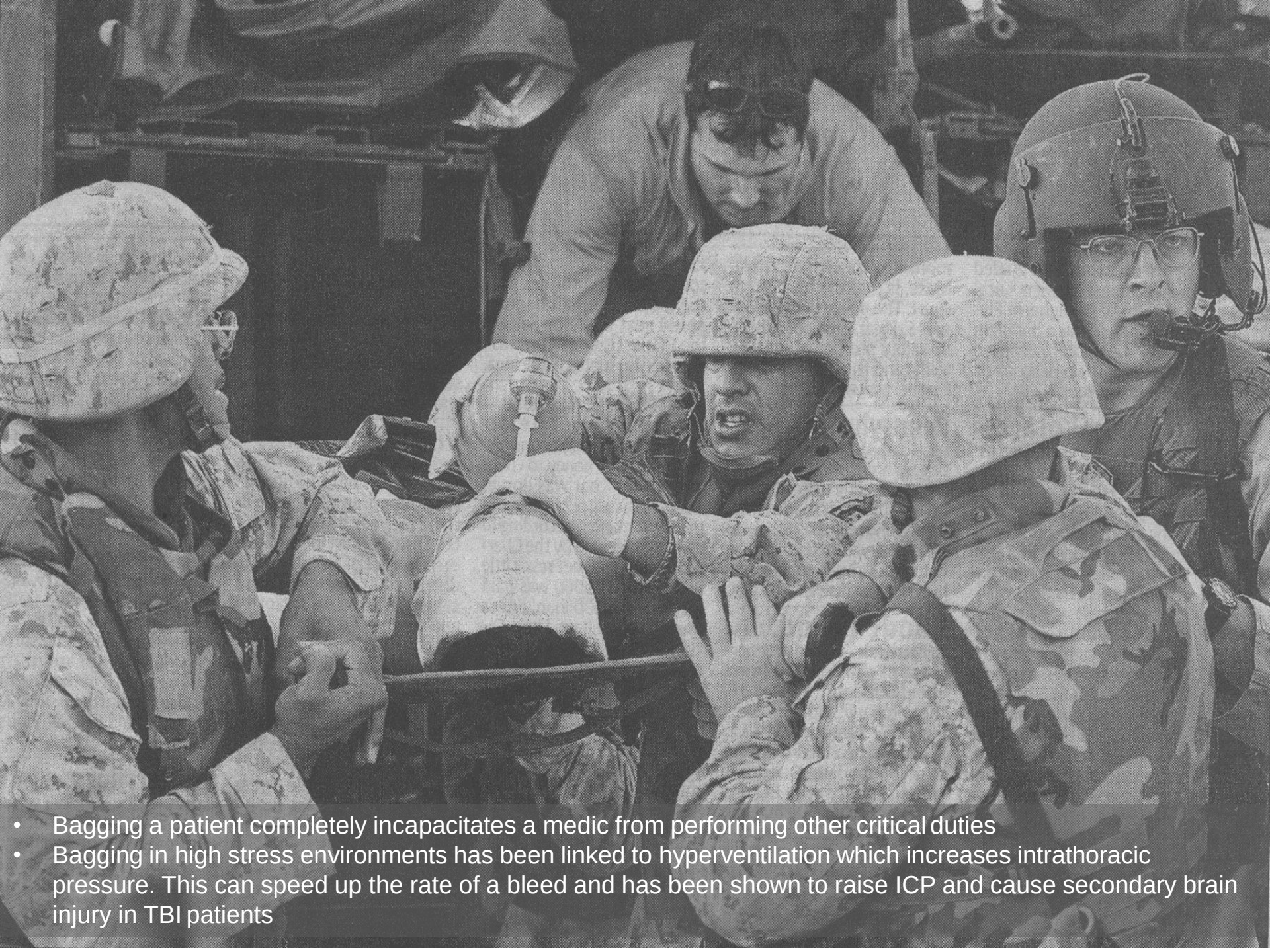
Training Guide



- Bagging a patient completely incapacitates a medic from performing other critical duties
- Bagging in high stress environments has been linked to hyperventilation which increases intrathoracic pressure. This can speed up the rate of a bleed and has been shown to raise ICP and cause secondary brain injury in TBI patients

