

# Care, cleaning and disinfection of invasive **mechanical ventilators**



## During ventilation and between patients

Always read and follow the instructions and recommendations of the manufacturer's manual

Consumables associated with oxygen delivery are generally intended as **single use devices**, and should be treated as infectious material and disposed of accordingly. Dispose of **patient interface and filters**, for example, as per facility standard operating procedures for infectious/biohazardous waste management.

## During ventilation (same patient)

Before starting any hygiene tasks, please take preventative measures to ensure that:

All electrical medical equipment are disconnected from power supply while tasks are being done; and, activities are performed away from the medical wards, preferably in biomedical workshops.

Task	Description
1. Single-use breathing circuits are recommended and should not be routinely changed for the same patient	Changing circuits leads to the dispersion of contaminated droplets and aerosols as well as increased use of medical resources.
2. Place filter in both inspiratory and expiratory end of the ventilator	When using a disposable filter, the exhalation filter is required to be replaced when the resistance is increased. The disposable filters can be used up to 48 hours before being exchanged. Replace the filter if the expiratory resistance increases or according to the instructions for the filter, whichever comes first.
3. Drain water in lines daily	On a daily basis, drain water in gas supply inlet filter, and check the amount of liquid in the expiratory module water trap (the liquid volume cannot be more than half of the bottle).

## BETWEEN PATIENTS

After each patient use, the ventilator must be cleaned, disinfected, and stored appropriately in a clean environment before use on another patient

Task	Description
1. Perform risk assessment prior to entering the room	Consider the patient care tasks that will need to be performed or additional risks that may be encountered during disconnection of the device.
2. Perform hand hygiene	
3. Don appropriate personal protective equipment (PPE)	PPE worn during disinfectant preparation should include surgical mask/respirator, goggles or face shield, long-sleeved fluid resistant gown or gown + apron, rubber gloves, and boots or closed work shoes.
4. Disconnect the device	Turn off the device and disconnect from the patient, the oxygen source and the power.
5. Properly dispose of single use breathing circuit and exhalation valve filters	Dispose of single use breathing circuit and exhalation valve filters in designated infectious material/biohazardous waste container.

Task	Description
<b>6. Prepare closed container with components requiring high-level disinfection</b>	Place any components that will be sent for high-level disinfection (respiratory valve, active humidifier, flow sensor and expiratory tubing if used/indicated, and other connectors/components) in a designated closed container for transport to sterile services department. If it is indicated in the manufacturer's manual, follow the instructions for autoclaving parts of the ventilator that are specified for this process.
<b>7. Move the mechanical ventilator to a well-ventilated area for cleaning</b>	<b>Move the ventilator</b> away from patient area and other equipment to a designated well-ventilated space where cleaning and disinfection of the device can be performed.
<b>8. Change gloves</b>	<b>Discard gloves</b> in appropriate waste container, perform hand hygiene, and don new gloves.
<b>9. Wipe the external device surface from top-to-bottom with detergent (Cleaning)</b>	<b>Wipe the external ventilator surface</b> (including controls, housing, trolley and support arm, touch screen, power cord and gas supply hose) with a damp cloth or disposable wipe soaked in detergent and clean water and then wipe off any remaining detergent residue with a dry lint-free cloth. Use mechanical action (scrubbing) and brushing, if necessary, along the edges and joints to remove visible dirt deposits and calcifications. It is not necessary to routinely clean pressure lines within a ventilator between patients (these lines are not exposed to the patient or the patient's respiratory secretions).
<b>10. Prepare disinfectant solutions</b>	Should always be performed before use, in well-ventilated areas away from patients.
<b>11. Wipe with disinfectant</b>	Prepare a fresh cloth or disposable wipe soaked in a compatible disinfectant. Wipe the device from top to bottom, ensuring surfaces of sensors/cables are wiped while avoiding contact with electrical connectors. 0.1% sodium hypochlorite (1000 ppm) should only be used according to the manufacturer's instructions if device is known to withstand use of chlorine-based agents and no ammonia-based cleaning agents or acidic body fluids (e.g. urine) are present on the device. Do not use different disinfectant formulations during the same disinfection step, this may produce toxic fumes.
<b>12. Remove PPE- wash hands</b>	Doff, discard PPE and perform hand hygiene.
<b>13. Store clean ventilator and disinfect before new use</b>	Ensure cleaned ventilator is stored in an area where there is low risk of contamination between uses, and that at least 1 minute of contact time has elapsed after the application of the disinfectant before it is used on next patient.

