Government of **Western Australia**
Department of **Health**

Communicable Disease Control Directorate Guideline

Use of Air Purifiers in WA Healthcare Facilities

Guideline 0003 / 2 February 2022

These guidelines have been released by the Communicable Disease Control Directorate, Public and Aboriginal Health Division, Western Australian Department of Health, to provide consistent and evidence informed advice to agencies involved in the prevention of infections and management of communicable diseases in Western Australia.

ACKNOWLEDGEMENT OF COUNTRY AND PEOPLE

The Communicable Disease Control Directorate at the Department of Health acknowledge the Aboriginal people of the many traditional lands and language groups of Western Australia. We acknowledge the wisdom of Aboriginal Elders both past and present and pay respect to Aboriginal communities of today.

Contents

1. Definitions / Acronyms

Term	Definition
Bilevel Positive Airway Pressure (BiPAP) device	Non-invasive form of therapy for those suffering from sleep apnoea
Continuous Positive Airway Pressure (CPAP) device	
Communicable Diseases Network Australia (CDNA)	The organisation that provides national public health advice for the prevention and control of communicable diseases.
High-efficiency Particulate Air (HEPA) filter	A high efficiency particulate air (HEPA) filter is a disposable, extended media, dry type filter in a rigid frame, having a minimum filtration efficiency of 99.97% and designed to remove particles greater than 0.3 microns at a specified flow rate of air.
HVAC Company	Australian company who supplies environmental services including dust and pollution control, collection and disposal. Supply of bag filters.
National Safety and Quality Health Service (NSQHS) Standards	The primary aims of the NSQHS Standards are to protect the public from harm and to improve the quality of health service provision.
Negative Pressure Isolation Rooms (NPIRs)	A room in which the air pressure differential between the room and the adjacent indoor airspace directs the air flowing into the room i.e. room air is prevented from leaking out of the room and into adjacent areas such as the corridor. Used to isolate patients who have a suspected or confirmed disease that is transmitted by the airborne route.
Therapeutic Goods Administration (TGA)	TGA is Australia's regulatory authority for therapeutic goods.

2. Purpose

The purpose of this guideline is to provide information regarding the use of air purifiers in the clinical setting, within Western Australia (WA) healthcare facilities, as a risk mitigation strategy to reduce the risk of transmission of Severe Acute Respiratory Syndrome (SARS) coronavirus 2 (SARS CoV-2). A printable poster with guidance on use for clinical staff can be found at Appendix A.

3. Introduction / Background

The National Safety and Quality Health Service (NSQHS) standards, outline a requirement to appropriately manage environmental control measures such as heating, ventilation and air conditioning (HVAC) systems to reduce risk. In line with these standards, HVAC systems should be reviewed to ensure effective function and planned preventative maintenance schedules should be in place, as per Australian Standards.

For additional information regarding HVAC system maintenance, refer to HVAC system strategies to airborne infectious outbreaks – Revision B Health Technical advice (Victorian Health Building Authority) and the World Health Organisation (WHO) Ventilation roadmap.

4. Requirements (of the Guideline)

4.1 Considerations for use

Well designed and appropriately utilised air purifiers are suitable for use to supplement existing ventilation in inadequately ventilated spaces and in these settings can be a useful strategy to reduce transmission of airborne pathogens. Air purifiers have limited benefit in spaces that are already adequately ventilated, such as appropriately functioning negative pressure isolation rooms (NPIRs).

The performance of these devices depends on the ventilation rate of the room, with the relative effectiveness of the purifiers significantly enhanced at lower room ventilation rates. The effectiveness also depends on the airflow patterns within the room and the ability for the device to effectively mix the air in the room and draw air through the high-efficiency particulate absorbing (HEPA) filter. Positioning the device closest to the infectious source will provide the most benefit.

