

Display Sample Test Spirograms

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© Hankinson Consulting, Inc.

P.O. Box 3905

Valdosta, GA 31604-3905

229-253-9344

info@hankconsulting.com

www.hankconsulting.com

Introduction

One of the most critical skills in performing spirometry is the task of observing test results, and particularly the shapes of the volume-time and flow-volume curves, and providing the subject with the appropriate coaching instructions based on the technician's observations. In most spirometry course environments, very few poor efforts are observed because most students usually know how to properly perform the FVC maneuver. So, this training material contains a series of 40 spirometry tests, and specifically individual curves, are displayed in the order they were performed. All 40 sample tests were performed by actual subject in epidemiological studies like NHANES III. The best use of these sample tests is for the instruction to display each curve of a tests and have the students provided the appropriate instruction(s) or determine if the test has been satisfactorily completed.

Software Installation

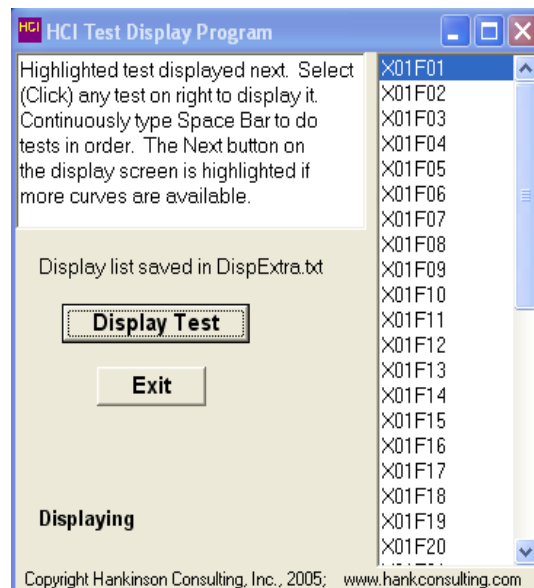
If the software is distributed to you on a CD, it may be installed by simply inserting the CD into your CD-drive. If the installation process does not auto-start, run the executable file **TDInstall.exe** located in the root directory of the CD. If you are installing the software from an FTP-site, download the file TDInstall.exe and execute this file to install the software. An icon will appear on your desktop screen, which when clicked, will start the **Test Display** software.

Program Operation

The main program is started by clicking the icon located on your desktop. When the program is started the Display Tests Screen is shown, see figure on right.

The list box on the right of the screen shows all of the test session available for display. You may select any of these test session by clicking on the appropriate test identification (**X01F03** for **Exercise 11-3**). When the **Display Test** button is clicked, the selected test will be displayed. The test following the previously displayed test will be automatically selected when you complete your test display and return to the main screen.

