white paper

Shepherd Center

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Shepherd Center Helps Patients Breathe Easy

Successes show that ventilator weaning among people with spinal cord injury does not follow a one-size-fits-all approach.

BY AMANDA CROWE, MA, MPH

Most of us breathe in and out – nearly 1,000 times an hour at rest – without even thinking about it. The same reflexes occur when we have something caught in our airway or chest; our body automatically triggers a cough to help clear our airways and lungs. But for people with high-level spinal cord injury (SCI), breathing doesn't come so easily.

Usually when we breathe in and out, the diaphragm, which acts as our primary breathing muscle, contracts to allow air to fill the lungs. Some people with SCI lose control of their diaphragm and need a mechanical ventilator for a period of time, perhaps even for the long haul, to help them breathe.

"The goal is to help strengthen these muscles, if their injury allows it, so they no longer rely on the ventilator," says Kelley Taylor, Respiratory Therapy Supervisor at Shepherd Center. "For a time, we support respiratory function and assist with coughing to help get any secretions up."

Shepherd Center's expert team, comprised of highly trained respiratory therapists, pulmonologists/intensivists, work to wean patients off ventilators whenever possible. But, as Andrew Zadoff, M.D., Medical Director of Respiratory and Critical Care services explains, timing is everything, and for people with SCI faster is not necessarily better.

"When people have a spinal cord injury, they have more mucus production and that's a function of the injury itself; it's thicker and much more difficult to cough out. Because they can't cough strongly enough, they are at risk for pneumonia, and mucus that plugs or blocks the lungs," Dr. Zadoff says.

Assuming there are no new lung problems, he explains the excess secretions associated with SCI are there for two to three months post-injury.

"We are very measured in our approach," Dr. Zadoff says. "We don't try to push patients off the ventilator just to have them fail and go back on. Our goal is to make sure they are safe every step of the way, and that might mean being on the ventilator longer to prevent problems."

Shepherd Center is equipped to manage patients who need ventilators while they participate in a

comprehensive rehabilitation program. "We don't lose time just by taking care of their lungs, we try to do it all at the same time," he said. "Quite often, patients lungs are structurally healthy, it's the impact of the injury that affects their breathing."

The hospital is on the cutting edge of ventilator assistance and weaning, and is often called upon to share best practices.

"We have everything on the market that can be used for secretion clearance to help prevent problems for our patients, and to set them up for success in weaning if that's a viable option for them," Taylor notes.

Examples include advanced cough-assist machines and devices to help move secretions. These include continuous positive expiratory pressure and wearable CPT vests, among other techniques.

Whether and when a patient comes of the ventilator primarily depends on a patient's:

1. Vital capacity – the deepest, fullest breath he or she is able to take, and a marker of how well they are able to open the lungs and move secretions on their own, and
2. Volume or amount of secretions

Shepherd Center began ventilator weaning not long after its inception in 1975. At any given time, there are 10 to 12 patients on ventilators and receiving intensive care to prevent problems. Many patients come to Shepherd Center with low expectations of weaning off of the ventilator, but the hospital's team is able to help them regain independent breathing function.

The Art of High-Volume Ventilation

In most hospitals, usual clinical practice is to set the amount of air pumped into the lungs at low volumes according to patient's height. But when it comes to patients with SCI, using higher volume is better.

"A patient may come to Shepherd Center on 450 milliliters of air, and we may go up to double or triple that volume right away," Taylor says. "Because of the nature of SCI, we need to give them a higher volume to better inflate the lungs and mobilize their secretions."

Patients notice the difference, too. Taylor says they often say, "Wow, I feel like I can breathe now."

Part of the art of readying patients to wean is also finding the lowest sensitivity setting for patients so they don't have to work too hard to take a breath. Taylor says she believes if acute hospitals and trauma centers started this high volume-low sensitivity approach for SCI patients from the start, many more patients would already be on the road to weaning off the ventilator when they arrive at Shepherd Center.

