

Biphasic Cuirass Ventilation (BCV)



*because,
it's just better.*

**HAYEK
MEDICAL**

A UNITED HAYEK COMPANY

Understanding Biphasic Cuirass Ventilation (BCV).

Biphasic Cuirass Ventilation, or Hayek BCV as it's better known, is a simple concept.

Breathing consists of two phases: Inspiration and Expiration. During the inspiration phase the diaphragm moves downwards, while the rib muscles pull the ribs out expanding the chest. This expands the lungs and generates a lower pressure inside the chest cavity than outside.

This decreases the pressure below normal atmospheric pressure, causing air to rush in through the nose and mouth and into the lungs. This is termed negative pressure breathing. When we breathe out the muscles relax, the diaphragm moves up and in, and this pushes air out of the lungs.

Biphasic Cuirass Ventilation works in the same manner, sucking the diaphragm down and creating a negative pressure in the chest - the **Inspiratory Phase**.

However, what makes BCV so special is the active phase that uses positive pressure to push air back out of the lungs - the **Expiratory Phase**.

This also happens to be the way we naturally breathe.



What If You Could Ventilate..

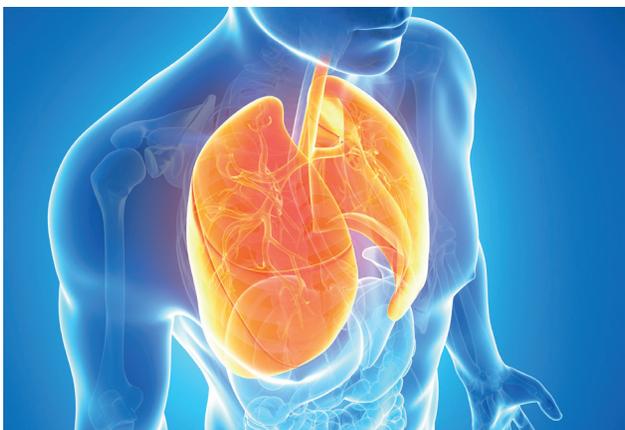
... even while eating or speaking?



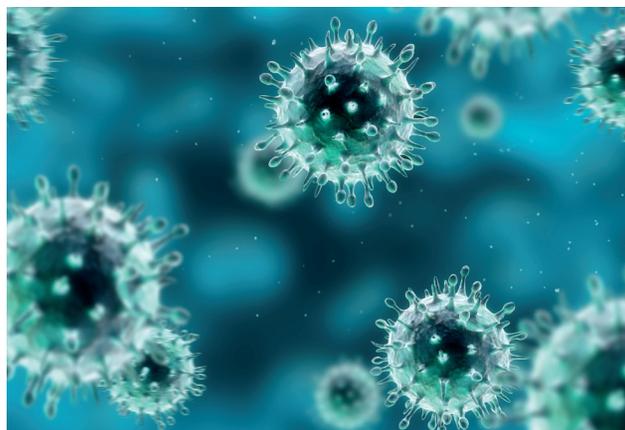
without a facemask ✓



without sedation ✓



without the risk of barotrauma ✓



without the risk of infection ✓

An Easy To Use Method That Patients Prefer.

Biphasic Cuirass Ventilation provides an efficient and effective method



BCV Provides

Biphasic Cuirass Ventilation provides an efficient and effective method of non-invasive external ventilation, and is a real alternative to traditional forms of ventilation.

BCV Works

As ventilation is biphasic, it is possible to achieve both higher tidal volumes (negative inspiratory tidal volume and positive expiratory tidal volume) and higher frequencies ranging from 6 to 1200 breaths per minute. All while allowing the user to have proper and complete control over I:E ratio, without having to depend on passive recoil of the patient.

Biphasic Cuirass Ventilation has been proven to reduce mortality rates, increase patient comfort, and avoid many of the harmful side effects associated with other existing forms of ventilation techniques.

With over 100 publications to date, BCV is a very well proven method of ventilation.

Example Patient Groups:

- Acute respiratory failure
- Chronic obstructive pulmonary failure
- Neuromuscular (e.g SMA)
- Head and spinal injuries
- Cystic fibrosis and those who require physiotherapy aids related
- Lung disease
- Asthma sufferers
- Ventilation post operation
- Post fontan, fallot
- Lung collapse
- Pneumothorax
- ...And so many more.

When Can I Use BCV?

* A better question is 'When Can't I Use BCV?'

You can use BCV in virtually any circumstance where you would use any other form of non invasive ventilation and, come to think of it, even in most cases where you would use invasive ventilation.