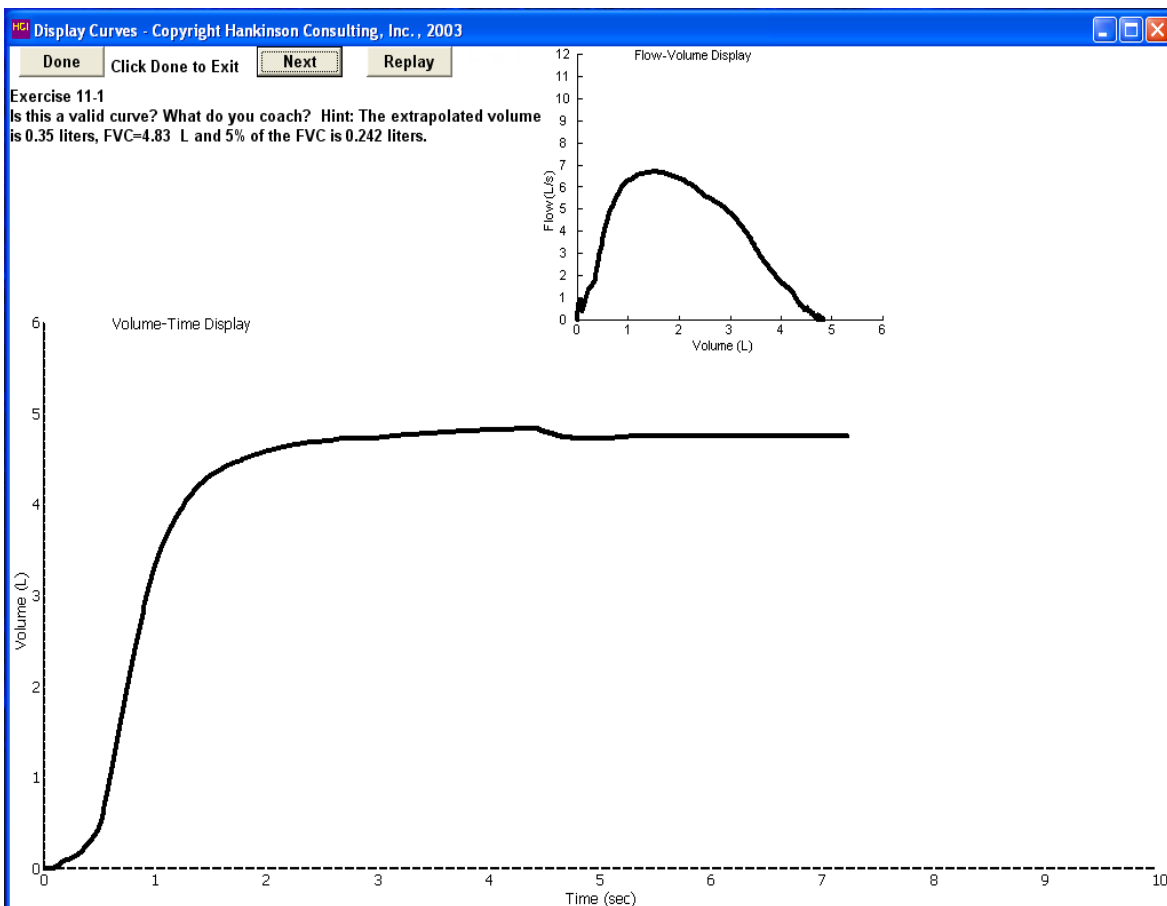
You can control the order of the test display and/or remove tests by editing the text file DisplayTest.txt located in the program



directory. Simply rearrange the test identification numbers or delete the identifications numbers you do not wish to have displayed.