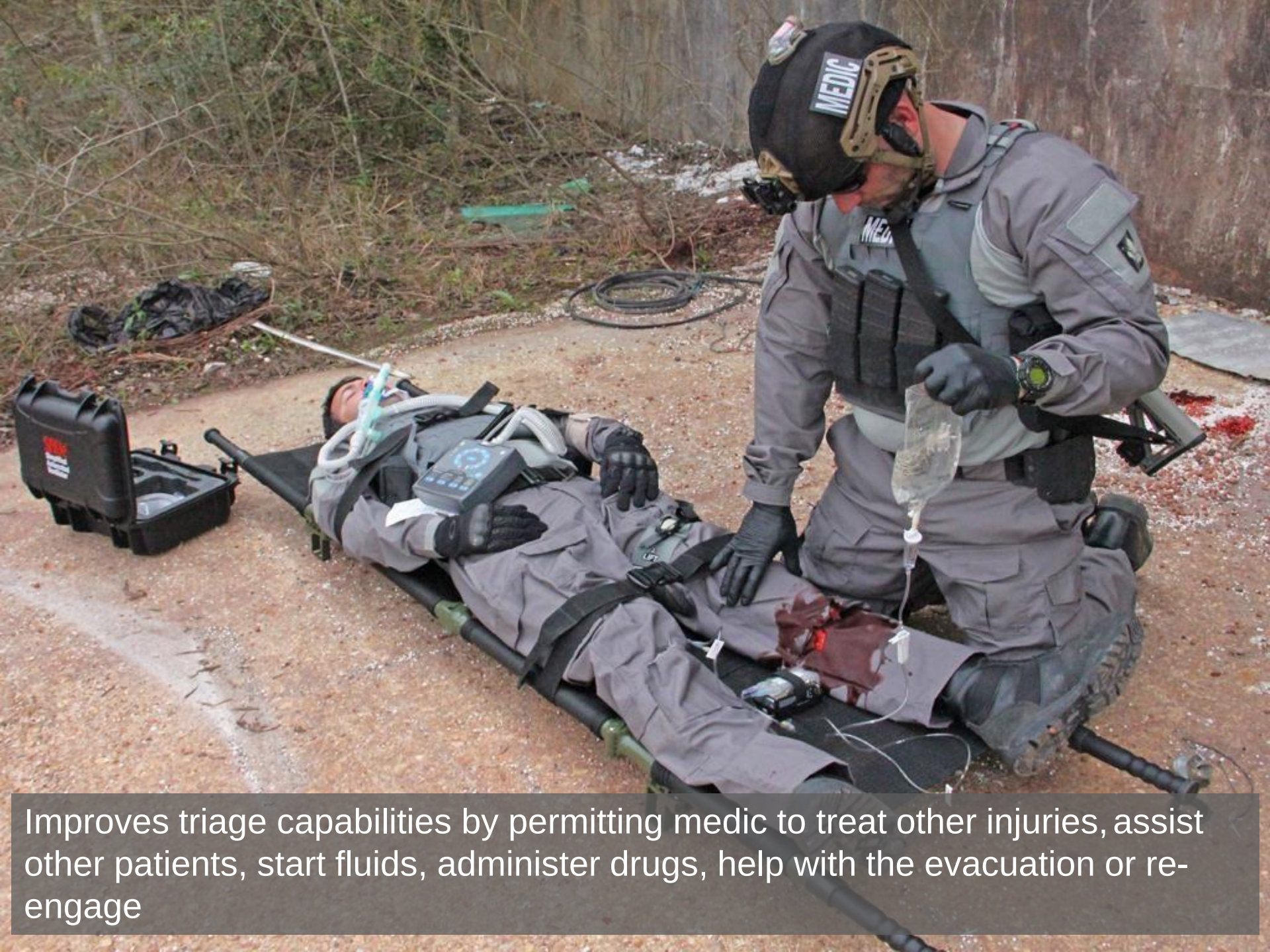
Introducing the SAVe II +

Designed to elevate the standard of care and improve triage capabilities

Simply select the height of the patient to deliver a targeted tidal volume

Removes guesswork and error associated with bagging in high stress environments

Reduces likelihood of hyperventilating the patient or causing gastric insufflating



Improves triage capabilities by permitting medic to treat other injuries, assist other patients, start fluids, administer drugs, help with the evacuation or re-engage

Where should the SAVe II+ be fielded?

