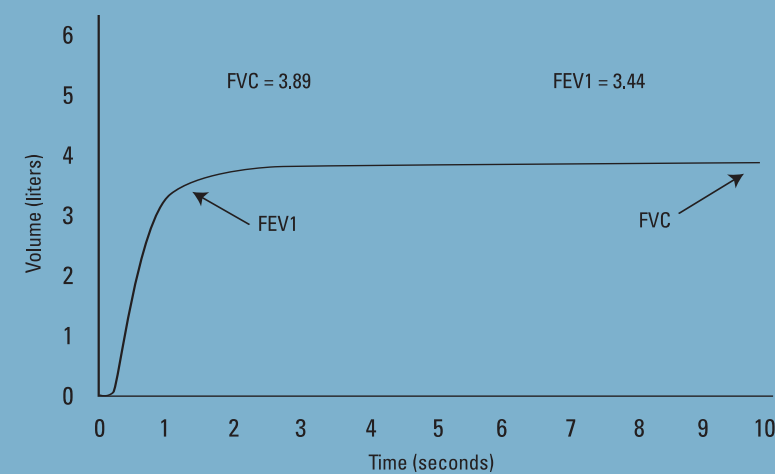


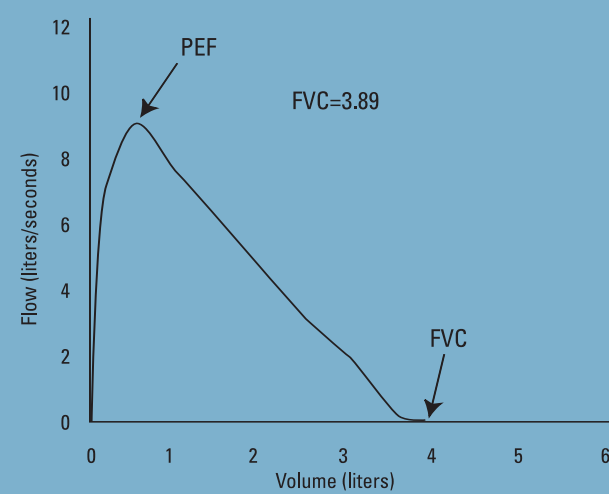
Spirometry Effort Acceptability & Reproducibility

An acceptable effort is defined as free from error and artifacts. A reproducible effort is defined as being without excessive variability. Criteria for determining whether efforts are acceptable and reproducible are outlined below.

Normal Volume Time Curve



Normal Flow Volume Curve



Flow volume curves exhibit a sharp initial peak flow close to the "Y" axis, then a relatively straight descent at 45° to the baseline. Volume time curves show an obvious plateau of at least 1 sec after 6 seconds of exhalation.

Patient Preparation

We recommend that you practice the procedure with the patient before starting the test, but first, you should prepare the patient for the procedure:

- Patient may sit or stand.
- Patient should loosen tight clothing.
- Patient should elevate chin and extend the neck slightly.
- Patient should use a nose clip or pinch his/her nostrils with fingers.

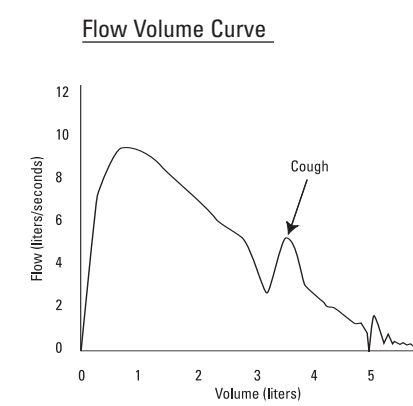
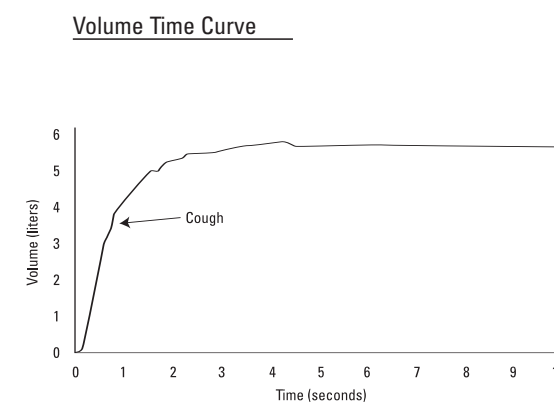
Patient Coaching