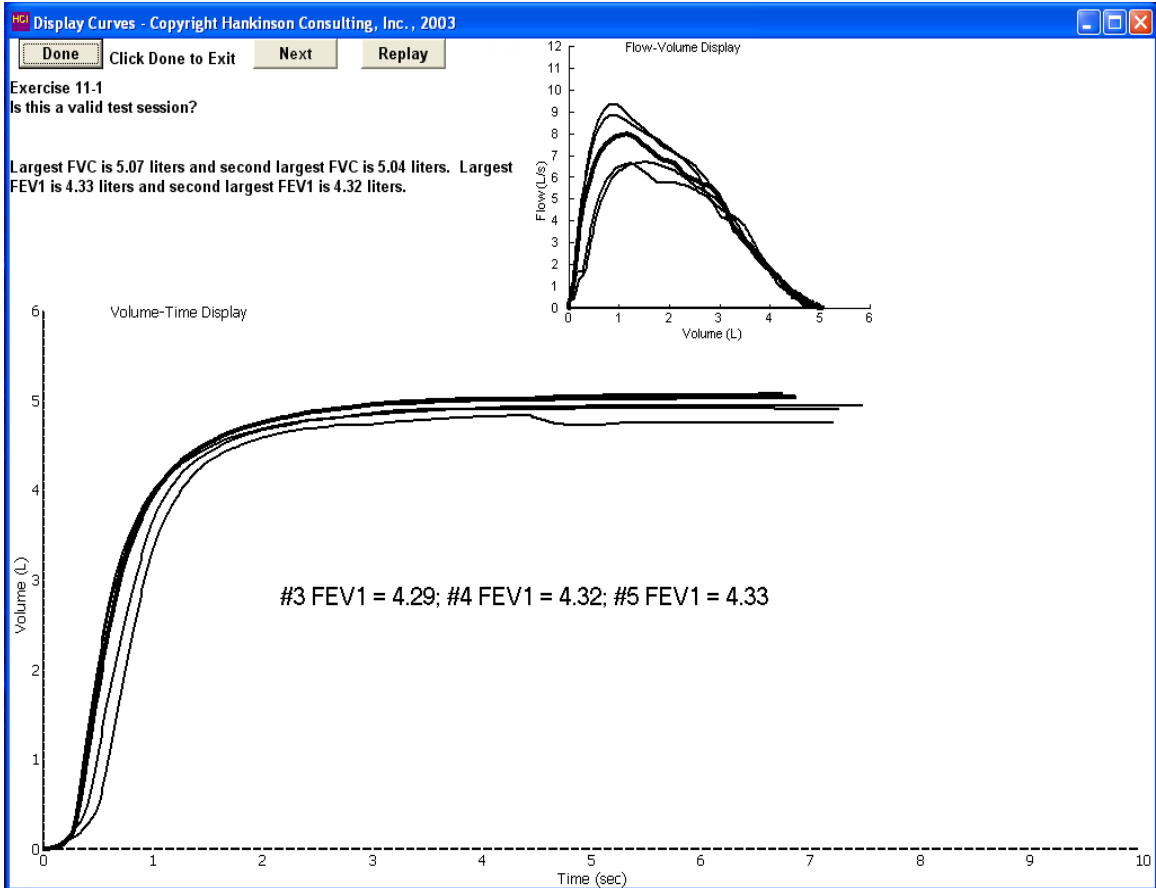
When the **Display Test** button is clicked, the **Test Display Screen** will appear (Figure 2) where you can step through the various curves. Suggested questions are provided as well as any relevant numbers needed to determine the best coaching instruction. Although some comments are provided below, the instructor, who should be an experienced technician, should provide the appropriate instruction or comments for the students as each curve is displayed.

You can determine if another curve is available by looking at the “**Next**” button. If another curve is available, the “**Next**” button will be highlighted as shown below. You may ask the students to provide the best coaching instruction as each individual curve is added to the test session. For example, the curves in Figure 2 show excessive hesitation and the subject should be coached to **Blast the Air Out**. When you are done reviewing the test, click the “**Done**” button to return to the **Display Test Main Screen**.