SAVe II +
(Part 70110H)

- Any place there is a BVM
- With all forward deployed medics and corpsmen
- On CASEVAC Platforms / Vehicles of Opportunity
- Battalion Aid Stations
- As a backup at forward surgical hospitals
- Third World Hospitals that lack ventilators
- General quarter's stations, fast boats, submarines, LCUs and LCACs

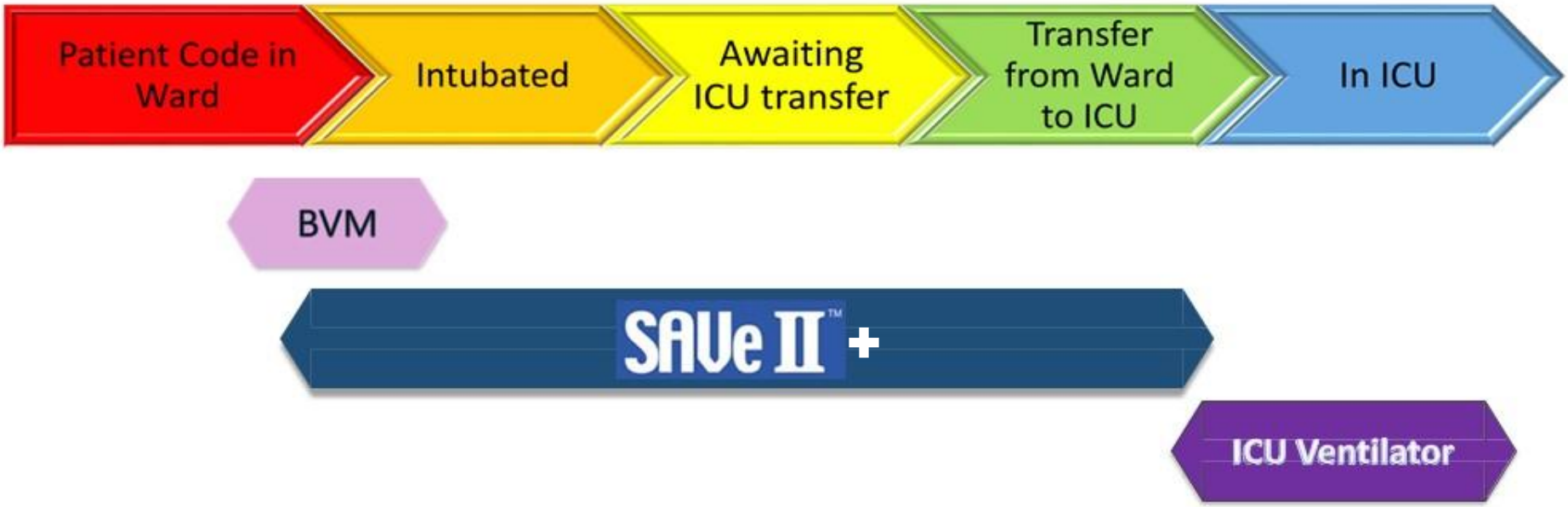
SAVe II+™

Where does the SAVe II+ belong in the Chain of Care? (pre-Hospital)

The SAVe II+ is meant to improve the standard of care and triage capabilities of the medics operating in the field by providing more consistent and safer ventilation with less effort.

SAVe II+

Where does the SAVe II+ belong in the Chain of Care? (Hospital)



The SAVe II is meant to improve the standard of care with the limited resources and capabilities of the healthcare worker operating in the ward, where the environment is less controlled than the ICU, by providing more consistent and safer automated ventilation.

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When should the SAVe II+ be used?