- Place the flow transducer in your mouth, on top of your tongue & between your teeth.
- Close lips and teeth around the flow transducer to create a tight seal, like if you were blowing in a musical instrument.
- Keep your chin slightly elevated and make sure that your tongue is out of the flow transducer.
- Take a good deep breath.
- Now BLAST into the flow transducer as hard, fast and completely as possible.
- Keep blowing, squeeze all the air out.
- Stop.

Reproducibility Criteria

- Largest FVC should be within 5% of the next largest FVC.
- Largest FEV1 should be within 5% of the next largest FEV1.
- Must meet criteria for acceptability.

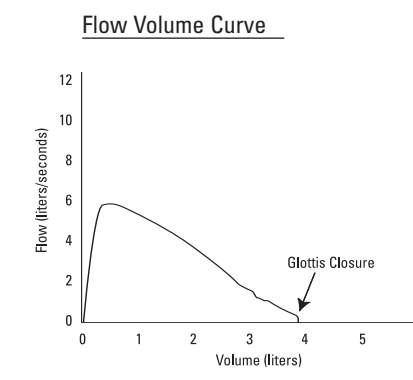
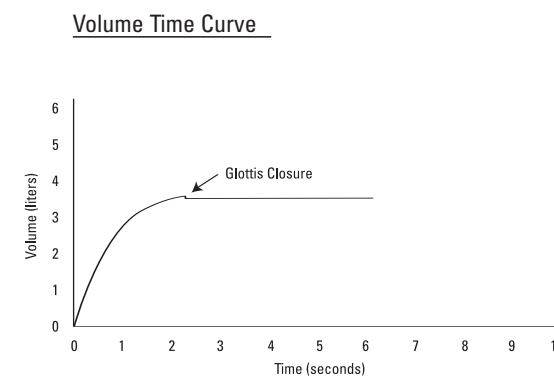
Inaccurate Results From Coughing



Coughing

Coughing during the first second may affect the FEV1. Both volume time and flow volume curves show dips instead of smoothly formed lines.

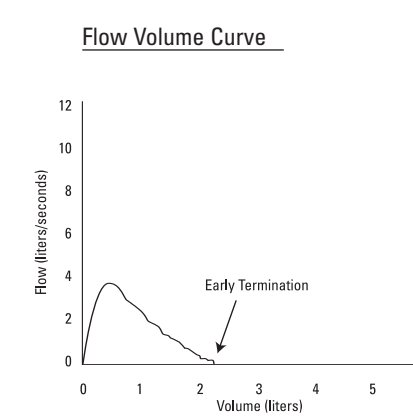
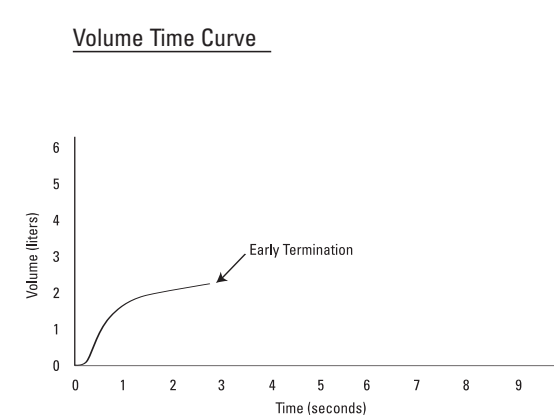
Inaccurate Results From Glottis Closure



Glottis closure

The flow of air is temporarily completely cut off. Both curves stop abruptly. An artificial plateau is reached on volume time curves, with a bend where the effort stopped.