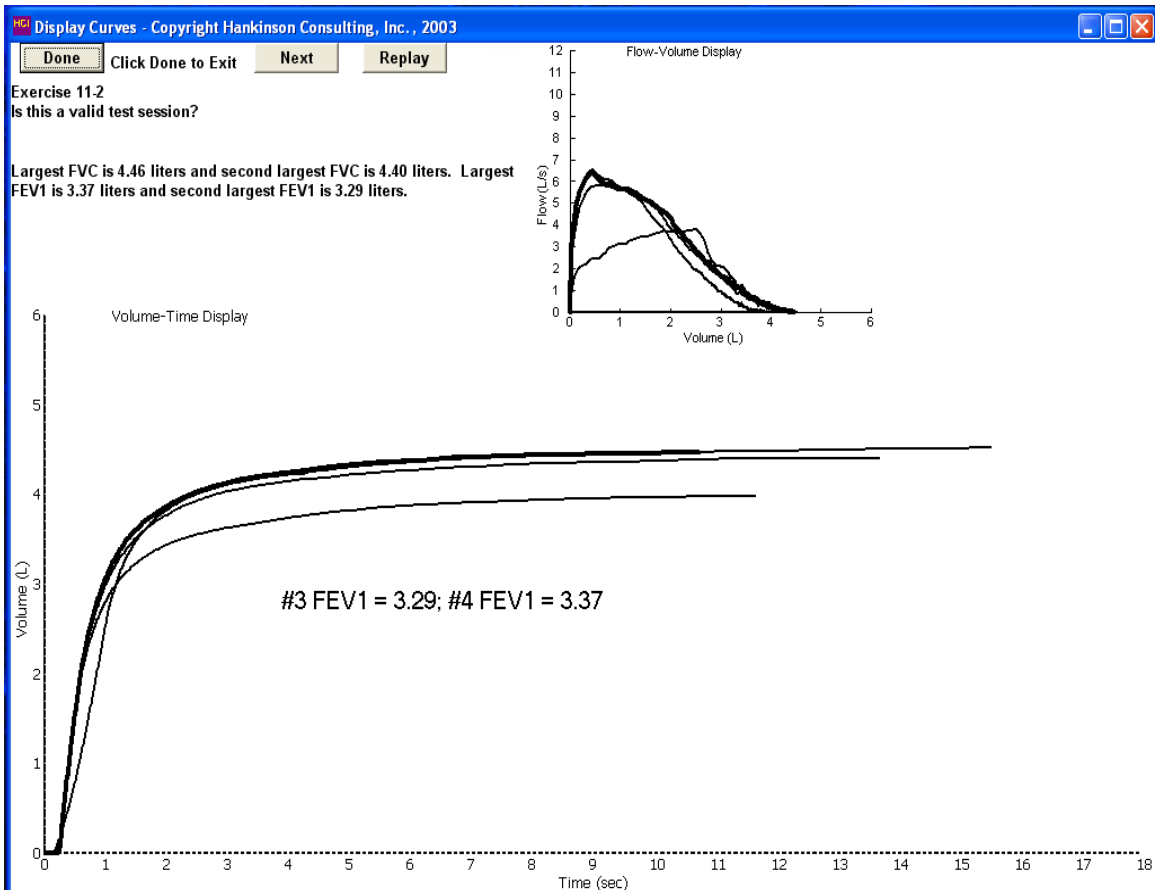


Exercise 11-1 Sample first curve displayed, coach blast the air out.