Air purifiers should be used when caring for suspect or confirmed COVID-19 patients (refer to CDNA guidelines) or those with epidemiological risk factors in the following circumstances:

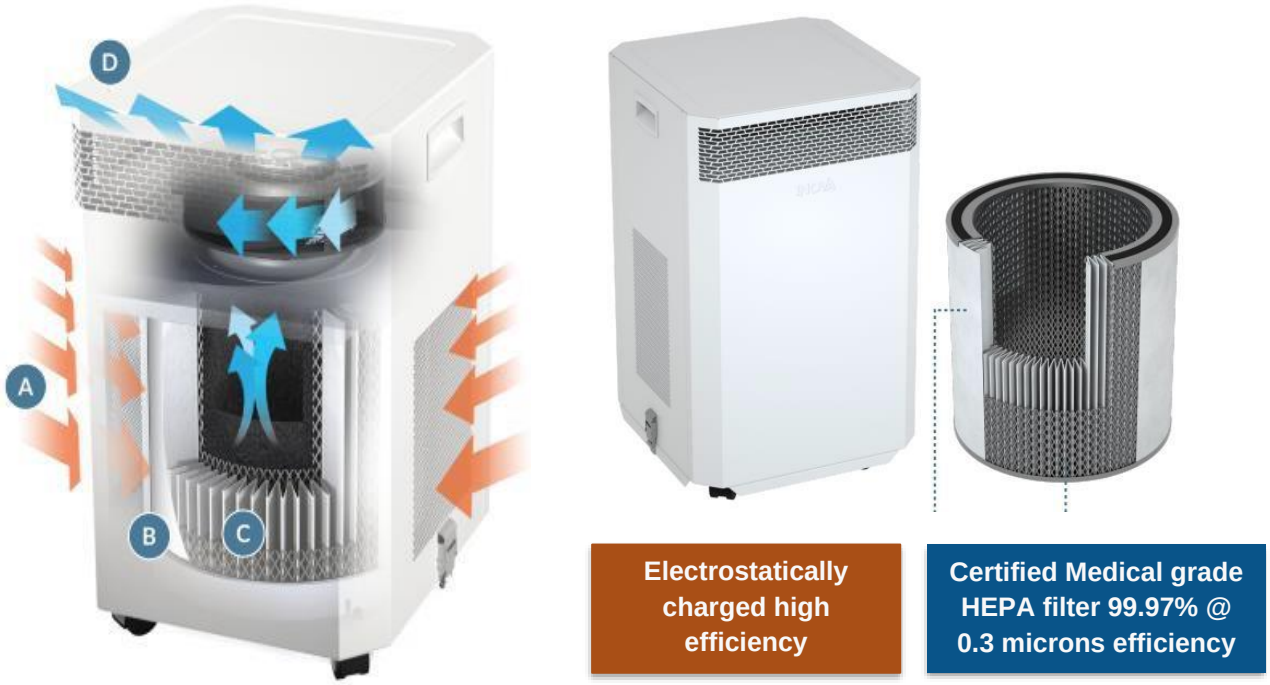
- Single room (with door closed)
- Room when the patient is utilising a Continuous Positive Airway Pressure (CPAP) device or Bilevel Positive Airway Pressure (BiPAP) device or any other form of non-invasive ventilation (NIV)
- In an open bay area when a single room is not available
- In COVID-19 designated wards, consider use in staff open area zones and corridors within a designated COVID-19 ward.

COVID-19 patient criteria	Order of priority
Epidemiological and clinical criteria are met	1
Epidemiological criteria only met	2
Clinical symptoms only	3

4.2 Equipment

This guideline is specific to the InovaAir® AirClean V20 and V9 air purifiers.

