ASV®
Adaptive Support Ventilation
ASV adapts to the patient’s needs by continuously adjusting the pressure needed while maintaining a safe ventilation range. It provides all levels of ventilation to meet any patient need.

Ken Hargett, Director Respiratory Care
The Methodist Hospital, Houston (TX), USA
What is ASV?

Ventilation adapted to the patient

Hamilton Medical developed the Intelligent Ventilation mode Adaptive Support Ventilation® (ASV®) to make mechanical ventilation easier to use for the caregiver, and at the same time safer and more comfortable for the patient. Therefore, ASV employs lung-protective strategies and adjusts ventilation automatically – breath by breath, 24 hours a day, from intubation to extubation. ASV also encourages the patient to breathe spontaneously, thereby promoting early extubation.

The benefits

✓ Increase the comfort and safety of your patients
✓ Make life easier for the caregivers
✓ Increase the efficiency of your ICU

The highest-ranking ventilation mode

ASV is a well-established mode in critical care since 1998 and has become a standard mode in many hospitals around the world. A recent publication named ASV and the next generation INTELLiVENT-ASV® as the highest-ranking ventilation modes on the market, based on technological capabilities related to the goal of patient safety, comfort, and liberation.1)

* Not yet available in all markets

<table>
<thead>
<tr>
<th>Criterion</th>
<th>INTELLiVENT-ASV</th>
<th>ASV</th>
<th>SmartCare®</th>
<th>Auto-mode</th>
<th>NAVA®</th>
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One mode from intubation to extubation

Only three major controls

In conventional ventilation modes, the clinician sets ventilator controls such as tidal volume, pressure, respiratory rate, and expiratory and inspiratory time to achieve clinical targets, including a certain level of alveolar ventilation and oxygenation for the patient depending on the patient’s activity. ASV makes ventilation easier by providing one mode for both active and passive intubated patients, and only three parameters to control ventilation as well as oxygenation.
How ASV works

Setting the target

Conventional ventilators are set manually and need constant assessment by the clinician. ASV automates this process, making it the world’s first Intelligent Ventilation mode. The clinician sets the target minute volume and the ventilator determines the combination of tidal volume and respiratory rate according to the respiratory mechanics of the patient.

ASV in passive patients

In passive patients, ASV is a volume-targeted pressure-controlled mode with automatic adjustment of inspiratory pressure, respiratory rate, and inspiratory/expiratory time ratio. Maximum tidal volume is controlled by setting a maximum inspiratory pressure. Expiratory time is determined according to the expiratory time constant to prevent dynamic hyperinflation.

ASV in active patients

In spontaneously breathing patients, ASV is a volume-targeted pressure support mode with automatic adjustment of pressure support according to the spontaneous respiratory rate. The automatic decrease of pressure support, when the patients recover their inspiratory strength, is very useful for weaning. ASV can also be used to perform a weaning trial before extubation.

1. Assess the patient’s lung mechanics breath by breath.
2. Optimize the tidal volume/respiratory frequency combination breath by breath based on lung mechanics.
3. Achieve optimum tidal volume/respiratory frequency by automatically adjusting mandatory rate and inspiratory pressure.
Ease of use

One mode for all

ASV can be used for almost all of your adult and pediatric intubated patients, including post-operative, COPD, and ARDS patients.\(^1\), \(^2\), \(^3\), \(^4\) It supports both active and passive patients, and automatically adjusts the level of support needed.

Visual decision support

Hamilton Medical’s graphical interface is recognized as one of the best in the field.\(^6\) It gives clinicians an instant overview of critical parameters and patient status, providing valuable aid to clinical judgment. The Dynamic Lung visualizes the patient’s lung conditions and helps the clinician see the change in inspiratory resistance and static compliance, as well as the patient’s spontaneous trigger activity.

Provide patient-centered care with fewer resources

ASV automatically and continuously adjusts respiratory rate, tidal volume, and inspiratory time depending on the patient’s lung mechanics and effort. This eliminates the need for separate modes for passive and active patients, and reduces the number of controls that need to be set. Studies have shown that ASV requires fewer manipulations and generates fewer alarms than conventional modes.\(^1\), \(^2\), \(^3\) This helps to shorten training periods and to decrease the workload for the clinical staff.

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What ASV does for us as therapists is it allows us to make sure that we are crafting the breath in the absolutely best possible way for that patient at that time.

Craig Jolly, RRT, Adult Clinical Education Coordinator
University Medical Center, Lubbock (TX), USA
Four steps - as simple as that

Step 1: Set patient height and gender

First you set the gender and height of the patient. The ventilator will then calculate the patient’s ideal body weight.

Step 2: Set the target minute volume

Determine the target minute volume in terms of percentage of normal minute volume. ASV sets a default target minute volume of 100%. This equals a normal minute ventilation of 100 ml per kg per minute in adults and up to 300 ml per kg per minute in children. Depending on patient conditions, a higher minute volume might be necessary to reach an appropriate CO₂ level.