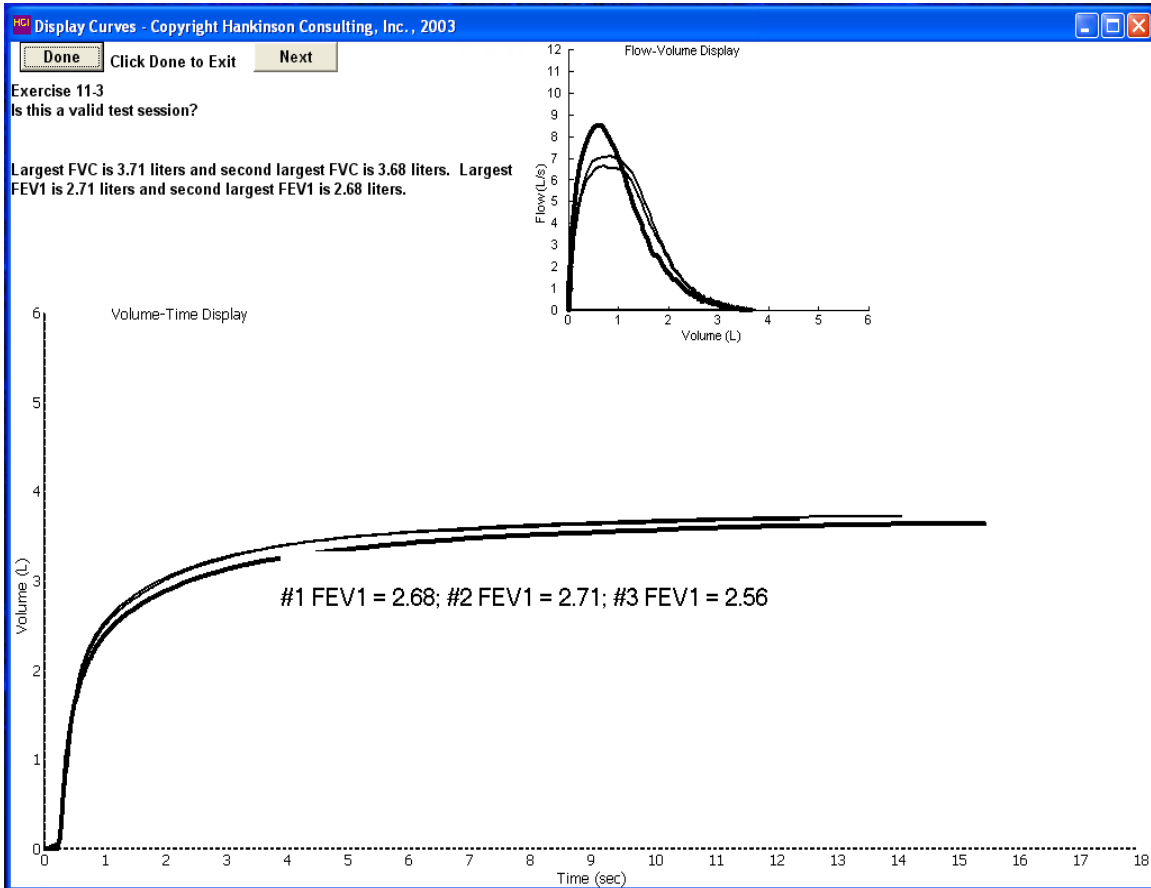
The following figures provide a description of each of the 40 tests available for display. All of the curves are displayed as would appear after the test has been completed. Sometimes the subject refused to provide more maneuvers and the test is not valid.



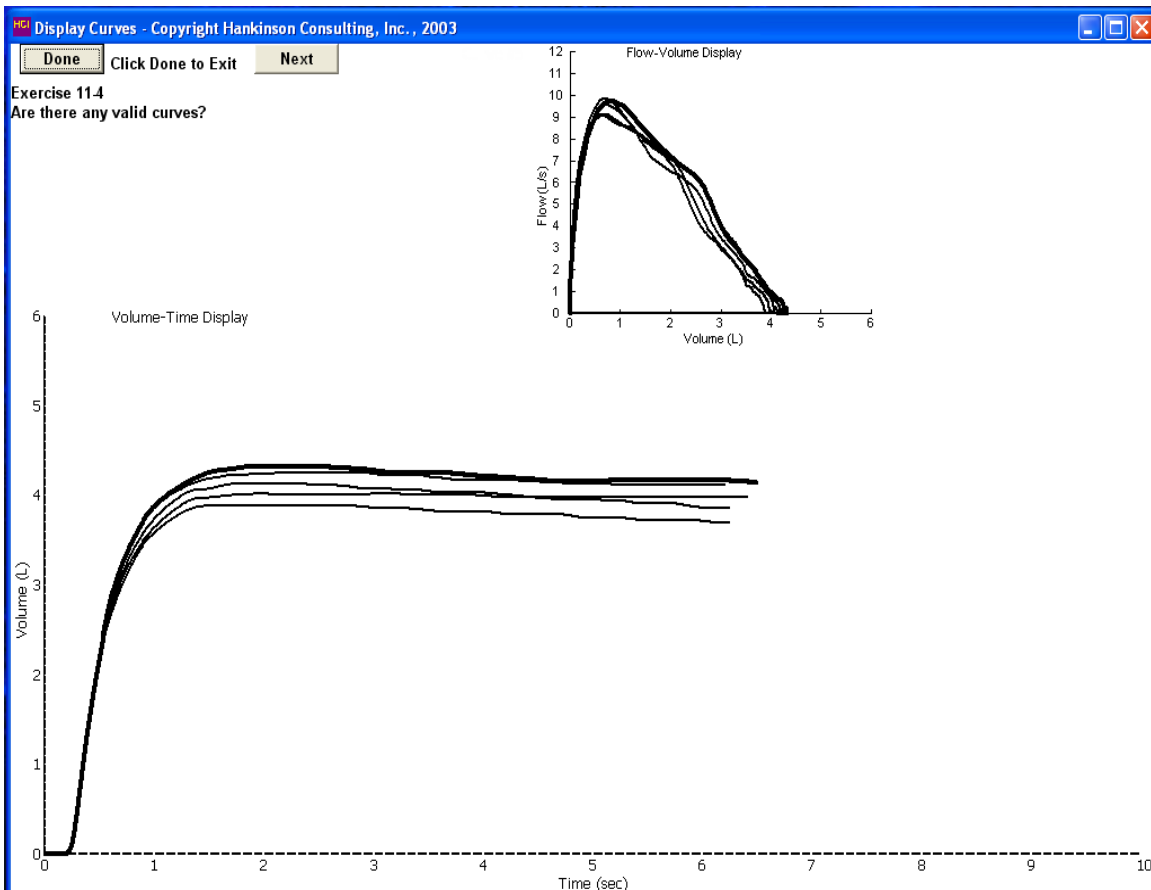
Exercise 11-1. Coach blast the air out.



