic infection prevention and control: six 10-minute modules, produced by the Department of Health VICNISS - IPC eLearning Modules. Also available for download to your Learning Management System.

Accessibility statement and publisher information

This PowerPoint is available at VICNISS <https://www.vicniss.org.au/>

To receive this presentation in another format, email <COVID19InfectionControl@health.vic.gov.au>.

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Questions?

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