How BCV Works

The Nitty Gritty



Simple Application

Biphasic Cuirass Ventilation works using a clear plastic shell called a Cuirass. The Cuirass is lightweight and has a foam seal that maintains an airtight fit around the patient. It is very comfortable to wear. It is available in 11 different sizes, ranging from babies to adults. The Cuirass is placed on the patient, and connected to a United Hayek power unit, such as the Hayek RTX or Hayek HRTX.

Broad Applications

Biphasic Cuirass Ventilation can be used both in the hospital setting or at home. BCV is ideally suited for use in both acute and chronic, intubated or non intubated patients.

Comfort Factor

Biphasic Cuirass Ventilation doesn't just ventilate fantastically, it's really, really comfortable too. The seal is made of super soft foam, the Cuirass is very, very light and it's designed to fit like a glove. And, because United Hayek power units automatically compensate for leaks, the Cuirass doesn't need to be applied tightly.

Clean & Hygenic

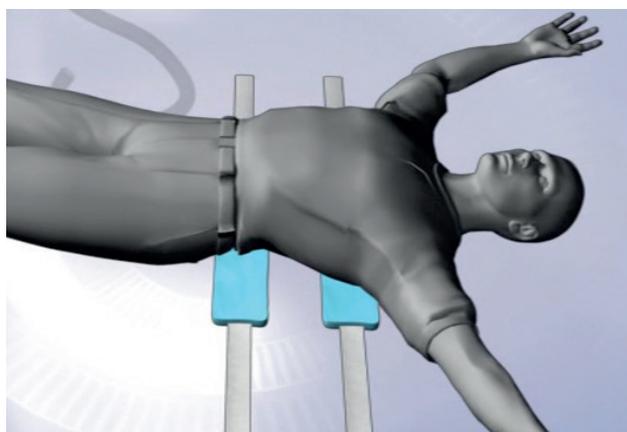
Did we mention the seal is hypoallergenic, and it's disposable too? That means it's hygenic, which helps to avoid infection, and, of course, it's latex free.

Superb Technology

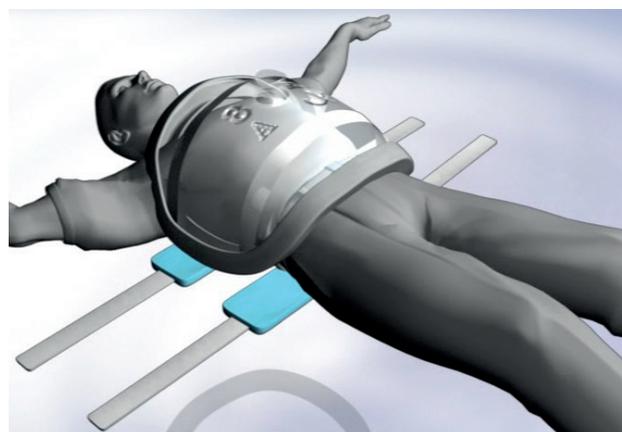
United Hayek power units are really advanced. Devices like the Hayek RTX are crammed with the latest technology. It incorporates many modes of ventilation, as well as a dedicated physio mode, which not only helps loosen secretions, it helps eliminate them with its built in cough mode. Any other ventilators you know of do that ?



You can use Biphasic Cuirass Ventilation with virtually any patient that would otherwise be on either a facemask and, (in most cases) instead of a tracheostomy, as well as a method of weaning from invasive positive pressure ventilation (IPPV).



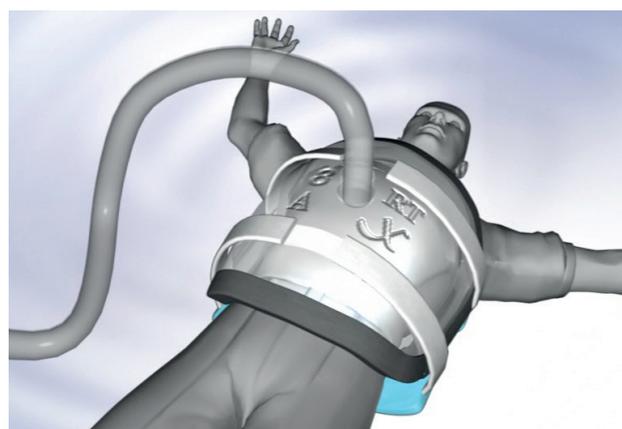
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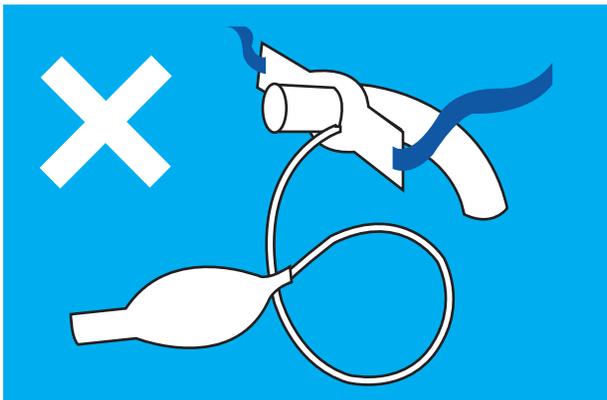