Figure 1: InovaAir® AirClean V20 and InovaAir® AirClean V9 air flows



The InovaAir® unit consists of a case / motor, a filter base plate (detachable), a power cable (located in base of box), pre-filter (pre-installed) and a HEPA Filter (pre-installed)

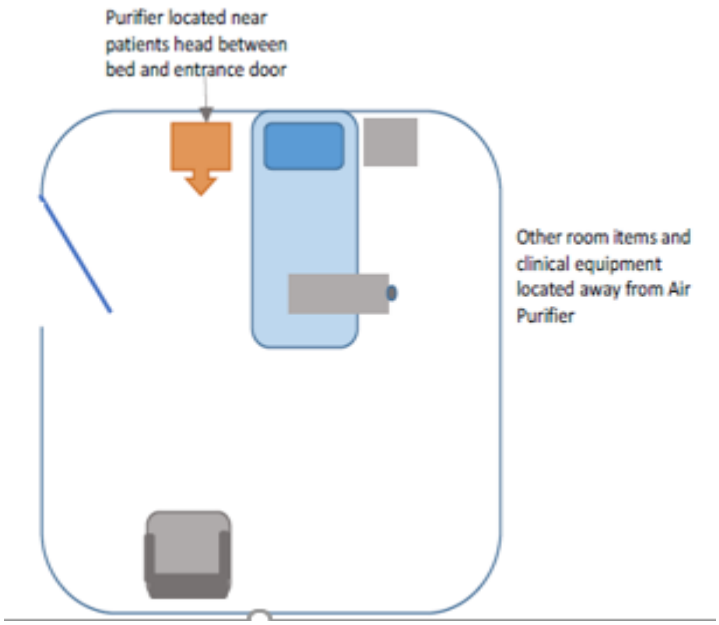
A. Air is drawn into the system through the sides of the unit.
B. Air passes through the fine dust pre-filter.
C. Air passes through the H13 HEPA filter which removes dust, allergens and sub-micron fine particle matter.

4.3 Positioning

As these are portable devices, they can readily be relocated to the most appropriate setting / position, however, it is recommended that an air purifier be positioned to ensure:

- It is close to the head of bed of the patient ("point of source")
- There is a distance of at least 100mm between the appliance and the nearest wall to allow for adequate air circulation
- The airflow of the device is not obstructed - always keep air intake and outlet of the unit unobstructed
- There is a clear space of at least 25 cm to the front of the device
- The unit is kept away from heat sources and/or flammable objects
- Use only on solid, horizontal, and stable surfaces
- Refer Figure 2.