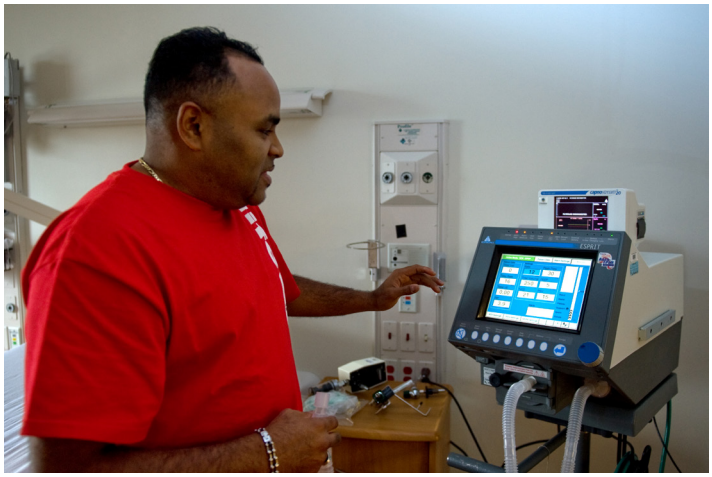
"We are taught in school that high volume can be dangerous for most patients, and cause injury to the lungs, but for patients with SCI, their chest musculature is weak, and not only will they tolerate it, they need it," she adds.

"We've found it to be very effective in our patient population," Dr. Zadoff notes. This practice of high volume-low sensitivity is consistently coupled with other measures, including proper hygiene, frequently turning

Why Vent Weaning is so Important

There are risks associated with staying on a ventilator in addition to patients feeling hindered by being connected to the machine. Other health concerns include:

- Pneumonia risk
- Reduced strength
- Poor/declining nutrition
- Increased lengths of stay
- Poorer quality of life
- Greater financial burden and costs



patients to prevent secretions from congealing in the lungs and applying state-of-the art technologies and therapist-driven protocols.

Giving Patients a Voice Again

One motivating step in the process of ventilator weaning is what frequently happens when patients first arrive at Shepherd Center. A patient may come in on a ventilator having not spoken or eaten for weeks, possibly months. But with high volume ventilation, Dr. Zadoff explains, they are more likely to be able to talk with families and loved ones.

"It may not directly impact whether a person ultimately can come of the ventilator; that's often dictated by the level of injury and other factors. But it is a huge motivator," Taylor says, adding that it's usually a tearful and joyful moment when the person finally speaks for themselves.

"Patients are given a voice again to be able to dictate their care and needs," Dr Zadoff says.

Engaging Caregivers from Day One

"It's very scary and overwhelming for families, who immediately worry about whether their loved one will come home on a ventilator and how they will manage in taking care of them," Taylor says. "We let them know that our goal is to get them off the ventilator as soon as possible if that's realistic."

We get them involved day one, for example, helping their loved one breathe with an Ambu bag when we need to take the patient off the ventilator to suction their secretions and teaching family members in home care techniques and health management.

Focusing on the Diaphragm

For patients who are unable to breathe on their own and use a mechanical ventilator, a diaphragm pacing system (DPS) has the potential to provide them with part- or full-time respiratory support.

Mechanical ventilation comes with functional limitations, such as reduced mobility and difficulty speaking, as well as inherent complications, including infection, tracheal injury and equipment malfunction. DPS requires implantation of electrodes, via laparoscopic surgery, to stimulate the phrenic nerve – the motor innervation to the diaphragm, which is responsible for the act of breathing.

"This option can liberate people from the ventilator, and it may also be an interim step to get the diaphragm stronger," says Dr. Zadoff, noting that more patients come to Shepherd Center with a DPS implanted, but he and his team often need to adjust the settings for optimal results.

For more information about ventilator care at Shepherd Center, visit ***www.shepherd.org/patient-programs/ventilator*** *or contact Kelley Taylor at kelley_taylor@shepherd.org or 404-352-2020.*