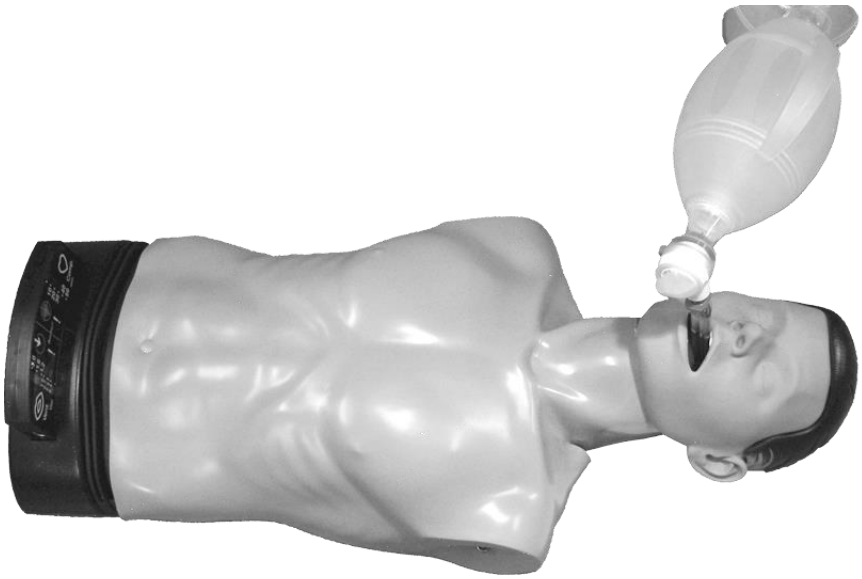
SmartMan
MORE SURVIVORS

LV Protocol On SmartMan



Products

LV Protocol can be intubated or not

Available on

ALS (LV) Pro and Pro+

Megacode (LV) Pro and Pro+

SmartMan Low Volume 10:1 on a Non-Intubated Patient

(For CAM, CAMS, ART, ROC, PitCrew)

For 2015 ALS and Megacode LV Products
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The New Protocol

This is a new protocol for performing CPR. It is based largely on the research coming out of the Resuscitation Outcomes Consortium which showed that improved attention to chest compressions results in higher levels of survivors.

There are 3 basic components to performance of this protocol:

1) Performing High Quality Continuous Chest Compressions
2) Reducing Interruptions to Chest Compressions by
   a. Not stopping to give a ventilations
   b. Performing compressions during Peri-Shock where possible
3) Providing a low volume ventilation in the space between continuous compressions

Several different groups utilize this with slight differences in how it is implemented. For example it is known as ROC, ART, BART, CAM, CAMS, PitCrew. It also goes under several different names: 10:1 low volume, continuous compressions with interposed ventilations, 10:1 on a non-intubated patient.

Advantages to Patient

Uninterrupted chest compressions for continuous flow of blood
Air provided so that oxygenation is being provided

How It Works (The Math)

Summary
Perform continuous quality chest compressions with another person giving one puff of air from the BVM about every 6 seconds (10th compressions)

- Releasing the chest (negative pressure) pulls in 180ml – 200 ml.
- From the BVM you push in about 200ml of air.
- Target Total Volume is between 300 – 400ml of air.

Continuous Quality Chest Compressions.
At a rate of 100 – 110 per minute, the negative pressure on release of the chest compression is pulling air into the lungs for 0.25-0.30 seconds before the next chest compression begins.

Ventilation Timed With Release of Chest
By timing the puff of air from the BVM with the release of the chest we can avoid pushing air into the stomach and we can achieve a reasonable ventilation.

- If you push air from the BVM too quickly, the air will go into the stomach.
- If you push air from the BVM when the chest is being compressed, the air will go into the stomach.
- If you push air correctly it will go into the lungs along with the air being sucked in by the release of the chest.