Figure 2: Recommended air purifier positioning

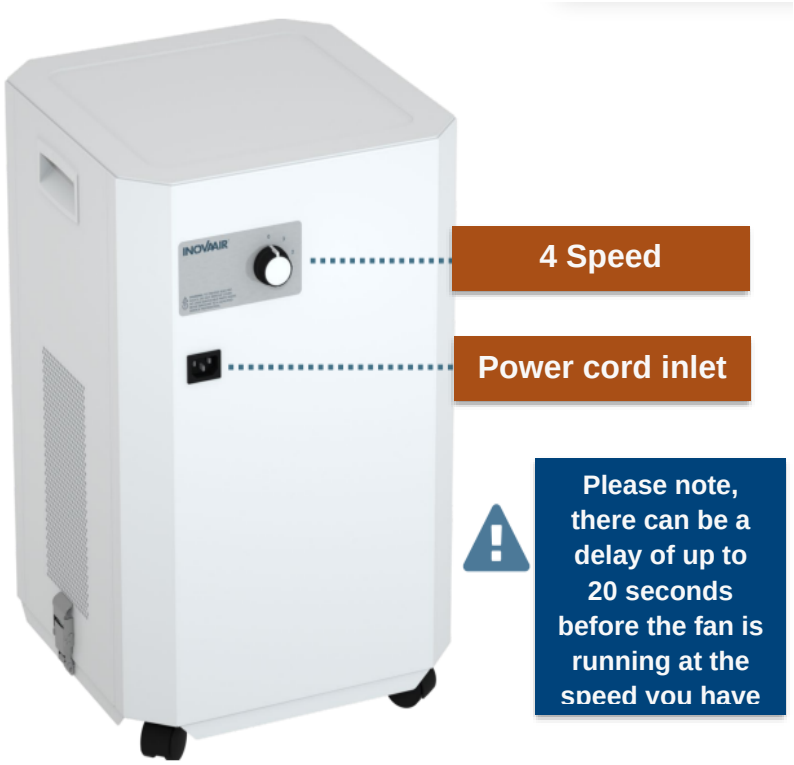


4.4 Operating the air purifier

- Disconnect power, or unplug, before cleaning, performing any maintenance or replacing a filter.
- Do not operate unless all components are fully assembled, securely latched and in the upright position.
- It is also important to make sure the air purifier has easy access to a power outlet as long cords can be a trip hazard and may result in damage to the unit should it be knocked over. The air purifier works best when it has unrestricted airflow around it with the door and windows closed
- where possible, the unit should preferably be turned on and operating in a room for 30 minutes prior to a patient admission.
- Following patient discharge, the unit should preferably be left running for a 60-minute period, during which time cleaning of the room can be undertaken. The unit should then be turned off prior to it being cleaned (refer section 4.8 and 4.9).
- Refer Figure 3 and Figure 4 for controls of both models.

Figure 3: InovaAir® AirClean V20 controls

Figure 4: InovaAir® AirClean V9 controls



4.5 Calculating air changes per hour (ACH) rates

Air exchange rates will depend on the volume of air in the room and the existing air exchange rate from any ventilation system already in use. Other factors that influence infection transmission risk in indoor spaces include the ceiling height, occupancy level, duration of occupancy and activities undertaken such as aerosol generating procedures e.g. a room with a very high ceiling can achieve a higher dilution (reduced risk) even with a low ACH rate. As a general guide, the air purifier should be utilised with the aim of achieving a minimum of 6 ACH and in combination with the existing ventilation system, should then provide an air exchange rate of between 8 – 12 ACH.

The room dimensions in m^3 will need to be measured and a laser measure (readily available from hardware stores) is a good option to undertake these measurements. There may be a standard room height through the facility in which case only the room length and width would need to be measured. Refer Figures 4 and 5.

ACH = Airflow (m3/hour) / room volume (m3)

An example calculation for the V20 unit to establish ACH is noted below:
For a room size of 2.4m high x 5m wide x 5m long = $60m^3$

- V20 unit run on a fan speed setting of 10 = 375 / 60 = 6.25 ACH
- V20 unit run on a fan speed setting of 12 = 430 / 60 = 7.15 ACH

Figure 5: InovaAir® AirClean V20 speed controls

Speed Control

The system has a variable speed controller and uses an energy efficient European AC fan.
Power consumption is relative to the selected speed.

Min	2	4	6	8	10	12	14	16	18	20	Control position
6	8	10	14	20	29	40	48	68	82	84	Power Consumption (Watts)
100	155	210	265	320	375	430	485	540	595	650	Airflow (m^3/hour)

The higher the speed, the more times per hour the air in your living space will be cleaned, so it is recommended to run the system at the highest speed you are comfortable with. Higher fan speeds will generate higher sound levels.

Figure 6: InovaAir® AirClean V9 speed controls

Speed Control

The system has 4 speed settings and uses an energy efficient European AC fan.
Power consumption is relative to the selected speed.

1	2	3	4	Control position
Low	Med	High	Max	Speed Level
12	17	35	55	Power Consumption (Watts)
85	174	262	350	Airflow (m^3/hour)

4.6 Measuring patient rooms

Although it is not critical to include the ensuite / bathroom if the door is normally closed when undertaking room measurements, it is considered a pragmatic approach to include the bathroom volume if it is likely the door is left open occasionally.

If the ensuite / bathroom door is predominantly left closed the air changes per hour available in the room will be enhanced, however where possible, if the door can be left open this will improve the room airflow through existing bathroom exhausts.

Air flow to maintain negative pressure in patient rooms relative to corridors, where possible, is considered as important as air changes.