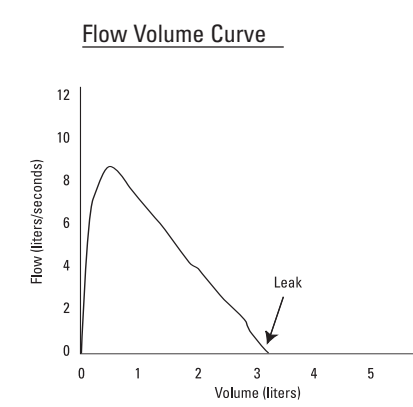
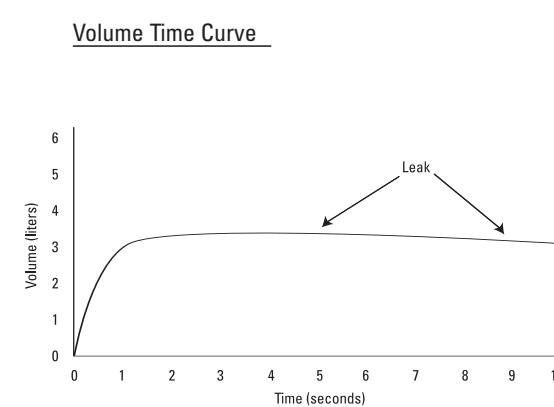
Inaccurate Results From Early Termination



Early termination (< 6 sec)

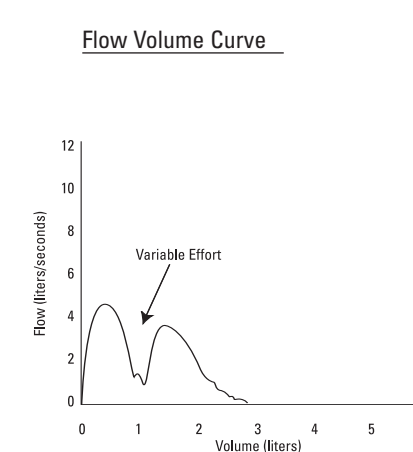
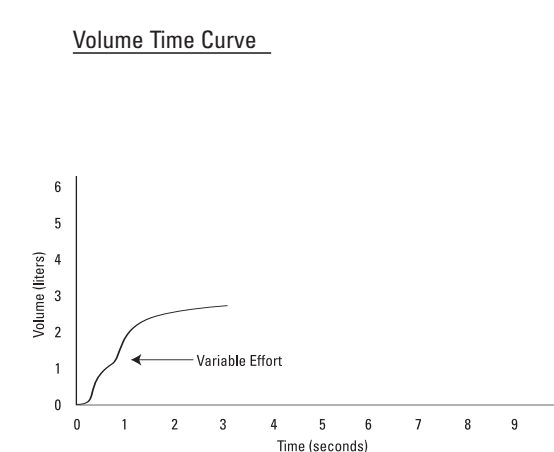
No obvious plateau is reached on volume time curves and the exhalation is less than 6 seconds. Flow volume curves show a low total volume with flow dropping sharply at the end of expiration.

Inaccurate Results From Leaks



Air leak can happen around the flow transducer or from the nose. Volume time curves drop instead of reaching a plateau. Flow volume curves backtrack at the end.

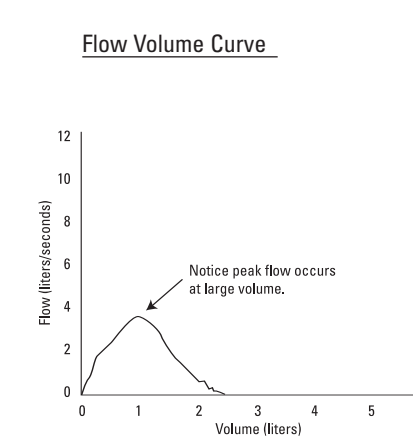
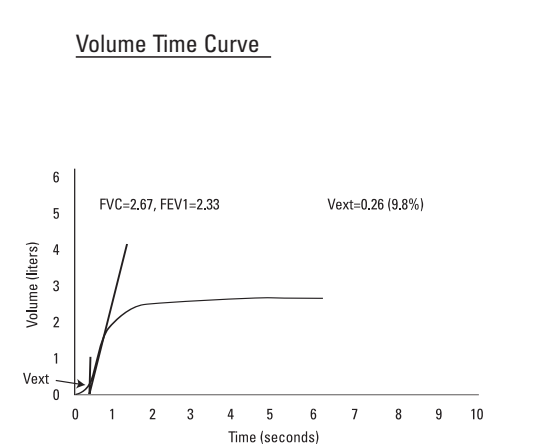
Inaccurate Results From Variable Effort



