5.4 SmartMan Manual – 5. Results 4. Advanced Airway

v5.1 and later Current version v5.3.3.3
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5.4 Results CPR with Advanced Airway

Results are an accurate analysis of every practice or test performed on SmartMan. This document provides a description of the detail found in the results for chest compressions. Results are displayed as soon as an activity is complete.

Alternatively you can come back and view the results at a later time. To do this, follow this procedure:

1. Login to person whose results you wish to display,
2. In the Actions Menu, click on View Previous Results.
3. Click Compressions
4. Click on the results you wish to display

The Results Display for CPR

For a detailed explanation of the colored bars see others sections of this manual.

- Chest Compressions see "**SmartMan Manual - 5. Results 1. Compressions**".
- Ventilations see "**SmartMan Manual - 5. Results 2. Ventilations**".

The display for chest compressions is slightly different than described above, as:

- both chest compressions and ventilations appear on the screen at the same time,
- the timing of the ventilation is in relation to the chest compressions, i.e. after 30 compressions
- analysis must take account of how both skills worked together to achieve the best result for the patient.

5.4.0 Review of the Protocol for CPR with Advanced Airway

The basic objective of CPR is to circulate oxygenated blood for a patient that is unable to do so for him or herself. With an advanced airway in place the protocol is for continuous chest compressions with a ventilation about every 6 seconds.

With an advanced airway in place, you perform continuous chest compressions for 2 minutes and a second person performs ventilations every six seconds or about every 10th compression.

The person performing the compressions does not stop or slow down for the ventilation. However that person does help the other person by counting out loud and performing compressions at the correct rate and depth.

If a person is squeezing the BVM at the same time the person is pressing the chest this is counterproductive for the patient. The person performing the ventilations must perform the ventilation so the air goes into the lungs on the release of the chest. This means only a 0.3 second window is available. (The math works out like this: A compression at a rate of 100 per minute = 0.6 of a second for each compression. Half down and half up leaves us with 0.3 seconds for the chest recoil.)

In order to master this skill, you need to know whether you started pushing air into the lungs before the chest started to rise (too early), whether you started to push the air into the lungs when the chest was already rising (too late) or you started giving the breath at just the right moment.

CPR Results Main Page

When a practice or test is completed the screen will appear as in the picture below. In the main results page, note the number on the circled areas. Each area contains details on some aspect of the performance.

Notice the areas circled in green.

Circle 1 = Percentage Score
Circle 2 = More Scores
Circle 3 = Real Time Feedback Area
Circle 4 = Show Next Cycle Button
Circle 5 = Show More Detailed Analysis Button

Below is a description of the detail found in the results for CPR.

Below is a detailed description of the information in each area and what it means.

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5.4.1 The Percentage Score

The overall score for the performance appears in the top right hand side of the screen.

This is calculated from all of the component skills in both chest compressions and ventilations, and includes the overall timing and the timings of ventilations as related to chest compressions. Current emphasis is on the priority of chest compressions and thus this score is weighted with 75% on the quality of the chest compressions and 25% on the quality of the ventilations.

Note: You must always get some air into the lungs or the activity will stop and it will not give you a final score.

The score allows individuals and program directors to set a target achievement level. It is also useful in allowing individuals to compare a) their current score with their previous scores and b) their own achievement level with how others have done in the same skill.

In CPR with advanced Airway there are two separate starting points for the activities.

a) You can start the timer before placement of the intubation device. In this case the score takes into account how long it takes to place the device.

   In this activity the accuracy of the delivery of the ventilation so that it is not conflicting with the pressing of the chest during chest compressions is considered in the calculation.

b) You can start the activity after the intubation device has been placed. In this case the score reflects how well the compressions and ventilations were performed.

   In this activity the accuracy of the delivery of the ventilation so that it is not conflicting with the pressing of the chest during chest compressions is considered in the calculation.

The score allows individuals and program directors to set a target achievement level. It is also useful in allowing individuals to compare a) current score with their previous scores, and b) their own achievement level with how others have done in the same skill.

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5.4.2 More Scores

This area provides more detail on the performance. It concentrates on information related to chest compressions.

Besides the final score it provides the following information.