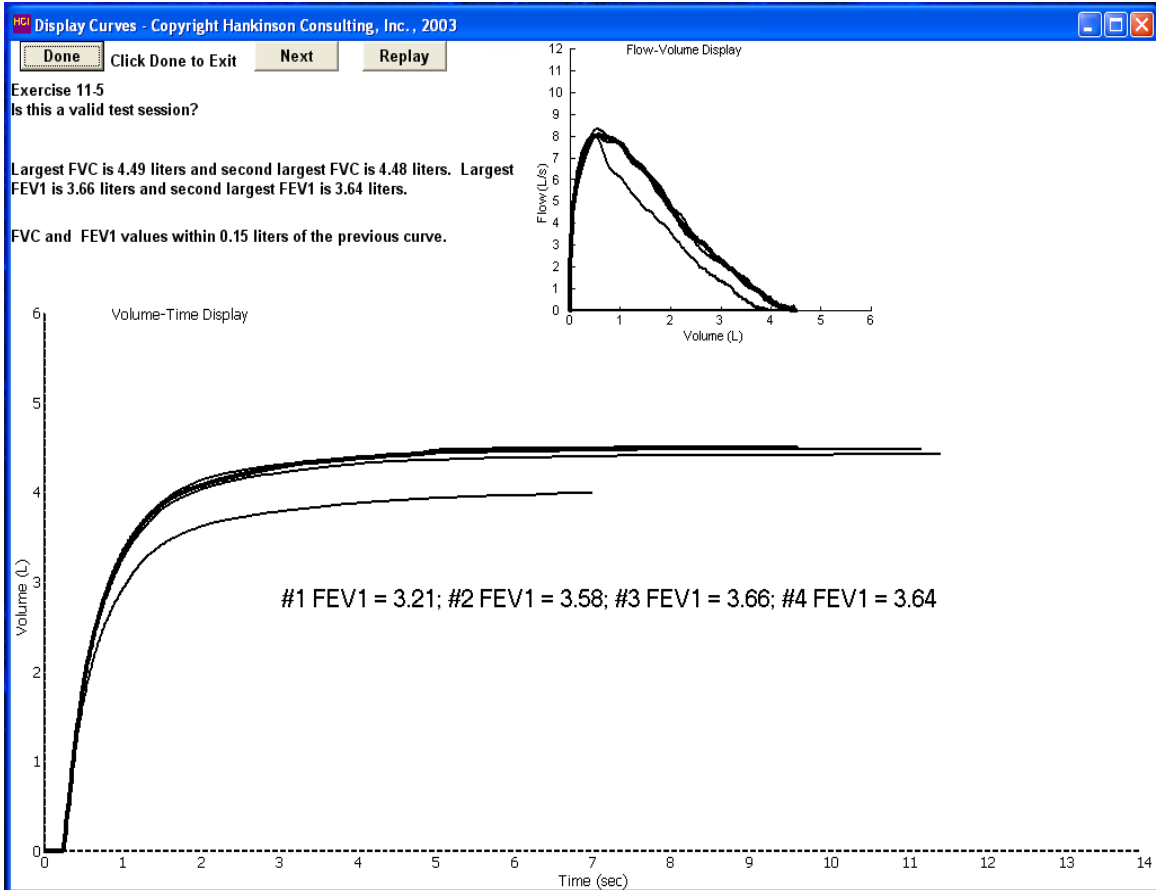
Exercise 11-2. Coach blast air out and take a deeper breath.