When it should be used	When it shouldn't be used
▪ When size, weight or ease of use is paramount ▪ Anytime the alternative is a BVM ▪ When a more sophisticated vent isn't available or there isn't an operator with the requisite training to run it	▪ When a patient is trying to breathe spontaneously ▪ When there is a more sophisticated vent and the personnel with the requisite training to run it

SAVe II+

SAVe II+ Operation

Extreme Functional Simplicity

SAVe II+

Tidal Volume is based on ARDSnet

By selecting the height of the patient the SAVe II+ dials in a lung protective, ARDSnet based TV of 6mL/Kg of ideal body weight. The Respiratory Rate is set to target a minute volume between 5-6.6 LPM depending on the height of the patient. This keeps mean intrathoracic pressure low

ADULT HEIGHT (FT' IN")	TIDAL VOLUME (mL)	RR (BPM)	MINUTE VOLUME (LPM)	PIP (cmH_2O)	PEEP (cmH_2O)
4' 3"	250	20	5	30	0
4' 6"	250	21	5.3	30	0
4' 9"	260	21	5.5	30	0
5' 0"	300	20	6.0	30	0
5' 3"	340	18	6.1	30	0
5' 6"	380	16	6.1	30	0
5' 9"	420	15	6.3	30	0
6' 0"	470	14	6.6	30	0
6' 3"	510	13	6.6	30	0

These presets were calculated using 6 mL/Kg of a male patient's ideal body weight (IBW). If you use the presets females will receive on average 6.5 mL/Kg of ideal body weight. A look up chart on the bottom of the device will help the operator fine tune the volume. The presets do not go below 250 mL so patients at 4'3" and 4'6" are receiving higher relative tidal volumes than 6mL/Kg.

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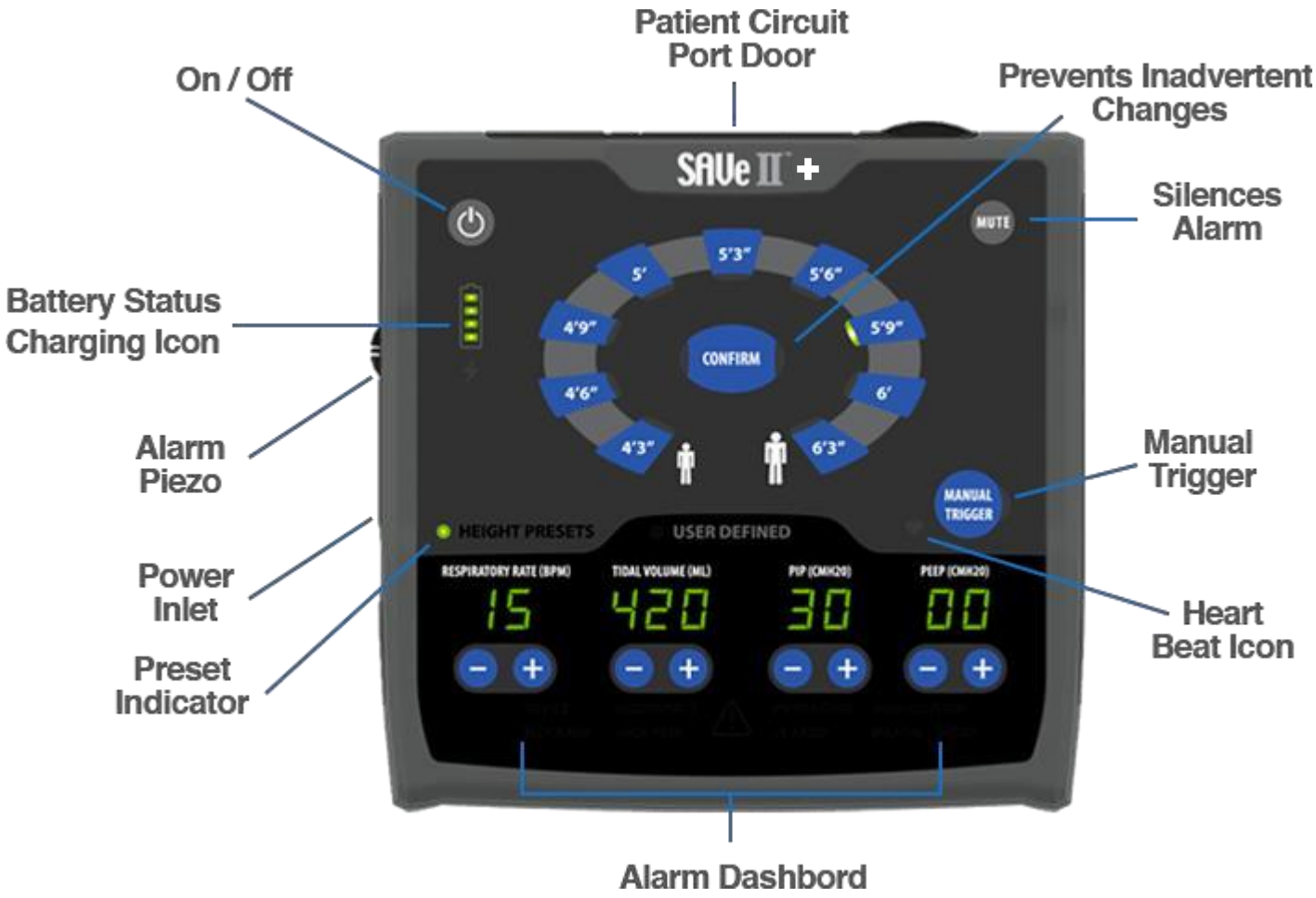
SAVe II+ Overview



