3.0 Procedure/Instructions for Spirometry & Flow-Volume Measurements

Some equipment requires that the patient first inhale to total lung capacity (TLC) before the mouthpiece is inserted and the forced expiration initiated. Other equipment functions by having the patient insert the mouthpiece prior to inhaling to TLC for the forced expiration. Regardless of the type of machine used, the patient must be actively coached to obtain accurate results.

To obtain maximal values for FEV$_1$ and FVC, you must ensure the patient first inhaled to his/her TLC and then performs the forced expiration with maximal effort. The following is an example of instructions to the patient.

3.1 Pre-test Instructions

- “This is a test which will require your maximal effort.”
- “I am first going to ask you to fill your lungs as much as you can.”
- “Then I will tell you to completely empty your lungs as fast as you can. This will require you to use the muscles in your chest and stomach”
- “I will then repeat the instructions as you go through the test.”

3.2 Instructions during the Patient’s Performance of the Test

With the patient breathing normally, say:

- “After the next breath I want you to fill your lungs as much as you can. Take a big breath in-in-in-keep inhaling.”

At TLC say:

- “Blow-blow-blow, keep blowing, keep blowing, keep blowing, you’re almost empty, keep blowing. That’s good.”
- “Come off the mouthpiece and rest.”
- “We will be doing this a few more times.”

3.3 Recording Results

Repeat the test until the two highest FEV$_1$ and FVC results agree within 200 ml.

For patients with moderate to severe airway obstruction, a forced expiration can take more than 10 seconds. It is important to continue until the expiration is complete.

At least three FVC tests should be done and two of these should have FEV$_1$ and FCV values which agree with the other FEV$_1$ and FVC values to within 200 ml. It is acceptable to select the highest FEV$_1$ and the highest FVC from different tests, but with some automatic machines you may not be able to do this. Sometimes more than three tests must be done to satisfy yourself that you have obtained the maximal effort from the patient.

3.4 Cautionary Note
Some patients with asthma may develop bronchospasm during FVC testing. These patients show a progressive decrease in FEV$_1$, and usually in FVC as well, as repeat tests are done. In these patients the first test will usually give the best results and you will not be able to achieve reproducibility. If you suspect test-induced bronchospasm, give the patient without contraindications a β$_2$ agonist and, 15 minutes later, repeat the FVC test. You should see an improvement in FEV$_1$ over the lowest prebronchodilator value but FEV$_1$ might not reach the highest prebronchodilator value.