Final Score: This is the SmartMan overall percentage score.

Compressions: This is how many compressions were performed and the target number.

Time Taken: This is the actual time taken and the target time.

Compressions (Depth): This is the percentage of compressions accurate for depth.

Compressions (Rate): This is the percentage of compressions accurate for rate.

Depth, Rate, Release: This is the percentage of compressions accurate for all three i.e. Fully Compliant Compressions.

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5.4.3 Real Time Feedback Area

5.4.3.1 The Colored Bars

The colored bars give a quick easy way for the person performing a skill on SmartMan to know how they are performing and what they need to change in order to receive a high score. The higher score meaning they are performing higher quality compressions.

The person aims to produce pure bright green bars at all times. If there is any other color, then he or she needs to modify how they are performing compressions.

In CPR with an advanced airway, SmartMan shows colored bars for both chest compressions and for the ventilations. Also it will show whether the ventilation is optimal for the patient by showing whether the ventilation was being pushed into the lungs when the chest was being compressed or not.

Again it will indicate accuracy of the skill with the following 4 basic colors.

Bright Green means everything is correct.	Dark Green means correct rate but incorrect depth (or volume)	Orange means rate too fast.	Red means it was too slow.

5.4.3.2 Compressions Indicators

The two green horizontal lines on the right side, show the target depth of the compression. Push the chest until the bar goes between these two green lines.

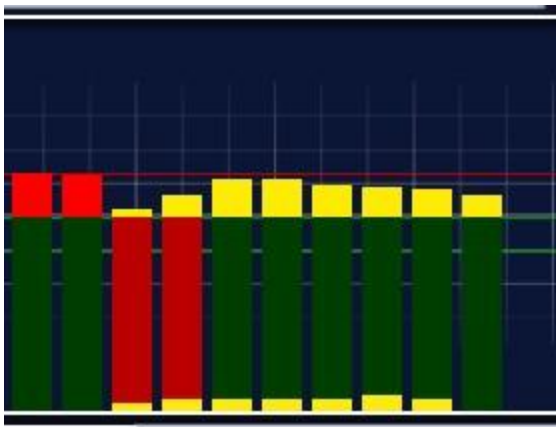
The compressions should be at least 5.0cm and not more than 6.0cm (roughly 2.0 inches and 2.5inches). The EU specifies a top limit for depth but the AHA does not. It cites there is no evidence to say that compressions deeper than this are beneficial.

The red line is the maximum depth for that manikin. It is the point at which you bounce off the bottom.

Yellow bar on the bottom: This shows the distance the chest has not been released. The higher it is from the bottom, the greater the distance of the non-release.

Yellow bar on the top: This shows that the depth went deeper that 2.5" (greater than 6.0cm).

Red bar on the top: This means that the chest hit the maximum depth of the manikin. The yellow on top will turn red if you hit the bottom.



5.3.3.3 Ventilations Indicators

Rate and Volume

The colored bars show rate at which the breath is given as well as the volume as indicated in the picture above. The target in SmartMan is always to produce bright green. This means that all parameters are correct.

Here is a summary of what the colors mean during ventilations.

The same colors are used in rescue breaths and ventilations given in CPR as for chest compressions. When performing ventilations on a patient, you must provide the correct inspiration volume and give the patient that volume at the correct inspiration rate.

SmartMan will detect if air goes into the stomach but the bars will only display information related to what goes into the lungs.

Volume of Inspiration

The two horizontal green lines on the screen show the target volume for each ventilation. For an adult it is between 0.5l and 0.7l. The target is close to 0.6L.

Bright Green means inspiration rate & volume was correct..	Dark Green means inspiration rate was correct but the volume was too little or too much.	Orange means inspiration was too fast; it took too short a time.	Red means inspiration was too slow. It is to be delivered over a span of 1 second.

Interval Between Inspirations

The interval between breaths during CPR with continuous chest compressions is not so important. It is roughly every 10 compressions or about every 6 seconds.

Timing of Ventilations

Ventilations performed correctly as the chest compression is released: The colored bars will be the same as in all other SmartMan ventilation displays. Bright green is the correct inspiration rate and correct volume.