Variable effort

The patient forced out the air at an inconsistent rate. Both curves show dips similar to those for a cough, making it difficult to distinguish between the two conditions. Tracings are unacceptable if cough or variable effort occurred during the first second.

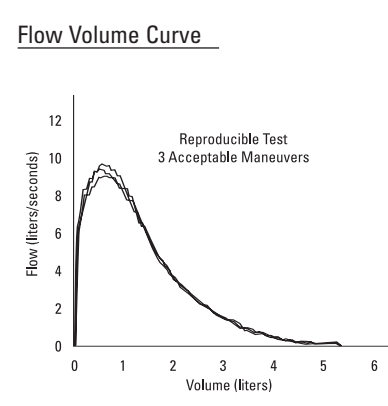
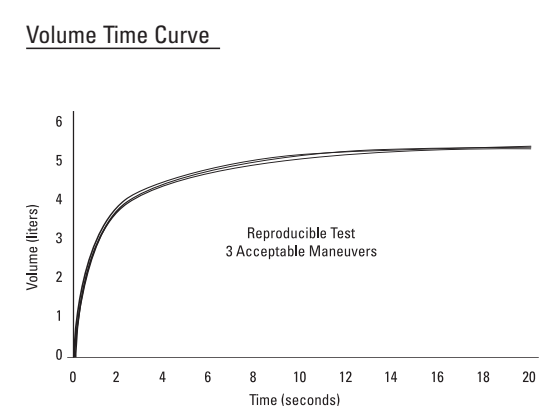
Inaccurate Results From Hesitation



Hesitation, False Start or Excessive Extrapolated Volume

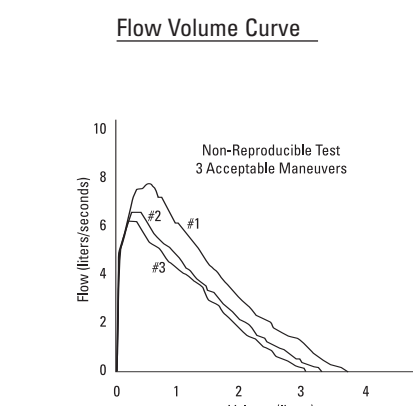
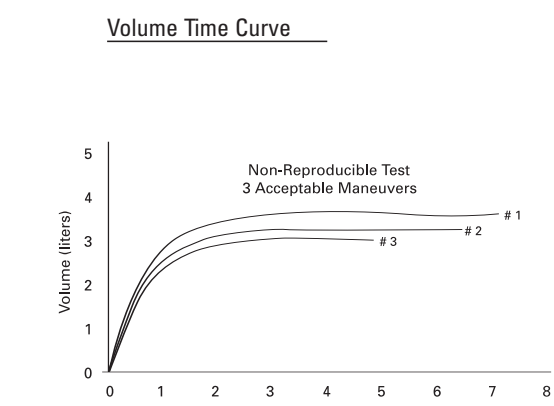
The patient did not exhale as forcefully as possible at the start of the effort. Volume time curves start slowly instead of climbing sharply. The peak of the flow volume curve is displaced to the right, away from the vertical axis.

Example of Non-Replicable and Reproducible Spirometry Test



Reproducible test

This example shows a reproducible test with 3 acceptable curves. The 3 FVC efforts are within 5% of each other, which indicates that the patient inhaled completely before each expiration.



Non reproducible test

This example shows a non-reproducible test with 3 acceptable curves. Note the obvious variability in the FVC size of the curves, most likely due to an incomplete inhalation. Coach the subject to take a deeper breath in before performing the FVC maneuver.