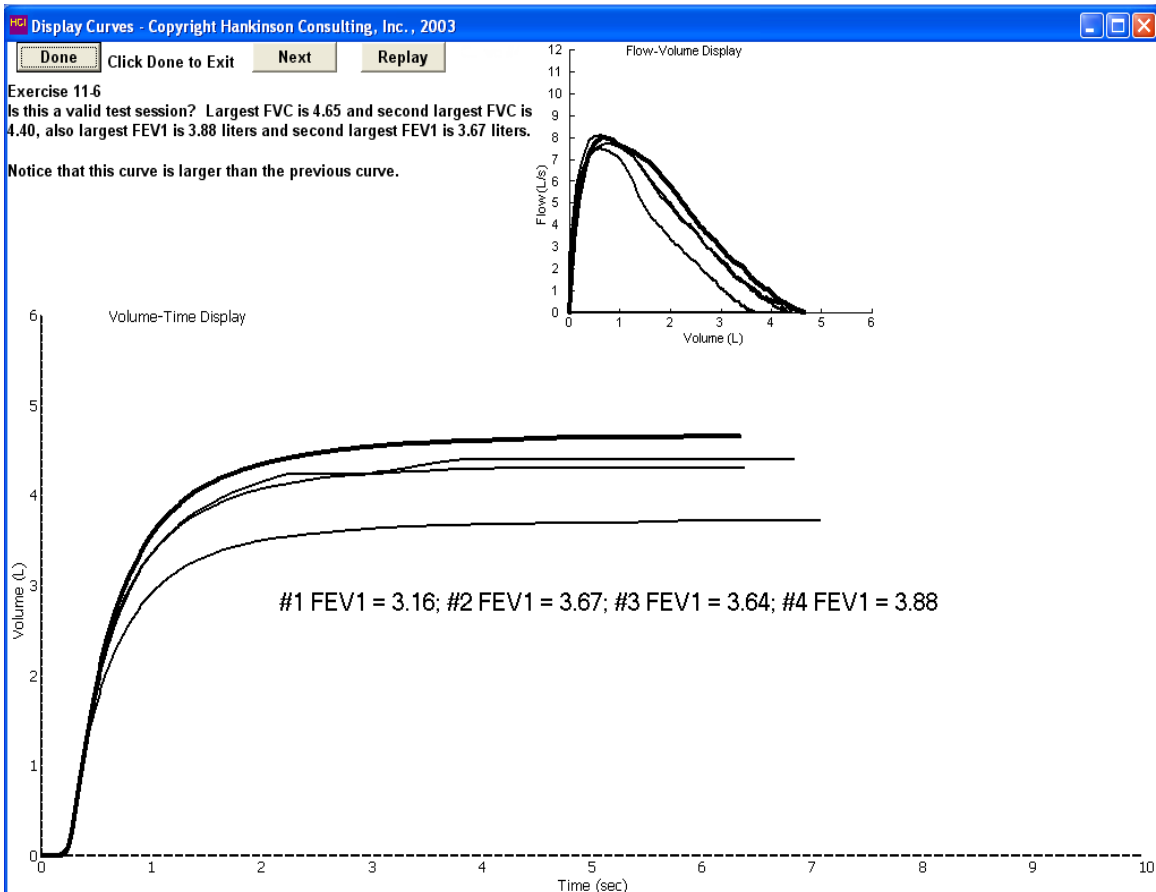
Exercise 11-3. Good repeatable test.