Ventilations performed against the chest as it is being compressed: With airway management and continuous chest compressions, the requirement on the person performing ventilations is much greater than is otherwise the case. To be able to provide the ventilation when the chest is rising (being released), you must receive feedback and develop a strategy on how to time the ventilation correctly.

SmartMan gives you the feedback so you know if you have started too soon or too late in relation to when the chest starts to rise.

TIMING VENTILATIONS WITH RISE OF CHEST

***Too Early**. If you started to press the BVM BEFORE the chest reached its deepest part, then an orange bar will show to the left (before) the hollowed out bar. See right as an example*

***Too Late**. If you started to press the BVM AFTER the chest reached its deepest part, then a red bar will show to the right (after) of the hollowed out bar. See example to the right*

***Correct Timing.** If you began to provide air as the chest started to rise, there will be no bar on either side of the main vertical bar and the bar will be solid*

Even if you begin squeezing the BVM too early or you end too late, you may still have put air into the lungs. This is not optimal for the patient as it creates intra-thoracic pressure and can lead to difficulties for a victim. Thus the colored bar will be hollowed out. The color will still represent the volume and rate of inspiration. Thus a hollowed out bar lets you now that the air that went into the lungs was not optimal.

The combinations of too early and too late combine with the variations in inspiration volume and inspiration rate. These are shown below.

Timing Correct; Volume correct; Rate of Inspiration correct;

Timing too early Volume correct; Rate of Inspiration correct

Timing too late Volume correct Rate of Inspiration correct

Timing Correct Volume correct; Rate of Inspiration too fast

Timing too early Volume correct; Rate of Inspiration too fast

Timing too late Volume correct; Rate of Inspiration too fast

Timing Correct
Volume incorrect; Rate of Inspiration correct

Timing too early
Volume incorrect
Rate of Inspiration correct

Timing too late
Volume incorrect
Rate of Inspiration correct

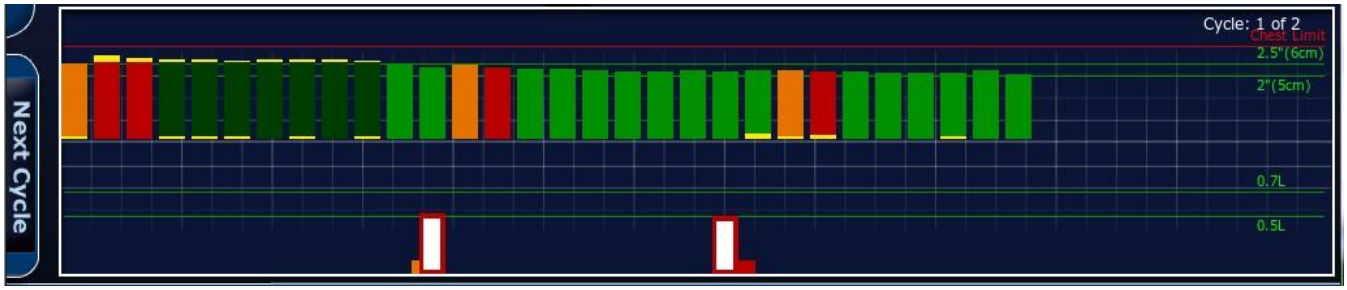
Timing Correct
Volume correct; Rate of Inspiration too slow

Timing too early
Volume correct
Rate of Inspiration too slow

Timing too late
Volume correct
Rate of Inspiration too slow

Example 1

Below is a sample showing CPR with and advanced airway.



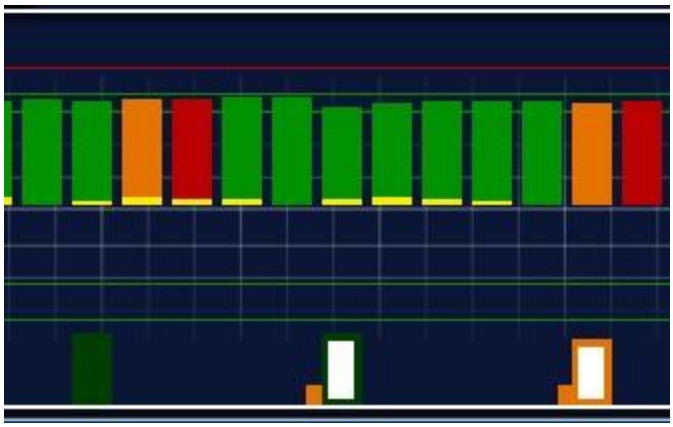
The compressions are showing a lot of bright green. Those are all very good. The dark green compression bars with a slight bit of yellow indicate that the depths were slightly beyond 2.5" or beyond 6.0cm. The main problem with the above set of compressions is the high number of non-released chests.