4.7 Maintenance

Each air purifier will be added to the facilities maintenance management system and the planned preventative maintenance schedule generated. Replacement filters can be ordered through the State Distribution Centre (SDC).

Recommended filter replacement

Filter	Minimum replacement intervals
Pre-filter (wrap around)	Every 3 month
H13 HEPA filter	Every 3 years

Pre-filter

1. The pre-filter is the initial stage of filtration, filtering large dust particles down to ultra-fine sub-micron particles, as well as viruses and bacteria.
2. Dust levels in ambient air will affect how long the pre-filter will last. Pre-filters are white when new and will turn grey within 1-2 weeks of use. This is nothing to be concerned about and simply means the filter is doing its job.

HEPA filter:

1. Generally, the HEPA filter will remain white and then gradually get darker in the final months of its life.
2. The outside of the HEPA filter will change colour and turn dark grey when it needs replacing.

4.8 Filter change and frequency

4.8.1 Pre-filter

When the dust layer is approximately 2mm thick the pre-filter should be replaced and / or at 3 monthly intervals, whichever is sooner.

4.8.2 HEPA filter

It is recommended to check the colour of the HEPA filter every 3 months and during the pre-filter change to check for signs of discolouration. Please note, the inside of the HEPA

filter will always remain white so it is important to check the outside of the HEPA filter which is visible when the pre-filter is being changed.

4.8.3 Filter change process

The virus can last on surfaces for some hours to days but the risk of fomite (inanimate object) transmission is generally low. The filters are made up of many layers and particles are trapped when air flows through the layers of filter media through several different mechanisms including interception, impaction, diffusion and electrostatic attraction. However, out of excess caution, when changing pre-filters and HEPA filters the following should be adopted:

- PPE requirements include utilising a minimum of a particulate filter respirator (PFR) mask, protective eye wear, long sleeved disposable gown and gloves.
- Turn off and unplug the system before unlatching the system housing.
- Remove the filter and place in a plastic bag and tie off.
- Discard the bagged filter into a general waste bin.

Important: Do not attempt to vacuum the HEPA or Pre-filter as this will damage the fine filter fibres and reduce efficiency. Air intake vents on the sides of the system can be vacuumed with a HEPA grade vacuum, including the base plate which sits under the filters.

Figure 7: Accessing the filters on the InovaAir® AirClean V20 and InovaAir® AirClean V9

