

IVUN's 2nd Educational Conference Call

Understanding How New Generation Portable Ventilators Can Lighten Your Load

Joan L. Headley, Executive Director, International Ventilator Users Network, St. Louis, Missouri, director@post-polio.org

Cyndy Miller, RRT, from Covidien Respiratory and Monitoring Solutions, presented information useful to IVUN Members who had requested background information and advice to assist them in switching from their older, soon to be obsolete, devices. Miller's presentation, shared with Members on a conference call on Oct. 24, 2012, can be viewed at www.ventusers.org/edu/ConfCall2012LightenLoad.pdf.

After reviewing the well-known advantages of the older vents (the PLVs and the LPs), she noted some of the disadvantages. The older ventilators are at the end of their life and parts are no longer made, they were not designed to meet current medical device safety standards, they are heavy, they use a lot of power so batteries don't last very long, they offer very limited breath delivery choices and, unless a special speaking valve is used, they enable speech only during inspiration, rather than during exhalation.

The advantages of the newer vents, such as the HT70® Series (Covidien), the LTV® Series (CareFusion), the Trilogy Series (Philips Respironics) and the iVent Series (GE) include (but are not limited to) readily available parts and service, lighter weight (9-16 pounds), greatly improved power efficiency so that batteries run longer, use of lithium-ion batteries that offer a longer useful life, and built in PEEP (positive end-expiratory pressure), which can sometimes lessen or eliminate the need for oxygen and help to keep lungs expanded properly without the damaging effects of large tidal volumes. The newer vents meet new safety standards for medical devices and a couple of them (like the HT70 Series) are rated for transport (testing demonstrates device durability).

Finally, when PEEP is used on the new devices, a vent user may be able to speak during exhalation without a special speaking valve – or the user may choose to use a speaking valve, whichever is most comfortable.

Older method of breath delivery

With older portable ventilators, selection of breath delivery pattern is very limited because the compressed gas generator inside the device is very basic and incapable of more sophisticated movements. Working with limited options, physicians prescribed big long slow breaths, which allowed for speech during inspiration and helped to keep the lungs open. Since many vent users were not spontaneous breathers, and the ventilators offered no other methods for keeping lungs open, the use of these breath patterns that were unlike spontaneous breathing patterns was common practice.

To accommodate the larger tidal volumes without causing the users' carbon dioxide levels to drop too low, it was common for breathing circuit tubing sets to be equipped with a long length of "dead space (re-breathing) tubing" between the exhalation valve and the trach tube. Typically, PEEP was not used because the only method for delivering PEEP was a mechanical valve that attached to the



Covidien's Newport HT50®

exhalation valve. With no servo-controlling* mechanism, the PEEP leaked out and the resulting pressure between breaths was near or at ambient pressure. Miller also made the point that the older style of ventilators has fewer alarms.

Why change?

New technology has allowed manufacturers to make significant changes to portable ventilators. Miller listed a number of reasons for making the change. Newer portable ventilators:

- Are designed to ventilate a wider variety of people (including children);
- Can ventilate sicker people (this is very important since sicker people are now sent home);
- Can offer a breath that is more like a user's natural spontaneous breathing;
- Are lighter (makes them easier for caregivers to manage at home);
- Can run longer on batteries (this allows vent users more freedom);
- May be safer for the lungs of long-term vent users;

(Studies have shown that stretching the lungs from the beginning to the end of the breath (as with big long breaths) can damage lung tissue. It is thought that holding the lungs open between breaths with PEEP and using smaller tidal volumes can keep lungs healthy and cause less damage.)

- Meet today's regulatory requirements for safety and performance.

Newer method of breath delivery

On newer portable ventilators, breath delivery can be done in a variety of ways because the compressed gas generator that produces the flow is microprocessor-controlled and is capable of variable speeds. Consequently, newer portable ventilators can be adjusted to provide a typical breathing pattern, use a smaller (lower stretch) breath size to ventilate and then use PEEP to achieve

desired end-results for lung health. Servo-controlled* PEEP may keep lungs open without using the larger, potentially damaging tidal volumes. Also when PEEP is used in combination with a cuffless or deflated cuff trach tube, the patient may be able to generate expiratory speech without use of a speaking valve. Since the tidal volumes are not artificially big, "dead-space" tubing is not needed to keep carbon dioxide levels from dropping too low. Vent users who transition to smaller tidal volumes must make sure to shorten or eliminate dead-space tubing so that carbon dioxide levels do not rise above acceptable levels.