SAVe II+

Setup Instructions

Step A – Look, listen & feel
Step B – Clear airway

Step 1 – Insert airway or connect mask
Step 2 - Connect breathing circuit to device
Step 3 – Turn on SAVe II+
Step 4 – Connect breathing circuit to airway
Step 5 – Verify chest rise. Monitor Alarms
Step 6 – If desired, connect low pressure O2

Setup instructions can be found on the bottom of the device

Step A – Look, Listen and Feel

Look, listen and feel for breathing and pulse.

SAVe II™+

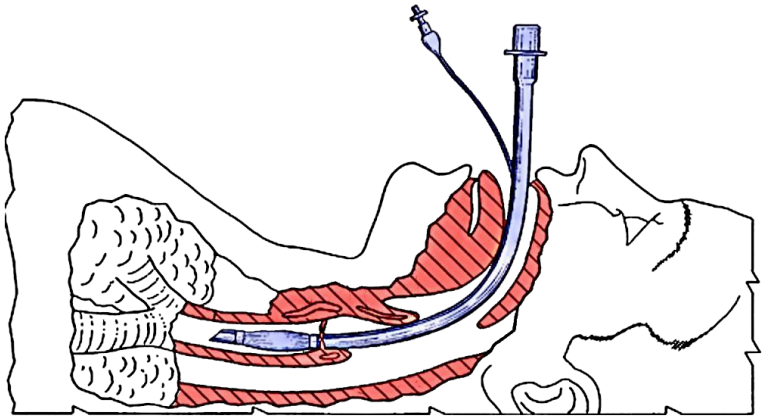
Step B – Clear Airway

Verify the airway isn't blocked.

Clear any debris or excess fluid the patient's mouth.

Step 1 – Insert Airway

The use of an ET tube, surgical or supraglottic airway is preferred over a mask. This will help reduce the risk of airway collapse or leakage around the seal of the mask. If this can't be done, immediately ventilate with a mask until an airway can be inserted.



Tip: It isn't always possible to immediately insert an airway. Consider training others on your team on how to perform a head tilt or jaw thrust and two handed mask seal to buy time while you stop massive hemorrhaging or perform other critical duties.

SAVe II™+

Step 2 – Connect Breathing Circuit

- Open port cover and connect all 3 tubes as pictured
- To minimize the chances of connecting the smaller tubes incorrectly, the tubes and the ports have been made different sizes. Smaller blue tube goes on blue color port.

Tip: Practice until you can pull out and fully deploy the SAVe II+ with a mask in less than 20 seconds. Consider teaching Combat Lifesavers or others on your team how to head tilt or jaw thrust and hold a two handed mask seal. This could buy time while you stop massive hemorrhage.