The Pressures
In Rescue Breathing - we deliver 600ml of air over 1.0 seconds.
In Low Volume protocol - we deliver 200ml of air over 0.3 of a second
Each of these produces the same amount of pressure and thus the air does not go into the stomach but into the lungs instead.

Hardware / Software Design

SmartMan is the first CPR training system to provide accurate hardware and software to correctly train to the demands of this protocol. The movement of the chest produces positive and negative movement of

air. Sensors are able to measure this movement along with the air delivered from the BVM to give the total amount of air delivered to the lungs through interaction of the compressions and ventilation.

The LV SmartMan provides for pressure sensitive opening of the value into the stomach. It reports on whether the air from the BVM is creating pressure by being too early or too late when compared to the pressures generated by the chest compressions.

It provides for a life like feel in the interaction of the chest compressions and the ventilations.

Both the SmartMan ALS and Megacode SmartMan can be ordered with the Low Volume (LV) option. LV manikins are able to perform the normal volume protocols as well.

Interaction of Compressions and Ventilations

Negative Pressure on Release of Chest

The 10:1 protocol is a negative pressure protocol. To be performed successfully, the ventilation needs to be timed with the negative pressure created by the release of the chest compression. Incorrect timing of the commencement of ventilation means you are likely to be providing ventilation either during the chest compression of the current compression or next compression (after you started). Providing ventilations during the compression phase of a chest compression is likely to force air into the stomach or create high air pressure to limit forward blood flow.

Short Puff of Air – Low Volume

The 10:1 protocol is a short inspiration time activity. To be performed successfully, the ventilation inspiration needs to have started slightly before the chest has reached its maximum depth of compression and it must finish when the next compression starts.

With compressions being performed at a rate of 100 – 110 per minute, this leave only 0.25 - 0.30 seconds to give the ventilation.

The 10:1 protocol is a low volume activity. The ventilation volume required for this protocol is 300 - 400 ml. The negative pressure created by the chest compression assists the flow of air into the lungs. The short inspiration time limits the volume of air to be supplied while avoiding excess ventilation pressure.

A Team Activity

The 10:1 protocol is a team activity. The better the team work between the rescuers, the better the results. It is impossible to perform this protocol successfully without high quality chest compressions and high quality ventilations. The person performing chest compressions must concentrate on performing perfect compressions as the priority is on compressions. That person should NOT slow down when the ventilation is to be given. The person compressing the chest can help the person ventilating by providing a consistent rate that is not too fast. The faster the chest compressions, the less time there is for the ventilation.

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The Training Activity

This activity requires at least two people.

One person performs **Continuous Chest Compressions** for 2 x 50 compressions (the user can change this setting).

A second person performs a ventilation about every 6 seconds (8-10) compressions. The target amount of air is 300ml to 400ml.

In SmartMan this is available as
a) 2 CPR Cycle with 50 compressions per cycle practice activity
b) 4 CPR Cycle with 50 compressions per cycle test activity

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Training

In order to provide the best result for the patient, training must focus on putting sufficient air into the lungs without putting it in the stomach. This is only possible when the chest is being release from the ventilations.

Difficulties to Overcome in Training

If the chest is being compressed you cannot introduce air into the lungs
Excessive air pressure (from pushing the air against the pressure created by the chest compressions) can stop forward blood flow
Excessive ventilation pressure can force air into the stomach

Working as A Team

For The Person Compressing

- Compressions should be performed to the highest quality to maximize blood flow
- Compressions need to be performed consistently to allow the ventilations to be correctly provided.
    - If compressions are too fast, it reduces the time to provide the breath.
    - If the compressions are erratic, it is very difficult to time the ventilation with release of the chest
    - If the compressions are too shallow, there is less time for air to go into the lungs.
- **TIP** to Help the Person Ventilating
    - Count out loud to the target number of ventilations then start the count again. This means the person can concentrate on timing the ventilation correctly and the sound can be a cue for when to start delivering the vent

For the Person Ventilating

- The Ventilation should be given ONLY on release of chest compression
- Ventilation volume target is 300ml – 400ml
- You have 0.25 to 0.30 seconds to get air into the lungs (inspiration time depends on the rate of compressions)
- TIP To help timing of ventilation
    - Begin to squeeze the BVM just after the person performing the chest compression has started pushing down. It will take a short amount of time before the ventilation begins to move into the lungs.
    - Try to focus on squeezing the BVM as you see the chest start of bend.