The first ventilation shows an orange bar before it. This means that the chest was still being pushed down when the ventilation started. Air then went into the lungs and its rate was too slow (red). The main bar is a hollow rectangle indicating that the air was not optimal because of the incorrect timing.

The second ventilation started too late. The chest was already rising. The air that went into the lungs was too slow (red). The main bar is a hollow rectangle indicating that the air was not optimal because of the incorrect timing.

Example 2

This is a close up section.



No bar in front of or after the green ventilation bar: Thus the first ventilation was timed perfectly with the release of the chest. Not quite enough air went into the lungs but the rate of inspiration was correct..

Orange bar in front of Hollow Rectangular: This means the ventilation was started too early. The air was being pushing into the lungs before the chest was rising. The main bar is a hollow rectangle indicating that the air was not optimal because of the incorrect timing. It is dark green indicating that the air that did go into the lungs was at the correct rate.

Orange bar in front of Hollow Rectangular: This means the ventilation was started too early. The air was being pushed into the lungs before the chest was rising. The main bar is a hollow rectangle indicating that the air was not optimal because of the incorrect timing. It is orange, indicating that the air that did go into the lungs was too fast.

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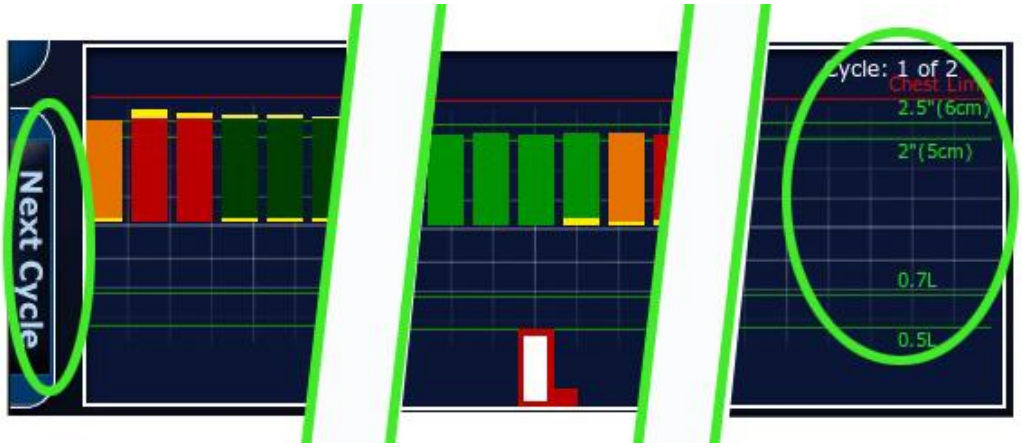
5.4.4 Show Next Cycle Button

The show Next Cycle button is on the lower far left edge of the screen. It is at the left edge of where the colored bars are displayed. When you click on this button, the screen will display the bars for the next cycle of 30 compressions and 2 ventilations.



In the top right of the bar area, it will indicate which cycle you are displaying.

Each time you click the Next Cycle button, it will show the results for the next cycle of compressions. Clicking the button again will scroll through each cycle until you are back at the first cycle again.