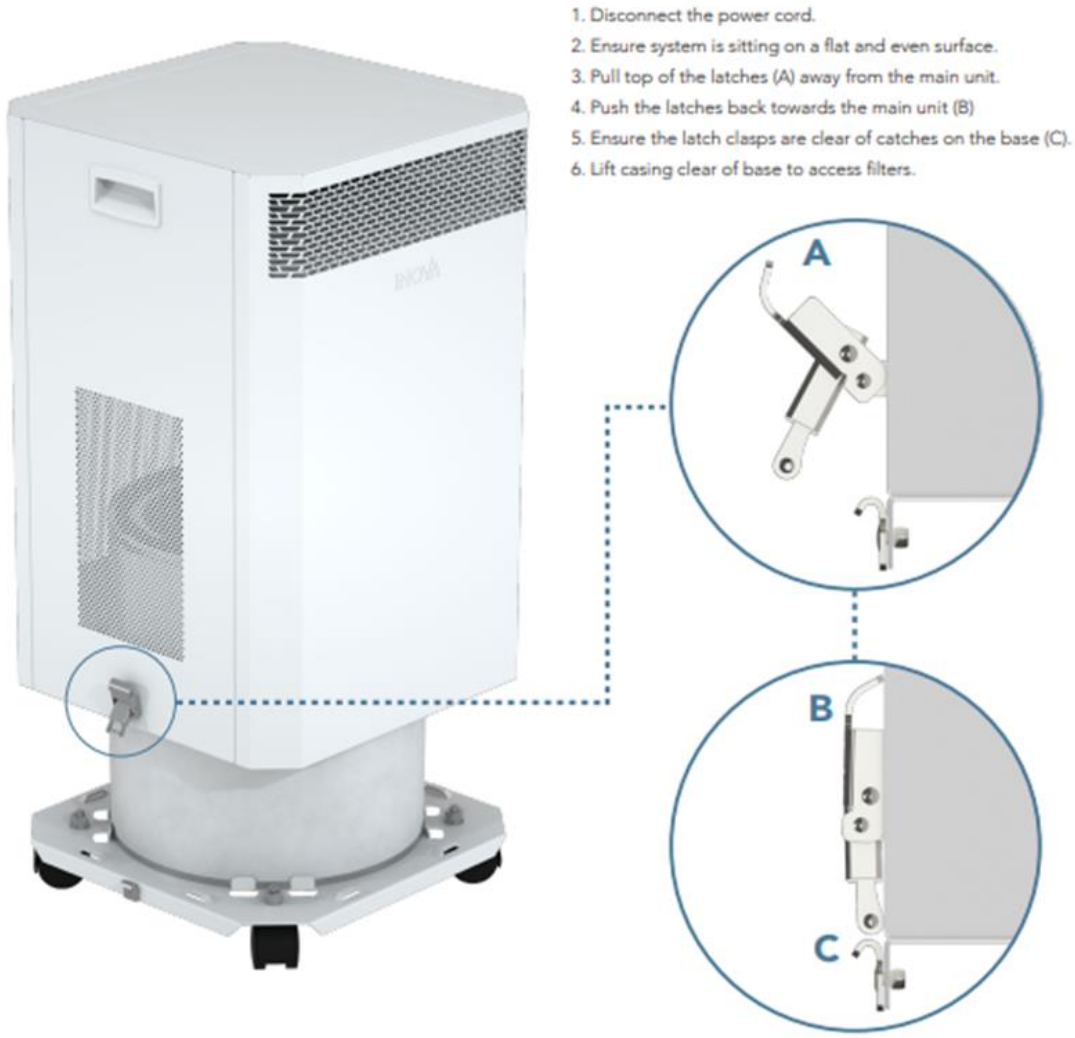
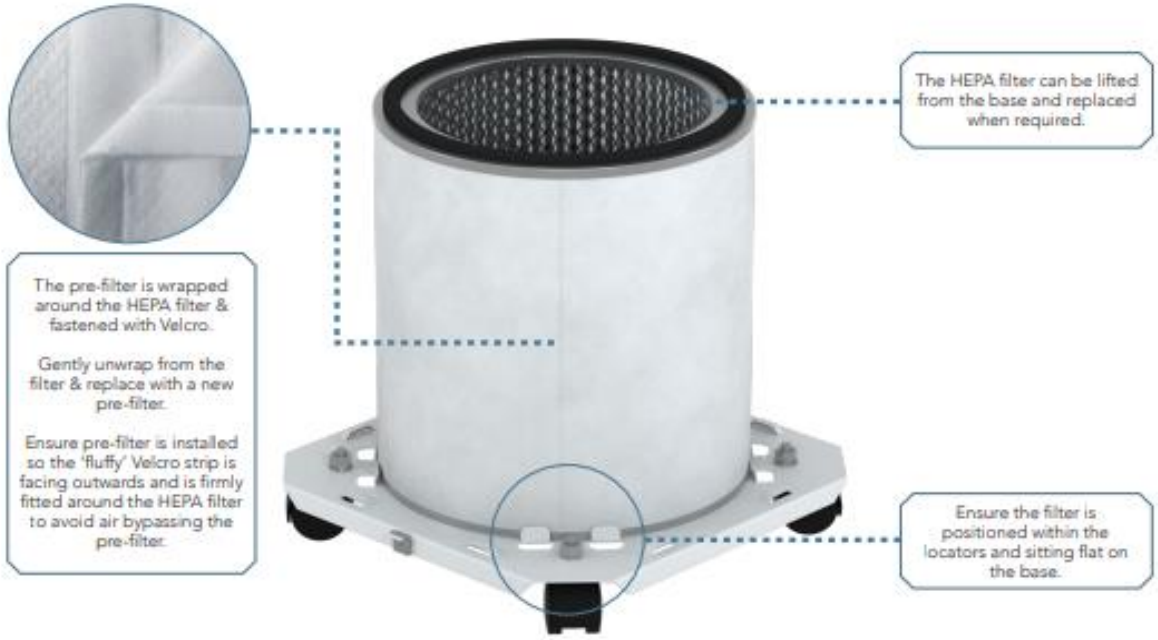