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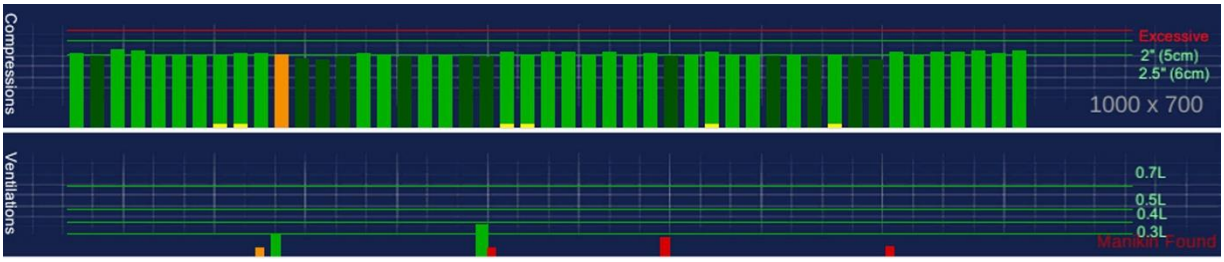
SmartMan Feedback

SmartMan will be showing the chest compressions on the top line and the ventilations on the bottom line.



Volume and Rate of Air

On the ventilation, the color of the main ventilation bar should be bright green. This will mean that you put in the correct volume of air in the correct amount of time.

Timing of Air

The timing of when air started to flow into the lungs will show on SmartMan by a small orange bar in front of the ventilation bar or a small red bar after the ventilation bar.

The orange bar before the ventilation bar means that you were pushing air against the person who was pressing the chest down. You started before the chest reached the deepest part of the compression.

A red bar after the ventilation bar means that you were pushing air against the person who was pressing the chest. You were still pushing are AFTER the release of the chest and it was being pushed down again.

Chest Compression Depth and Rate

On chest compression, the bright green color indicate correct rate and depth.

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Ventilation Technique

When to Squeeze

Start to squeeze the BVM just before the chest has reached its maximum depth of compression.

How to Squeeze

Deliver a puff of air quickly but not so strongly that the air goes into the stomach.
The ventilation inspiration should be 0.25s to 0.3s.

When to Release

Release the BVM fully as soon as the chest is fully released. You must not be trying to put air into the lungs when the chest starts the next compression cycle.

