Core medical equipment - Information

Ventilator, Portable

**Health problem addressed**

Portable ventilators deliver room air or oxygen-enriched gas into the breathing circuit, where it can be humidified by a heated humidifier or a heat and moisture exchanger before delivery to the patient. They provide long-term support for patients who do not require complex critical care ventilators. They can be used for treating patients with conditions like pneumonia or during mass casualty events.

**Product description**

Ventilators designed to provide support to patients who do not require complex critical care ventilators. These ventilators typically consist of a flexible breathing circuit, a control system, monitors, and alarms. Some systems may also include specialized breathing circuits, oxygen accumulators, and heat humidifiers or heat and moisture exchangers (HMEs). Most devices use positive pressure to deliver gas to the lungs at normal breathing rates and tidal volumes through an endotracheal tube, a tracheostomy cannula, or a mask. Power is typically supplied from a power line or from an internal or external battery (e.g., a car battery). These ventilators are used for long-term respiratory support in extended care facilities and in the home; they may also be used in emergency care.

**Principles of operation**

Portable ventilators deliver room air or O2-enriched gas into the breathing circuit, where it can be humidified by a heated humidifier or an HME before delivery to the patient. Typically, these ventilators drive air into the breathing circuit with a motor-driven piston or turbine. In the home setting, O2 is usually delivered directly into the breathing circuit from a separate source, such as an O2 tank. Most devices use positive pressure to deliver gas to the lungs at normal breathing rates and tidal volumes through an endotracheal tube, a tracheostomy cannula, or a mask. Portable/home care ventilators may use several methods of cycling (e.g., volume, time) and several ventilation modes, including control, assist/control, and synchronized intermittent mandatory ventilation (SIMV) modes.

**Operating steps**

Users first check that the unit is ready for use (e.g., run performance and calibration checks). They then make sure that settings (including alarms) are correct and appropriate for the patient type and condition. Once completed, the patient is connected to the ventilator. When the ventilator-patient connection is completed, users ensure that the patient is being properly ventilated. While patient is being ventilated, caregivers are responsible for monitoring/evaluating the patient, and for promptly responding to alarms.

**Reported problems**

Most of the reported problems involving portable ventilators arise from user error, poorly maintained exhalation valve assemblies, and the use of poor-quality breathing circuits. Other issues include disconnection of the breathing circuit from the device, equipment failure, disconnection/kinking/bending of tubing, and extreme environmental conditions. Also, critical changes in patient conditions can be missed if alarms are not set properly or are not noted by clinical staff.

**Use and maintenance**

User(s): Physicians, nurses, respiratory therapist, other medical staff  
Maintenance: Biomedical or clinical engineer/technician, medical staff, manufacturer/servicer  
Training: Initial training by manufacturer, operator’s manuals, user’s guide; clinical staff to assist family with home care operation

**Environment of use**

Settings of use: Home care, long-term care facilities, patient transport vehicles  
Requirements: Battery, uninterruptible power source (for charging batteries), proper tubing/masks

**Product specifications**

Approx. dimensions (mm): 150 x 250 x 300  
Approx. weight (kg): 7  
Consumables: Batteries, tubing, masks, filters  
Price range (USD): 3,300 - 13,500  
Typical product life time (years): 8  
Shelf life (consumables): Variable

**Types and variations**

Portable, carrying case

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