SAVe II™+

Step 3 – Turn on SAVe II+

1. Turn On

2. Select height of patient

3. Hit confirm

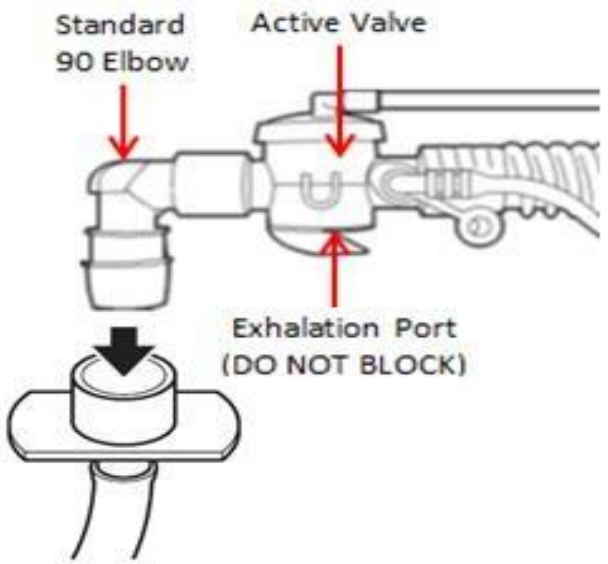
4. Verify Disconnect alarm and then block patient-end of breathing circuit and verify PIP Reached alarm

Tip: Once the alarm is resolved, the sound will seize and the flashing alarm indicator will remain solid for 30 seconds. Practice setting up the device regularly so that when its not a drill you remember that initially the alarms are supposed to sound.

SAVe II+

Step 4 – Connect Breathing Circuit to Airway

Connect the other end of the breathing circuit to the airway device or mask.



Don’t use a mask with a filter

Do not use masks that contain a filter. These filters will restrict the volume of air to the patient. You should only use the mask provided by AutoMedx, Combat Medical Systems or authorized SAVe II+ distributor.

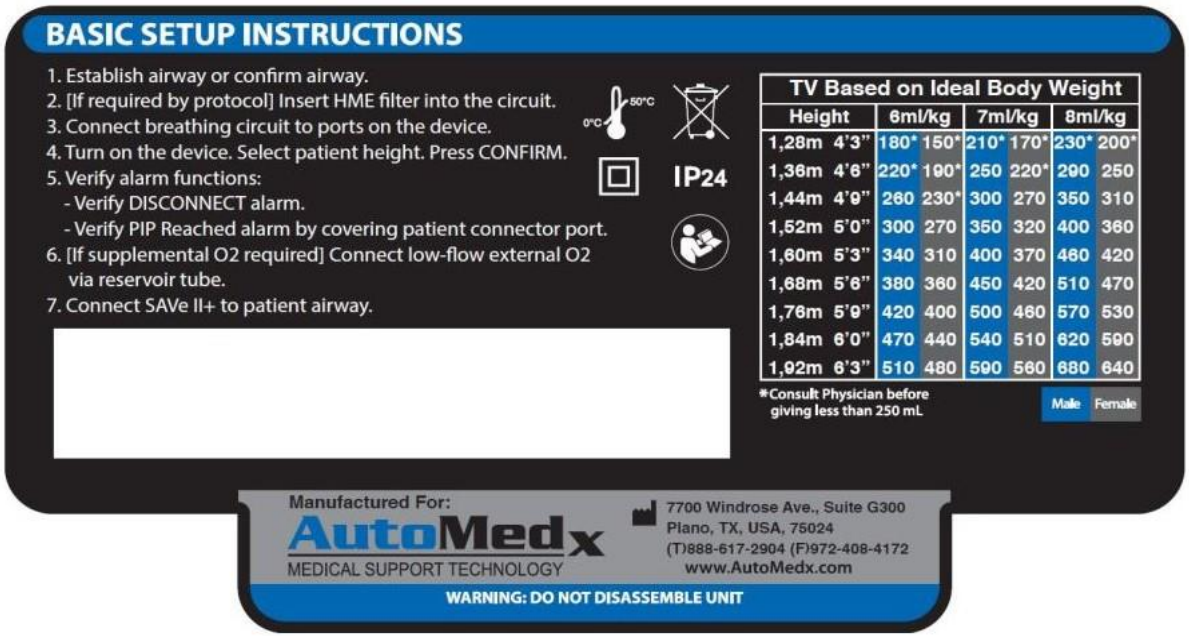
SAVe II™+

Step 5 – Verify chest rise. Monitor Alarms

Step 5 – Verify chest rise. Monitor Alarms

The SAVe II defaults are for every 3” inches and are set to a male ideal body weight. Use the look-up table on bottom of device to make adjustments for males at in between heights or for females as necessary.