Step 3: Set oxygenation controls

Set PEEP and Oxygen values to provide appropriate oxygenation.

Step 4: Set controls for synchronization and lung protection

Define the values for pressure ramp, trigger, expiratory trigger, and maximum pressure limit. You can then start the ventilation.
More safety and comfort for your patients

Enhanced patient comfort

ASV measures the patient’s lung mechanics and activity on a breath-by-breath basis and automatically adjusts ventilation, thereby always supporting the patient at the level currently needed. ASV ensures, via an optimal breathing pattern, that the patient receives the set minute volume, independent of the patient’s activity.

Lung-protective ventilation

ASV employs lung-protective strategies to minimize complications from AutoPEEP and volutrauma/barotrauma. It also prevents apnea, tachypnea, dead space ventilation, and excessively large breaths.1)

Decreased ventilation time

Within the rules of this lung-protective strategy, ASV encourages the patient to breathe spontaneously. According to several studies, ASV supports earliest possible spontaneous breathing by the patient 2, 3) and shortens the ventilation time in various patient populations 2, 3)

Patients in the medical intensive care unit could be extubated earlier following the introduction of ASV.4)

ASV was associated with fewer manual ventilator changes and alarms, and lower airway pressure.4)
Lung-protective ventilation

Guiding the patient toward the target

ASV continuously adjusts the settings to keep the patient within the target zone (red square), and guides the patient’s current values (yellow cross) to the target point (green circle), for both active and passive patients. When the patient condition meets the target point, the patient is considered optimally ventilated according to ASV.

Applying lung-protective rules

This lung-protection strategy ensures the patient’s safety while maintaining an operator-preset, minimum minute ventilation independent of the patient’s activity.

ASV applies a lung-protective strategy to avoid

- High tidal volumes and pressures
- Low alveolar ventilation
- Dynamic hyperinflation or breath stacking
- Apnea
Assess readiness to wean

Know when to extubate the patient

The Vent Status panel visualizes the dependence of the patient on the ventilator and indicates whether the patient might be ready for extubation. The six displayed parameters relate to the patient’s ventilator dependence, including oxygenation, CO₂ elimination, and patient activity. The floating indicators moving up and down within the columns show the value for the given parameters, and are updated breath by breath.

When all indicators have reached the light-blue weaning zone, a timer starts, showing how long the patient has been in the weaning zone. Spontaneous breathing trials should now be considered. You can define the weaning zone ranges to adapt them to the weaning protocol of your institution.

The floating indicators within the columns show the value for the given parameters – updated breath by breath.

When all indicators have reached the light blue weaning zone, spontaneous breathing trials should be considered.
Increase in efficiency

Reduction of treatment costs

Each eliminated ventilation day significantly reduces treatments costs - on average by 1,500 USD. It has been shown that the use of ASV can reduce ventilation time. In addition, the ventilator is now available for the next patient much earlier. A shorter ventilation time also reduces the risk of ventilator associated pneumonia (VAP), which may result in costs of up to 57,000 USD per case.

Efficient ventilator management

Patients’ lung mechanics change constantly during ventilation. Clinicians, however, do not always have the time to monitor and adjust settings for each patient, minute by minute and hour by hour. ASV helps by adapting to the changing conditions and needs of each patient, from intubation to extubation. This reduces the workload of clinicians and simultaneously ensures safe and comfortable ventilation for the patient.

Less time needed for training and education

ASV can reduce the time needed for standard settings and alarm management while maintaining ventilation quality. This frees up time for other aspects of patient care. Additionally, the ease of use, intuitive operation, and the free e-learning offered by Hamilton Medical reduce the effort for in-house training and education.

“ASV in particular has proven its worth in everyday use. Our crews are highly enthusiastic about it. They say that they don’t have to worry about the ventilation and can focus on setting the patient up.”

Dr. Olivier Seiler, Deputy Medical Director (till 2014)
Rega Air Ambulance, Zurich, Switzerland
Hamilton Medical

Intelligent Ventilation since 1983

In 1983 Hamilton Medical was founded with a vision: To develop Intelligent Ventilation solutions that make life easier for patients in critical care and for the people who care for them. Today, Hamilton Medical is a leading manufacturer of critical care ventilation solutions for a wide variety of patient populations, applications, and environments.

The right ventilation solution for any situation

The ventilators from Hamilton Medical ventilate all of your patients: in the intensive care unit, during an MRI procedure, and in all transport situations, from the neonate to the adult. Each of these ventilators is equipped with the same standardized user interface and uses the same Intelligent Ventilation technologies. This enables Hamilton Medical ventilators to help you to

- Increase the comfort and safety of your patients
- Make life easier for the caregivers
- Increase efficiency and return on investment