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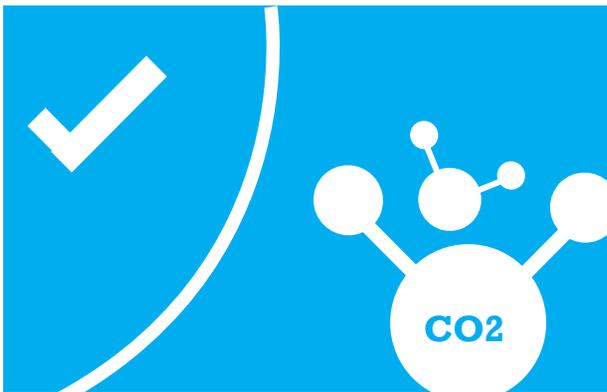


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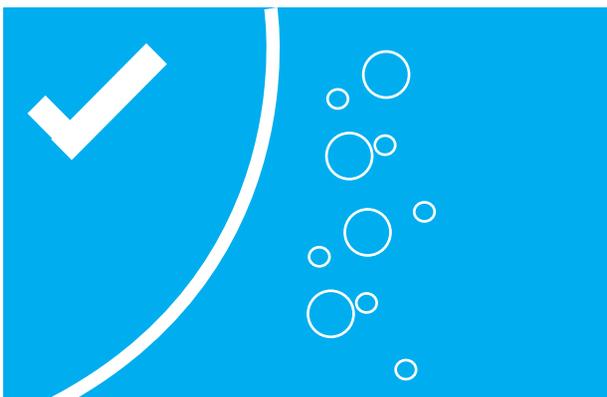
Other Benefits of BCV:



In most cases it can be used instead of a tracheostomy



It's really good at clearing CO2



It's unbelievably good at helping clear secretions, with high frequency and cough modes

Faq's: Page I

Things you may not know...

Can Biphasic Cuirass Ventilation (BCV) be used instead of invasive ventilation (IPPV) ?

Yes, in most cases BCV can be used instead of invasive ventilation.

Can a tracheostomy be removed if using BCV ?

The tracheostomy can be removed provided there is a patent airway and a physician determines that BCV is fulfilling the ventilatory requirements.

Is it possible to use BCV with other forms of ventilation such as mask based or invasive ventilation at the same time ?

Yes. BCV can be used either instead of an alternative method of ventilation or in conjunction with another form of ventilation in most cases.

Can BCV be used long term ?

BCV can be used long term, for months, for years or for a lifetime.

When is BCV not suitable ?

BCV generally requires a patent airway, and a stable spine. BCV may not be suitable for burns patients in some cases. BCV may not be effective for patients who are morbidly obese. Using BCV during pregnancy is discouraged.

What advantages does BCV have over other forms of non invasive ventilation such as mask based bi-level ventilation ?

BCV is comfortable to use. There are no obstructions to vision or speech as the Cuirass shell is placed over the torso, not over the face. Furthermore, unique to BCV is an active expiratory phase, which bi-level mask based devices do not provide.

Can BCV be self applied ?

Yes. In most cases, depending on patient mobility.

Can BCV be used aboard an aircraft ?

Yes. Some BCV devices comply with all relevant air travel regulations and can safely be used aboard an aircraft but please check with your BCV vendor prior to travel to ensure that your device complies with the regulations.

Can BCV be used with oxygen ?

Yes.

Can I eat and drink while using BCV ?

Generally yes. However, in some modes of treatment this may not be recommended - for example in secretion clearance mode. If in doubt, consult a physician for advice.

What are the side effects of using BCV ?

There are no known harmful side effects of using BCV.

Do I have to be in bed to use BCV ?

No. BCV can be delivered while laying, seated or standing.

Can BCV devices be battery powered ?

Yes. Some BCV devices are battery powered.

Can BCV be used with an abnormal body shape, or severe scoliosis ?

Yes. In most cases, if a standard sized Cuirass shell is not suitable, a custom made Cuirass can be produced.