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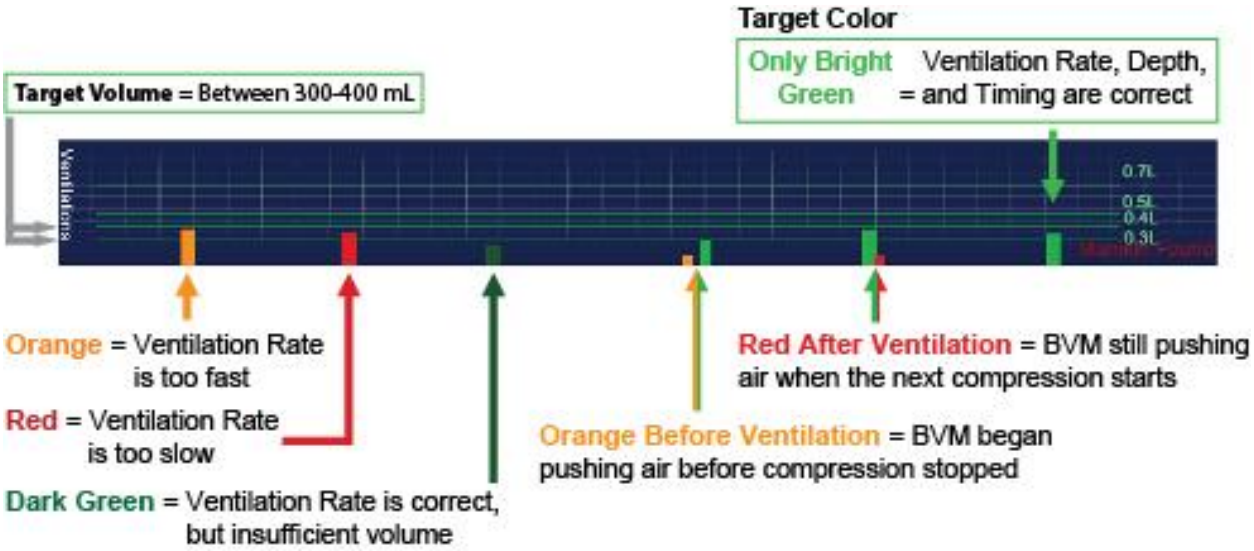
The Colored Feedback

LV Ventilation Main Bar (Rate and Volume):

This shows the rate and volume of the ventilation.

- If you see bright green you delivered sufficient volume of air (300ml to 400ml) over the correct time (0.25 - 0.3s).
- If you see a dark green bar you delivered incorrect volume of air but it was delivered at the correct rate.
- If you see an orange bar you delivered the air too quickly (and air likely went into the stomach)
- If you do NOT see any ventilation bar, then NO air went into the lungs. This could mean
  - you were 100% out of phase (the chest was being compressed as you squeezed the BVM)
  - you squeezed too hard and the air went into the stomach
  - you only put a small amount of air into the lungs and it did not register. Tolerance level at the low flow rates for this activity are on SmartMan 230ml and Airway SmartMan 110ml of air.



Ventilation Timing Bar (Timing of Ventilation Related to the Chest Compression)

This shows how well the ventilations was timed in relation to the release of the chest.

Target No Bar

The aim is to produce a ventilation that has no red bar after the vent bar and no orange bar in front of the main bar. This means that the ventilation was delivered in sync with the release of the chest (+/- 0.12 seconds from the maximum depth of compression)

Orange Before the Vent Bar

Shows that you provided a ventilation before the chest has reached its maximum compression depth. Often the rescuer performing compressions will feel resistance to the compression from this early ventilation. This is bad for the victim.

Red After the Vent Bar

You were late in providing a ventilation with the BVM. You are likely to be providing ventilation that continues during the commencement of the next compression. It is very difficult to show red timing bars on the standard SmartMan. The Airway SmartMan is recommended for this 10:1 protocol.

Tips From Others

The most difficult issue is to learn how to time the ventilation with the release of the chest. It does not have to be perfect, but the better you perform the better it is for the patient. Here are several suggestions from groups who are using this protocol.

Oral Cue

The person performing chest compressions counts 1 through 10 for each compression. The person on the ventilation learns when to give the squeeze related to how the person counts. Normally you begin to squeeze before the person completes saying the word “Ten”.

Visual Cue

Ventilate by watching the hands of the rescuer performing chest compressions. What how the chest creates a depression. On the 10 compression, begin squeezing the BVM when the chest is only half way down.

You are trying to ventilate during the release of the chest compression. Because the BVM is soft and you have to get the air to the lungs, you need to start slightly before the chest is fully depressed.

Practice From Feel

Ventilate as you normally would for rescue breathing as someone is performing compressions. You will feel the in and out pressure on the BVM. 1. Reduce the length of time you are squeezing. You will feel the shortened in out pressure. 2. Reduce the volume you give. You will see a much short bar indicating much less air has gone into the stomach. 3. Try to adjust you short squeeze and less volume to the release of the chest.

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