*Servo is short for **servo-mechanism**, an automatic device that uses error-sensing feedback to correct the performance of a mechanism.

Covidien manufactures two newer models of vents: HT50® and HT70® series. These devices use dual micro-pistons to compress room gas. The micro-pistons move back and forth many times with each breath, moving faster when the flow is higher and moving slower when the flow is slower. The sound changes as the flow increases. These ventilators need no supplemental gas to be connected but 50 psi or low-flow (cylinder, liquid or concentrator) oxygen may be attached if needed by the patient. Unlike turbine devices, the HT50 and HT70 series ventilators deliver room temperature gas. This may be important when using a heated humidifier since the humidifier's humidity output may be compromised by pre-heated gas.

The HT50 and HT70 series ventilators have passed durability transport testing and are cleared for transport. They are intended for use with invasive (endotracheal or trach tube) or non-invasive (mask or mouthpiece) patient interfaces during continuous or non-continuous ventilation.

HT70 Series Ventilators offer the convenience of three default and three programmable ventilation settings presets (day/night, well/sick). The built-in oxygen analyzer with high and low alarms ensures that the caregiver is alerted to changes in oxygen delivery that fall outside the intended range. Compared with direct connect systems, the HT70's Low Flow Oxygen Reservoir conserves oxygen use so that supplies last longer. And batteries last longer because these ventilators draw very low power. The HT70 Series can be powered by AC, by external DC or by the hot swappable (up to) 10-hour built-in battery. The built-in battery and emergency 30-minute backup battery both recharge in just three hours from either AC or external DC power.

The HT70 Plus Ventilator may be set up with an on-airway flow sensor if that is clinically appropriate.

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Do you have suggestions for other topics? If so, please send them to info@ventusers.org.

Upcoming Educational Conference Calls

IVUN's series of hour-long educational sessions via telephone are continuing. The call is free, but reservations are required, and available space will be first-come, first-served. To reserve your place to participate in the call, send an email to info@ventusers.org or call 314-534-0475.

Wednesday, January 23, 2013, at 1:00 pm CST

Tell Me about a Trach Before I Need One with Linda K. Dean, RRT, Educational Consultant and Clinical Specialist, Passy-Muir, Inc.

Third week in February 2013

How Do I Know When I Need a Trach? With professional to be announced. ▲

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Problems when transitioning

In Miller's experience, vent users are bothered most by the change in breathing pattern, new feel of a breath, new sounds, getting flow when not expected or wanted, the use of PEEP, new alarms and new labels/names for buttons on the newer machines.

Three ways to transition

Method 1: Use the new ventilator like the older ventilator, adjust to the new sound and learn how to avoid nuisance alarms.

Method 2: Use the new ventilator like the new ventilator is designed to be used right away.

Method 3: Make the transition gradually and work with your RT and physician to fine-tune ventilation settings as you go.

Many people find it easiest to use Method 3 and make the change at a pace that is comfortable. There are several parameters on a ventilator that can be fine-tuned so that the ventilator feels more comfortable to you. Even very small changes in flow rate, volume, pressure, breath timing or trigger sensitivity can make a world of difference.

It is very important to work with a respiratory therapist and your

pulmonary physician to make small changes until *you* feel comfortable.

Good battery care ensures the longest battery life.

Miller made a point of how important it is to care for batteries in order to ensure that the service replacement interval is maintained. It is best to keep ventilator batteries charged. That means leaving the ventilator plugged in to external power whenever possible, even when not in use. Users should connect the ventilator to external power right after using the batteries, even if the battery is not fully discharged. Then, every three to six months, the user should discharge the battery to the low battery alert level and then enter the time it takes to do so into a log. Batteries should be replaced at the manufacturer's specified interval or sooner if the use time is half or less than the original (new battery) use time from a full charge. Specific information about a particular ventilator's battery care is usually found in the manufacturer's Operation Manual. ▲

Cyndy Miller welcomes your questions via email at Cyndy.Miller@covidien.com.



Covidien's Newport HT70®