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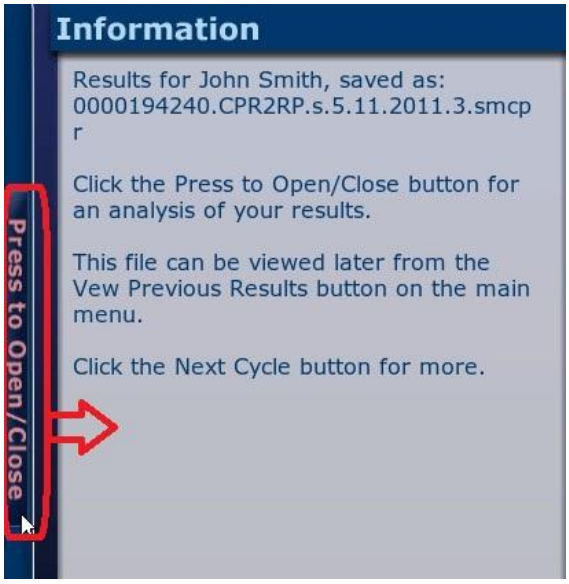
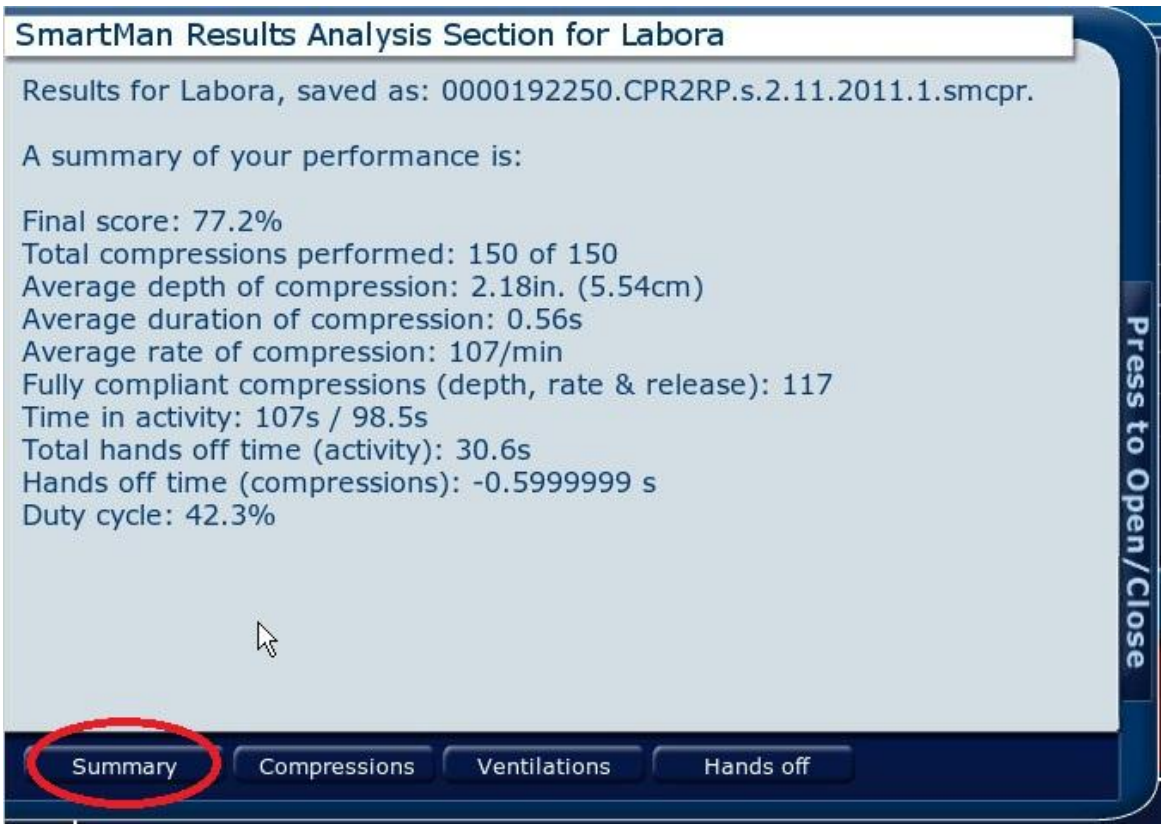
5.4.5 Show More Detailed Analysis Button

To see further detail on any skills performance, click on the button at the far left edge of the page. See area number 5 in the picture at the top of Page 2. This button is just above the Next Cycle Button.



5.4.5.1 Results Analysis – Summary Button

This will reveal the Summary Analysis page as seen below.