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More things you may not know...

Why does BCV help with the problem of CO2 retention ?

As BCV devices can operate at both high frequencies and have an active expiratory phase, they are able to very effectively control CO2.

How often are the seals changed on the cuirass ?

Cuirass seals are strictly single patient use for infection control purposes. Typically, one seal per patient per week is sufficient but varies according to the mode and frequency of use.

Can BCV be used while sleeping ?

Yes.

What clinical evidence is available for the use of BCV ?

Too much to list. Please refer to the BCV publications list or consult our website.

Is a prescription required for a BCV device ?

Yes.

Can the Cuirass (the plastic shell) be used on bare skin ?

No. It is recommended to wear a lightweight garment such as a sleeveless shirt or t-shirt.

Can BCV be used with chest drains or feeding tubes ?

Yes. While an air tight vacuum needs to be created over the chest, the Cuirass seals are soft enough to prevent drains and tubes from becoming occluded.

Can BCV be used on patients with only one lung, or who have had a pneumonectomy ?

Yes.

How do BCV devices perform secretion clearance and why do they help with clearing secretions ?

BCV devices are able to deliver High Frequency Chest Wall Oscillation (HFCWO) to loosen the secretions, followed by an assisted cough to help expel them.

Are BCV devices covered by insurance and/or National or Federal Health systems such as Veteran Affairs in the United States of America?

Yes. Please contact your nearest BCV provider or United Hayek for information.

How do I locate my nearest BCV provider or distributor ?

Contact United Hayek to find your nearest vendor. Our contact details are printed on the back page of this booklet.

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And even more things you may not know...

What is the difference between BCV Physiotherapy/ Secretion Clearance modes for secretion management and products such as the Hill-Rom Vest ?

A great deal. Whilst both high frequency chest wall compression (HFCWC) systems, such as The Hill-Rom Vest system, and Biphasic Cuirass Ventilation (BCV) systems, such as the United Hayek RTX, provide secretion clearance treatment and can work at high frequencies, they are two totally different methods, which must be distinguished between.

High Frequency Chest Wall Compression has only one active phase (on the chest) and compresses the chest from its initial lung volume (FRC) to below lung volume as it compresses, and then recoils back towards its initial lung volume. It has been shown in animal studies that this may cause reduction in FRC (Zidulka - High Frequency Chest Wall Compression Am Rev of Respir Dis 1983; 127: 709-713).

This may not be favourable with patients that have some alveolar collapse, which many of the patients requiring secretion clearance treatment have.

The Biphasic Cuirass Ventilation method has two active phases. One increases lung volume to above FRC (initial lung volume) by expanding the chest and only then compressing the chest to the desired level, preserving or augmenting lung volume (and thus avoiding lung collapse), and creating substantial expiratory airflow during secretion clearance and ventilation. This allows for the creation of a very efficient and physiological secretion clearance method.

To consider or describe BCV devices as high frequency chest wall compression devices is absolutely incorrect, both in terms of the method used and in terms of the results achieved. BCV devices also have a dedicated cough mode that uses an inverse I:E ratio to provide a long inspiration and a short sharp expiration helping to produce a cough. Vest type devices do not have such capability.

Recognition for Innovation

The United Hayek RTX won the prestigious Millennium Products Design Council Award, recognising The Hayek RTX BCV Ventilator as a significant advance in technology of the Millennium.



Planes, Trains & Automobiles

Biphasic Cuirass Ventilation provides a real answer to a real problem.



Recent high profile incidents have raised awareness of the acute problem of treating and dealing with mass casualty situations. One particular issue of great concern is the lack of an adequate way to deal with large groups of people requiring ventilation quickly and effectively.

Increased numbers of people gathering at shopping centres, stadia, public transportation facilities, high rise buildings and office blocks have increased the likelihood of mass casualty situations during accidents in these places. Increased traffic on the road, air, sea and rail has added to the realistic dangers faced by large groups of the public when travelling.

- **No need for skilled medical staff**
- **Effective ventilation without intubation**
- **Simplicity of use even when cumbersome protective gear is worn**
- **Portable - from the field to the medical centre with no need for additional equipment**



If you could use any form of ventilation, wouldn't you choose the most comfortable method that has no harmful side effects ?

That's why it should always be BCV FIRST.



Should you have any questions regarding Biphasic Cuirass Ventilation, or any of United Hayek's ventilation products, please email or call us at any time.

For more information you can also visit our website at www.hayekmedical.com where you can also view a range of informative videos and guides.

We look forward to hearing from you soon!

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