TIPS ON SAFE AND EFFECTIVE USE
PAV™ + Software
Critical Clinical Roles
Three key individuals play essential roles in a successful PAV™+ software program:

- **Physician** — Orders adjustments to PAV+ software settings.
- **Nurse** — Monitors sedation needs. For PAV+ software to be successful, the patient must have an intact respiratory drive. If too much sedation is administered, the patient’s respiratory drive will be reduced and PAV+ software will not provide adequate ventilation. Good discretion is advised in administering the appropriate amount of sedation throughout a patient’s care.
- **Respiratory Therapist** (Where RTs are available globally) — Understands the normal physiologic response to PAV+ software. Monitoring signs of distress is very important; elevations in respiratory rate are not uncommon.

Identify a Coordinator
To ensure consistent success, identify someone in the hospital who can be the internal coordinator for implementing a PAV+ software program. When a facility first adopts a program, it is not uncommon for a patient to be placed on PAV+ software, then switched off by another doctor without clinical reasons. If this happens, it’s important to find out why, to improve compliance and understanding going forward.

Coordinators can ensure smooth, continual compliance in the use of PAV+ software. They should plan on doing follow-ups daily during the early adoption stages to make sure everyone is on the same page. They may also:

- Train new staff.
- Troubleshoot patients who may need assistance with PAV+ software settings.
- Work with nurses on the appropriate use of sedation.

**HOW TO ENSURE PAV+ SOFTWARE SUCCESS**

- **Avoid over-sedation** — Other modes of ventilation can require a fair amount of sedation. A protocolized approach to a PAV+ software program begins with the nurse always “evaluating before sedating” patients. Some types of sedation have less impact on the respiratory system.
- **Understand the software** — PAV+ software is a very different approach to ventilation, one where flow, pressure, and volume are not set. It is important to know the ins and outs of PAV+ software and to become comfortable with its use. For more details on management of PAV+ software, see articles from Georgopoulos and Carteaux.
- **Monitor tolerance** — Because PAV+ software allows patients to breathe naturally, it is not uncommon for there to be an increase in the total respiratory rate. Assess the adequacy of settings and support by:
  - Monitoring other clinical signs of distress like HR, BP, and physical assessments. The titration of PEEP is another tool to improve patients’ compliance that may reduce respiratory rate.
  - The Carteaux study targeted peak muscle pressure by obtaining the difference of PPEAK – PEEP and the % Support used. If work was too high, the %Support was increased; if it was too low, the % Support was decreased.
  - Target muscle pressure example calculation:
    Peak Pressure = 20, PEEP 5, %Support = 70
    Peak Muscle Pressure = (20-5) x ((100-70)/70) = 6.43
    The “gain” (%Support setting) by PAV+ mode was adjusted in the article by Carteaux to maintain Peak muscle pressure between 5 and 10 cmH\textsubscript{2}O
  - PAV+ software also indicates the adequacy of settings by displaying a noninvasive range of the estimate of the patients work of breathing. The green zone indicates a normal value for work of breathing. Certain patients who have longstanding chronic obstructive pulmonary disease (COPD) may naturally have higher values.
• Assess patient respiratory patterns — With patients who don’t have a good drive to breathe or have had a head injury or splinting from pain or surgery, an NiF or P0.1 may help assess a reasonable ability to breathe spontaneously.

• Remember that PAV+™ software is not only a weaning mode — An article by Xirouchaki, as well as customers like you around the world, confirm that PAV+ software can be used successfully in many stages of support and with a variety of pathologies as long as patients meet other considerations:
  - No neurologic breathing patterns
  - Breathing is not too shallow from pain
  - Free from breathing tube leaks
  - Able to breathe spontaneously
  - Does not require excessive sedation

How to Get Started: Targeting the First Patient

• PAV+™+ breath type is intended for patients who have an intact respiratory drive and are already breathing in a spontaneous mode; conversions from Pressure Support to PAV+ software usually go very well.

• Monitor patients’ minute ventilation (EtCO₂ optional, and only if available), RR, BP and tidal volume before and after conversion. Some start on % Support of 701.

• When the difference between PPEAK and PEEP is small (<7 cmH₂O), the patient is on low delivered support and you can consider withdrawal if all other clinical assessments indicate it.

Additional Tips and Things to Keep in Mind:

• Patients switching to PAV+ breath type who had a low PaCO₂ to start with may not need to breathe until CO₂ has had a chance to build up.

• Setting the high spontaneous tidal volume alarm too low can result in insufficient support. Support pressure stops at 75% of the alarm setting, so an alarm of 1000 ml will stop support at 750 ml. A patient’s periodic high volume, such as a sigh breath, may be a good guide: Set the high spontaneous tidal volume alarm just above it.

• Be sure to enter the correct IBW.

• Setting enough PEEP allows patients to breathe at a comfortable FRC so they are not trying to overcome airway closure breath by breath. Avoid too-low PEEP settings.

• Preset PEEP also stints open the airways in COPD patients to allow immediate support; otherwise the disease process may result in severe closure of the airway and a delay in pulling flow from the circuit.

• Ensure that high pressure limits are not too low, as this can cause problems during startup.

• Set minute ventilation alarms and note any reductions, which could be related to sedation.

• Check alarm log for any periods of apnea — if detected, consider switching to another mode while assessing the cause.