The screen will tell you the name of the person who is logged in along with the name of the results file which is being displayed.

The Summary Performance Information will be

Final Score: This is the overall percentage score.

Total Compressions performed: This is the number performed of the target number.

Average depth of compression: This is the actual average depth of compressions performed.

Average duration of compressions: This is the actual average duration of compressions performed.

Average rate of compressions: This is the average rate per minute of compressions performed.

Fully compliant compressions (depth, rate, release): This is the total number of compressions out of the target number, that were 100% correct on all three parameters.

Time in activity: This is the actual time for the activity versus the target time.

Total Hands Off Time (activity): This is the total time not on the chest including the ventilation time.

Hands Off Time (compressions): This is the total time not on the chest and this does not include ventilation time.

Duty Cycle: This is Duty Cycle.

If you are viewing information at one of the other two buttons, click on the Summary Analysis button circled in red above, to return to the Summary Analysis.

Press the button at the right to close this window and return to the main results display page.

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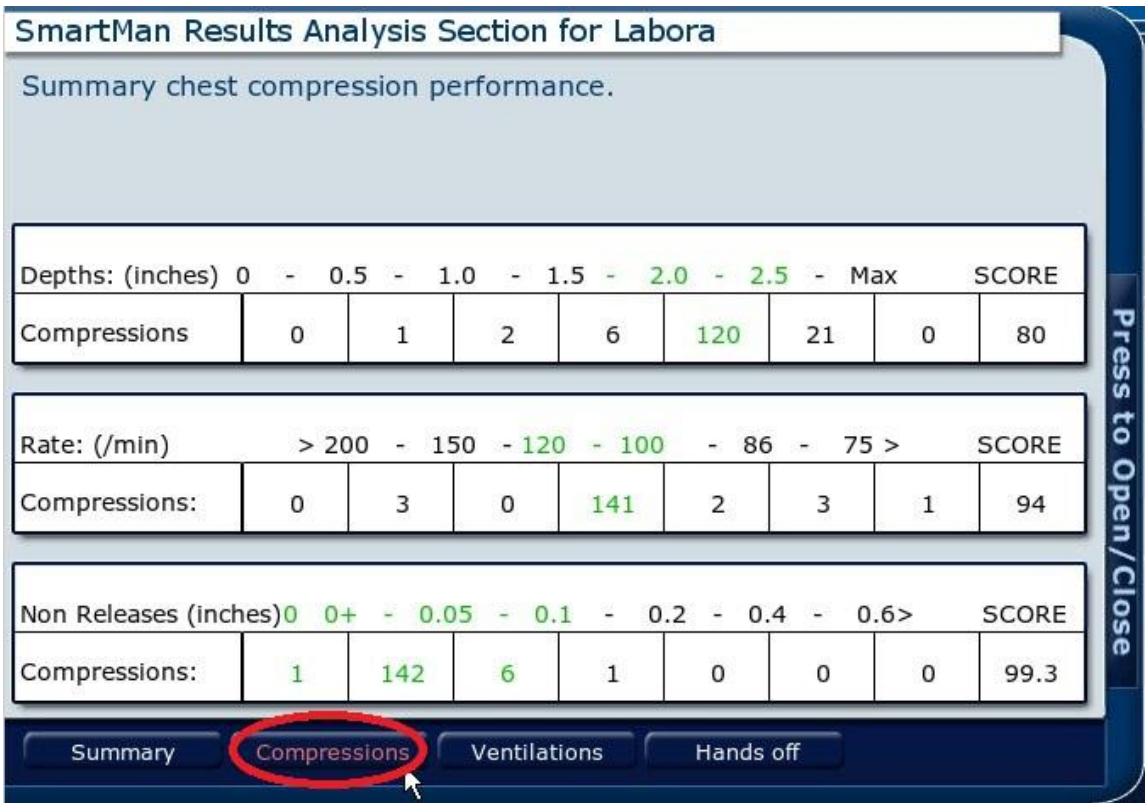
5.3.5.2 Results Analysis – Compressions Button