Figure 8: Replacing filters for the InovaAir® AirClean V20 and InovaAir®



4.9 Cleaning of air purifiers in a clinical setting

The exterior surface of the InnovaAir® air purifier can be easily cleaned due to its plastic and chemical free powder coated exterior surface. Each unit should be cleaned and disinfected daily, or more frequently if in high traffic areas, using products that have viricidal activity and are approved by the Therapeutic Goods Administration (TGA).

4.10 Process for cleaning the InnovaAir® air purifier in patient rooms

Following patient discharge the air purifier unit should be left running for 60 minutes allowing for the room to be cleaned during this time. Patient room cleaning is to be performed wearing a PFR, protective eyewear, fluid resistant gown, and gloves.

After the patient room (and ensuite if applicable) has been cleaned:

- Doff dirty gloves and perform hand hygiene using alcohol-based hand rub (ABHR).
- Don clean gloves.
- Turn off the air purifier.
- The exterior surfaces of the unit including external surfaces of the vents, should be cleaned with an approved detergent followed by disinfection with a TGA approved product that has viricidal properties. A two-step procedure i.e. using a detergent followed by a disinfectant or a one-step procedure using a 2-in-1 product i.e. a combined detergent and disinfectant product should be utilised.
- Report any cleaning issues / blocked vents to maintenance team.
- Disposable used cloths / wipes are to be discarded into a general waste bin
- Doff all PPE as per standard practices.
- Dispose of PPE into a general waste bin and perform hand hygiene.

Once the unit has been cleaned and disinfected it can be returned to the storage area.

Each facility should develop their own process for unit distribution and storage.

5. Relevant Legislation

Nil relevant

6. Additional Resources

HVAC system strategies to airborne infectious outbreaks – Revision B Health Technical advice (Victorian Health Building Authority)

World Health Organisation (WHO) Ventilation roadmap.

7. Guideline Contact

Enquiries relating to this Guideline may be directed to:
Infection Prevention Policy and Surveillance Unit
Directorate: Communicable Disease Control Directorate
Email: hiswa@health.wa.gov.au

8. Document Control

Guideline number	Version	Published	Review Date	Amendments
0003	V.1.	02/02/2022	02/02/2024	Original version

9. Approval

Approved by	Dr Paul Armstrong, Director, Communicable Disease Control Directorate, Department of Health
Approval date	02/02/2022

10. References / Bibliography

1. InnovaAir® Airclean V20 User Manual. https://inovadocs.info/v20.pdf

2. InnovaAir® Airclean DV20 Healthcare User Manual. https://inovadocs.info/dv20.pdf

11. Appendix 1 Air Purifier - Clinical Staff Guideline Poster

Government of **Western Australia**
Department of **Health**

Appendix A: Air Purifier Clinical Staff Guideline Poster

Considerations for use:

Air purifiers can reduce the risk of aerosols when caring for suspect or confirmed COVID-19 patients (refer to CDNA guidelines) or those with epidemiological risk factors in the following circumstances:

- Single room (with door closed)
- Patient utilising Continuous Positive Airway Pressure (CPAP), Bilevel Positive Airway Pressure (BiPAP) or any other NIV.
- In an open bay when a single room is not available.
- In **COVID-19 designated wards -** consideration can be given for use in staff open area zones and corridors.