Bottom Label



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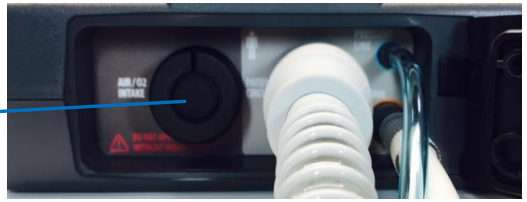
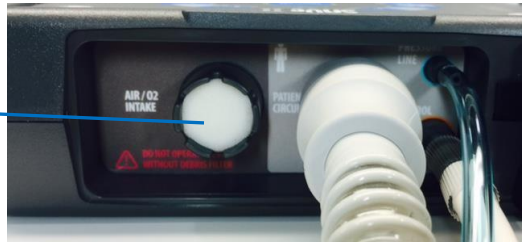
Step 6 – If desired, connect low pressure O2 via reservoir connector

1. Remove port cap
   (Port cap provides extra protection to the filter. It should remain in place unless the reservoir tube or the attenuator are in use)



2. Do not remove filter
   (Should not run the device without a filter in place as sand may get into compressor)



3. Attach collapsible reservoir tube and fully extend

Tip: If you aren't using supplemental O_2 you may want to connect the attenuator instead of the reservoir tube. It will significantly reduce the sounds of the ventilator. The reservoir tube and attenuator are reusable.

SAVe II™

Step 6 – If desired, connect low pressure O2 via reservoir connector

The amount of Supplement O_2 required to achieve a desired FIO_2 is determined by the minute volume being delivered to the patient. For instance at 5'9" the default setting is to deliver 420 mL at a rate of 15 BPM. That is a minute volume of 6.3 LPM. As such by adjusting the O_2 source to deliver 3 LPM would achieve an FIO_2 of around 59%. To get near 100%, deliver 6 LPM of supplemental O_2.

Minute Volume:	2L	3L	4L	5L	6L	7L	8L
O_2 Flow Rate:							
1	60	47	40	36	33	31	30
2	100	74	60	52	46	43	40
3	100	100	80	68	59	54	50
4	100	100	100	84	74	66	60
5	100	100	100	100	87	77	70
6	100	100	100	100	100	89	80
7	100	100	100	100	100	100	90
8	100	100	100	100	100	100	100
9	100	100	100	100	100	100	100

Note: this table is in the Operator's Manual

All but the smallest default height values result in a minute volume of around 6 LPM so focus on the highlighted values

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Troubleshooting

Alarm Overview

Silences alarm for 2 minutes

Piezo
(sound)

Alarm Dashboard
(visual)

SAVe II+

Alarms

Alarm	Potential Cause	Solution
Disconnect	Inadequately connected circuit tubing Inadequate seal between patient and airway Leak in Patient Breathing Circuit	1. Verify Patient Circuit tubing connections to SAVe II + control unit and airway 2. Verify airway is tightly sealed to patient. Adjust seal pressure if necessary. 3. Replace patient circuit (if available) 4. Ventilate by alternative means 5. If 3 and 4 are not possible, listen/feel patient circuit for leaks. Patch leak if found.
PIP Reached	Kinked patient circuit Obstructed airway Low lung compliance / High airway resistance / Excessive Tidal Volume for size of patient Vomitus in airway	1. Verify patient circuit does not have kinks 2. Verify correct placement of airway and that it is clear of obstructions. (see pg. 36 for instructions on clearing debris) 3. Verify PIP limit and TV setting are appropriate 4. Verify patient does not have a tension pneumothorax

Alarms

Alarm	Potential Cause	Solution
Battery	Low battery -At 15% last battery LED flashes and low priority alarm sounds for 30 seconds - At 10% last battery LED flashes and med priority alarm sounds for 30 seconds -At 5%, BATTERY indicator flashes and high priority alarm sounds -At 2% stops delivering breaths and continues high priority alarm sounds	1. Connect device to external power if available
Breath Assist	Spontaneous breath	1. If patient is not synchronizing with ventilator consider removing patient from ventilator if patient is able to breathe adequately on their own 2. If performing chest compressions, consider putting the ventilator into MASK CPR Mode by setting respiratory rate to 0 and manually triggering breaths.
Device	Internal malfunction Battery temperature above 60°C	1. Turn device off then on to clear transient alarm 2. If alarm not cleared ventilate by alternative means 3. Allow unit to cool down and retry