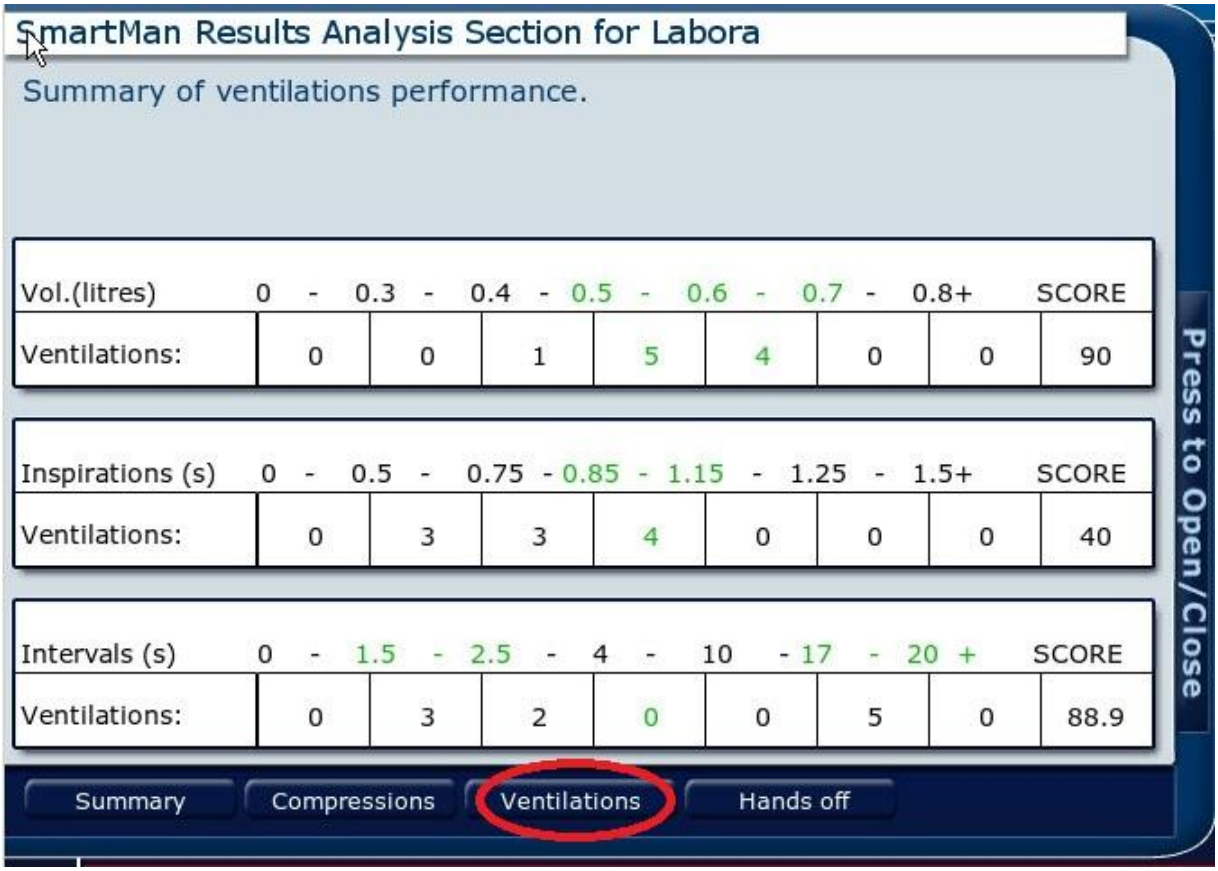
If you click on the Compressions Button you will see the depth, rate and non-release scores grouped by category.



Press the button at the right to close this window and return to the main results display page.

5.4.5.3 Results Analysis – Ventilations Button

This area displays the performance information for volume, rate of inspiration and interval between ventilations grouped by category. The target values are in green with the number performed placed into each category. See the picture below for an example.



Press the button at the right to close this window and return to the main results display page.