COVID-19 patient criteria	Order of priority
Epidemiological and Clinical criteria are met	1
Epidemiological criteria only met	2
Clinical symptoms only	3

Positioning:

It is recommended that an air purifier be positioned to ensure:

- The unit is close to the head of the bed of the patient (“point of source”).
- Easy access to power outlet to reduce risk of cord being a trip hazard
- A distance of at least 100mm between the appliance and the nearest wall to allow for adequate air circulation.
- The unit is placed away from flammable sources, on solid, horizontal, stable surfaces only
- Air flow is not obstructed i.e. air intake and outlet unobstructed by 25cm clearance
- Operated with doors and windows closed.

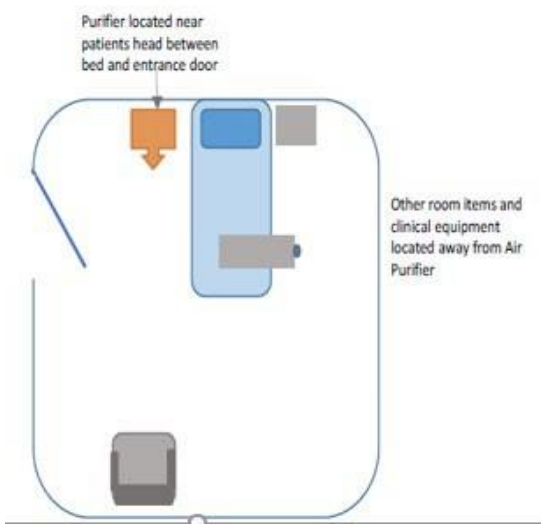


Figure 1: Recommended air purifier positioning

Min	2	4	6	8	10	12	14	16	18	20	Control position
6	8	10	14	20	29	40	48	68	82	84	Power Consumption (Watts)
100	155	210	265	320	375	430	485	540	595	650	Airflow (m^3/hour)

Figure 2: InovaAir® AirClean V20 speed controls

1	2	3	4	Control position
Low	Med	High	Max	Speed Level
12	17	35	55	Power Consumption (Watts)
85	174	262	350	Airflow (m^3/hour)

Figure 3: InovaAir® AirClean V9 speed controls

Operating:

- Position unit as outlined above and plug in. Select fan speed for unit in use, as per tables below.
- The unit should preferably be turned on and operating in a room for 30 minutes prior to a patient admission.

Room dimensions in m3 should be measured. ACH = Airflow (m3/hour) / room volume (m3).
An example calculation for the V20 unit to establish ACH is noted below:
A room size of 2.4m high x 5m wide x 5m long = 60m3
• V20 unit run on a fan speed setting of 10 = 375 / 60 = 6.25 ACH
• V20 unit run on a fan speed setting of 12 = 430 / 60 = 7.15 ACH

As a general guide, the air purifier should be utilised with the aim of achieving a minimum of 6 ACH and in combination with the existing ventilation system, should provide an air exchange rate of between 8 – 12 ACH.

Cleaning and disinfection:

- Following discharge of the patient, the unit should be left running for a 60-minute period, during which time cleaning of the room can be undertaken with consideration given to cleaning the air purifier last.
- The exterior surfaces of the unit including external surfaces of the vents, should be cleaned with an approved detergent followed by disinfection with a TGA approved product that has viricidal properties. A two-step procedure i.e. using a detergent followed by a disinfectant or a one-step procedure using a 2-in-1 product i.e. a combined detergent and disinfectant product should be utilised.
- Clinical staff should not be required to open the unit/s – please contact maintenance with any concerns re the appropriate functioning of the unit.

Filter Changes and any required related maintenance of the units:

Filter changes and maintenance will be undertaken as per the planned preventative maintenance schedules by maintenance staff.

This document can be made available in alternative formats on request for a person with disability.