Alarms

Alarm	Potential Cause	Solution
High MV	Attempted to select RR & TV combination that would have resulted in a minute volume greater than 8.0 L	1. Select TV/RR combination that results in minute volume of no more than 8.0 Liters 2. If a change is desired to TV and RR, start with the parameter that is decreasing
Breath	Respiratory rate has been set to zero and it has been more than 30 seconds since the last manually triggered breath	1. Manually trigger a breath
High PEEP	Stacking breaths	1. Ensure exhalation port is completely clear. 2. Consider reducing TV or RR.

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Specifications

Control	Operating Modes:	Dual Control – Intermittent Mandatory Ventilation CPR Mode
	Primary Control:	Time
	Secondary Control:	Pressure
	Breath Target:	Volume
Rate	Flow Rate (LPM):	Up to 36
	Breath Rate (BPM):	8 – 30
Pressure (cmH2O)	Peak Inspiratory Pressure (PIP) Limit	10 - 60
	Peak End Expiratory Pressure (PEEP)	0 - 20
	Inspiratory Trigger Pressure	2
	Inadvertent PEEP	< 2
Volume (mL)	Tidal Volume	200 – 800
	Minute Volume	1600 – 12000
Time (Seconds)	Inspiratory	0.67 – 2.50
	Expiratory	1.30 – 5.00
	I:E Ratio	Fixed at 1:2
Supplemental Oxygen	Input Flow Rate:	0 – 12 LPM
	FIO_2:	21-100%
Operating Time	TV=420, RR=15, PEEP=0 Lung: Rp5 COD5	2600mAh battery 8 hours 20 min 2800mAh battery: 9 hours 17 min

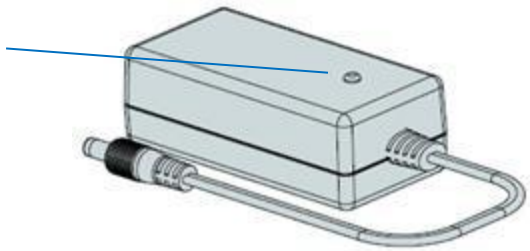
SAVe II™+

Specifications (con't)

External Power Supply	Input:	100 – 240 VAC / 50-60 Hz
	Output:	16.8 VDC @ 2.7A max
Audible Alarm	Standard:	Meets 60601-1-8 IEC
Dimensions:	Unit Size: Hard Case Size:	16.5cm x 16cm x 5cm (1320 cm^3) 31cm x 35cm x 24cm
	Weight (Unit Only):	2.3 lbs. (1.3 kg)
	Weight (Kit with Hard Case)	9.9 lbs. (4.5 kg)

Charging & Battery Care

- To charge the unit, plug into an outlet 100-240 VAC
- The lightning bolt LED on the device will turn green
- A red LED on the charger will also illuminate



- The SAVe II is fully charged when the LED on the charger turns from red to green. A fully depleted battery may also temporarily trigger the green LED.
- For storage longer than 1 month store the SAVe II+ at 25% charged (1 battery LED lit) and as close to 20C as possible
- A powered off SAVe II+ charges at the rate of 25% per hour
- A SAVe II+ will charge while operating but it takes longer

After Use Maintenance

- The single-use patient breathing circuit should be disposed of.
- The debris filter should be replaced.
- The ports on the SAVe II+ should be wiped with damp, soapy cloth and thoroughly dried with lint-free cloth between patient uses.
- Dirt and debris should be cleaned from the unit using a soapy cloth and then dried with a lint-free cloth.
- The SAVe II+ should be visually inspected for any damage that may affect operation. Do not use a damaged ventilator. Return it to AutoMedx for service.
- A new breathing circuit and airway should be packaged and stored with the SAVe II+.

Airway Management Safety Review

- The patient should be monitored at all times.
- Alarms should only be suppressed if absolutely necessary.
- An advanced airway device is strongly preferred over using a mask.
- If a mask is used, use two hands to help maintain proper position and seal.
- A pulse oximeter should be used to verify adequate oxygenation. Remember, there is a lag with pulse oximeters.

Questions

For questions or to receive further information / documentation, please contact:

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