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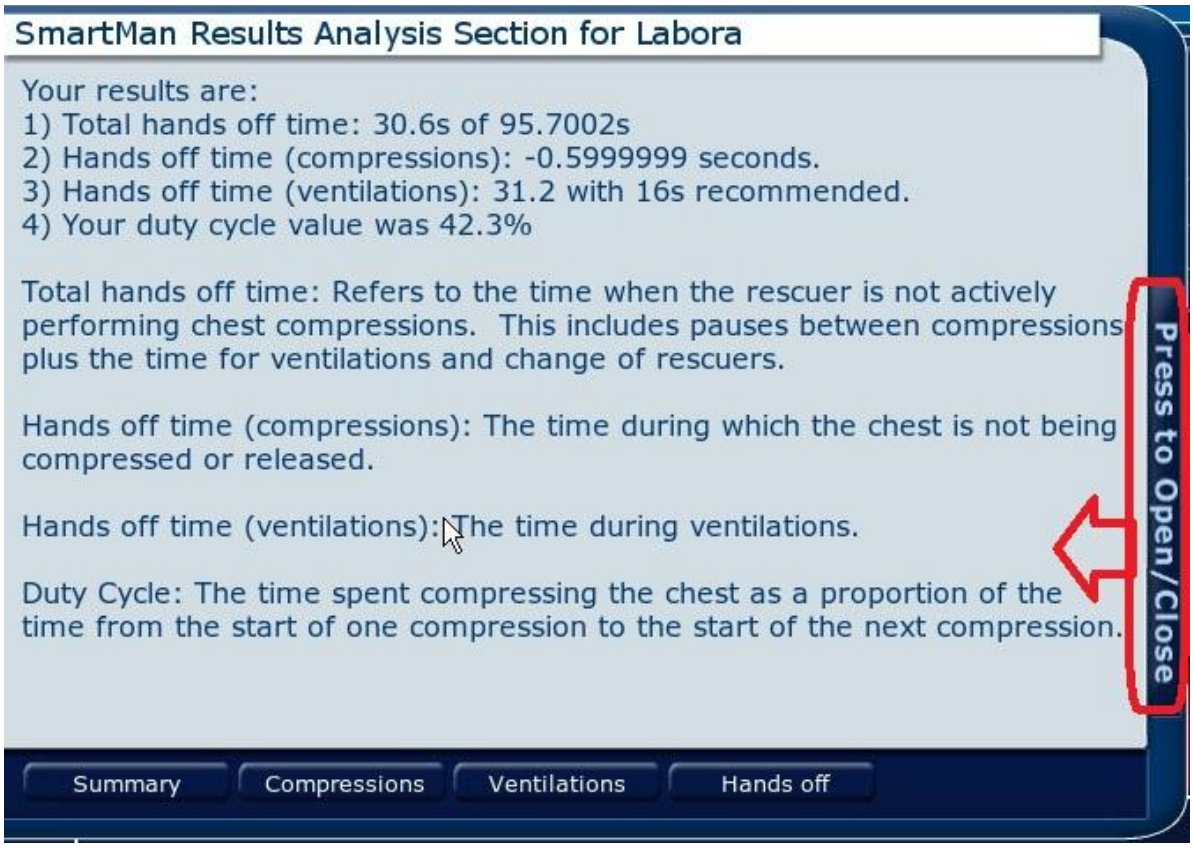
5.4.5.4 Results Analysis – Hands Off Button

The Hands Off and Duty Cycle button provides detailed analysis of the performance related to how long was spent in pressing/releasing the chest, delay times between compressions, and time allowed for ventilations.

The current guidelines specify the importance of spending as much time as possible in compressions. The stress on quality of CPR correlates with what is referred to as Duty Cycle. A lower score is better for the patient. The guidelines site research which shows that a duty cycle below 50% relates to coronary pressure and thus to blood flow through the brain.



This screen provides details on the following points.

Total hands off time: This refers to the time when the rescuer is not actively performing chest compressions. This includes pauses between compressions plus the time for ventilations and, if applicable, change of rescuers.

Hands Off Time (compressions): This refers to the time when the chest is not being compressed and not being released.

Hands Off Time (ventilations): The time taken for ventilations.

Duty Cycle: The time spent compressing the chest as a proportion of the time from the start of one compression to the start of the next compression.

Press the button at the right to close this window and return to the main results display page.

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5.4.6 Other Buttons

The main results page also contains a Print Screen Button and a Print Button.

See the section on "SmartMan Manual - 5. Results 5. Print" for more information on printing a file

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