

## NOTES

*Your doctor or therapist has given you this patient education handout to further explain or remind you about an issue related to your health. This handout is a general guide only. If you have specific questions, discuss them with your doctor or therapist.*

## Giving Lungs a Helping Hand

By Debra Yemenijian

Mechanical ventilation can assist patients when their lungs and respiratory muscles are in a weakened state. These patients range from individuals with spinal cord injury to patients with chronic obstructive pulmonary disease.

A mechanical ventilator compensates for the loss of normal breathing by delivering air to the lungs, which helps to maintain oxygen and carbon dioxide exchange in the blood. Patients can use assisted ventilation on a short-term or long-term basis, depending on their underlying condition.

In the intensive care unit, patients usually use large acute care ventilators. In home care, the devices are smaller and portable, and they can be mounted on wheelchairs, carts or bedside stands.

Most ventilators operate on electric current, but many are battery-operated. Backup batteries or backup generators are necessary in case of power outages.

### TYPES OF VENTILATORS

A variety of ventilators are available to meet a patient's assisted breathing needs.

- Bilevel positive airway pressure ventilators provide inspiratory and expiratory pressures. These ventilators mainly are used at night, and they're noninvasive.

- Volume-cycled ventilators deliver a preset volume of air either invasively or noninvasively. They can deliver larger amounts of air than bilevel units, and they can be used to enable deeper breaths for improving coughs.

- Pressure support ventilators raise the inspiratory flow of air until it reaches a specific airway pressure where the patient's lungs can be inflated without causing lung injury. Then, the device adjusts the flow to whatever rate is required to maintain that pressure.

A pulmonologist helps a patient choose the ventilator that's best for his or her respiratory needs.

### INVASIVE VS. NONINVASIVE

Some patients have the option to choose between invasive and noninvasive mechanical ventilation. Noninvasive ventilation uses techniques that don't involve a surgical operation. With this form of assisted breathing, tubing connects a ventilator to the patient through an

interface. This can be a nasal, oral or full facial mask, nasal pillows or other oral appliances.

The advantages of noninvasive ventilation include normal speech, taste, smell and swallowing, and less amounts of care giving. Its disadvantages include the patient having his or her mouth or nose covered by the mask, potential upper airway obstruction, and inability to tolerate the interface. This approach might not be successful when muscles responsible for swallowing, speech and coughing are impaired.

For patients who can't use the noninvasive form, invasive ventilation is available. With this kind of mechanical ventilation, an endotracheal tube or tracheotomy is used to provide breath support. A tracheotomy is a surgical opening in the windpipe through which a clinician places a tracheostomy tube that's connected to the ventilator by circuits.

The advantages of tracheostomy are direct access to the upper airway, a more secure interface, and a system for when 24-hour support is needed. A patient can use a speaking valve for smooth speech. This one-way valve lets air in through the tracheostomy tube but then sends it out past the vocal cords and mouth to make talking possible.

The drawbacks of invasive ventilation include potential infection and irritation at the tracheostomy site, more expensive equipment and supplies, and a mechanical cough device or greater amount of suctioning care that's needed the first year.

Both forms of mechanical ventilation offer several benefits for users. Patients are able to rest their respiratory muscles as the assisted ventilation helps to inflate their lungs more fully. In addition, assisted ventilation can improve patients' cough, sleep and quality of life. ■

*Editor's Note: Information adapted from the American Medical Association, the International Ventilator Users Network, and the National Heart, Lung, and Blood Institute.*

*Debra Yemenijian is assistant editor of ADVANCE.*