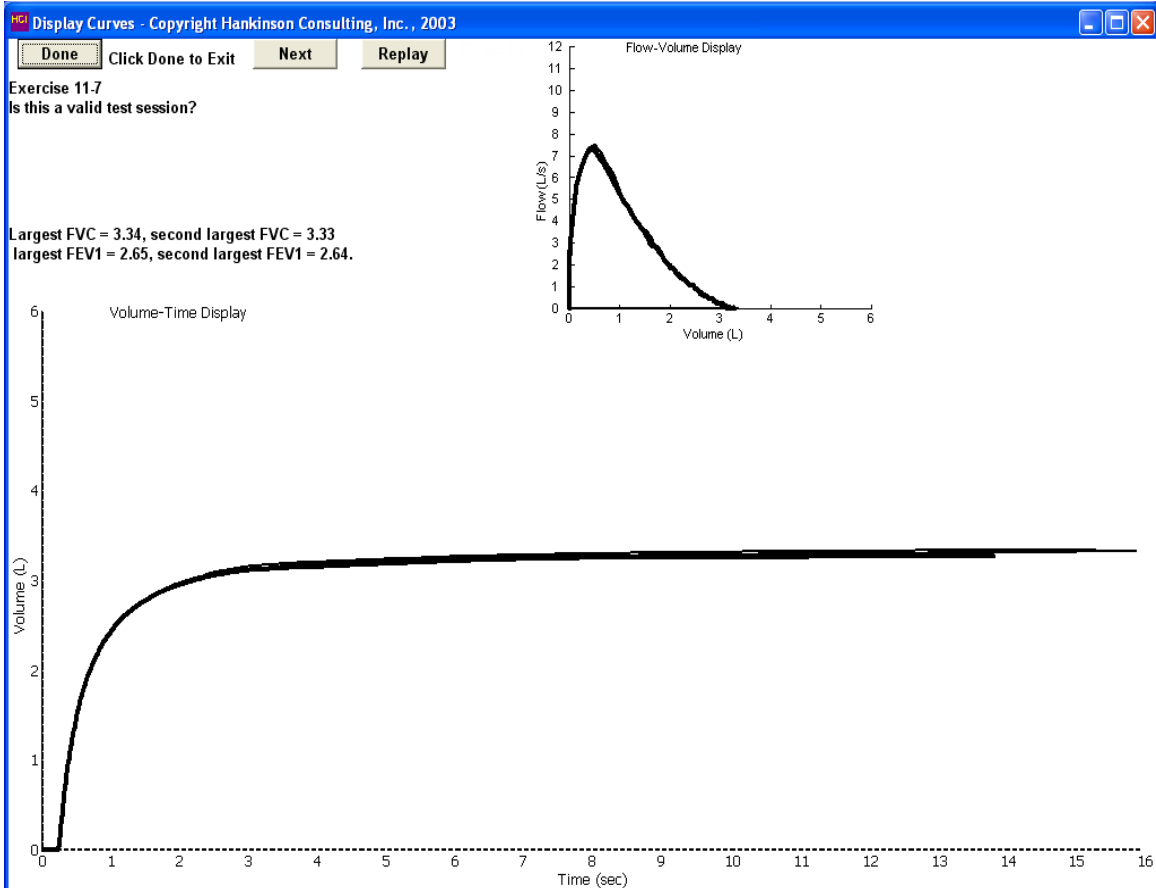
Exercise 11-4. Possible leak, check mouthpiece seal or spirometer for a leak.



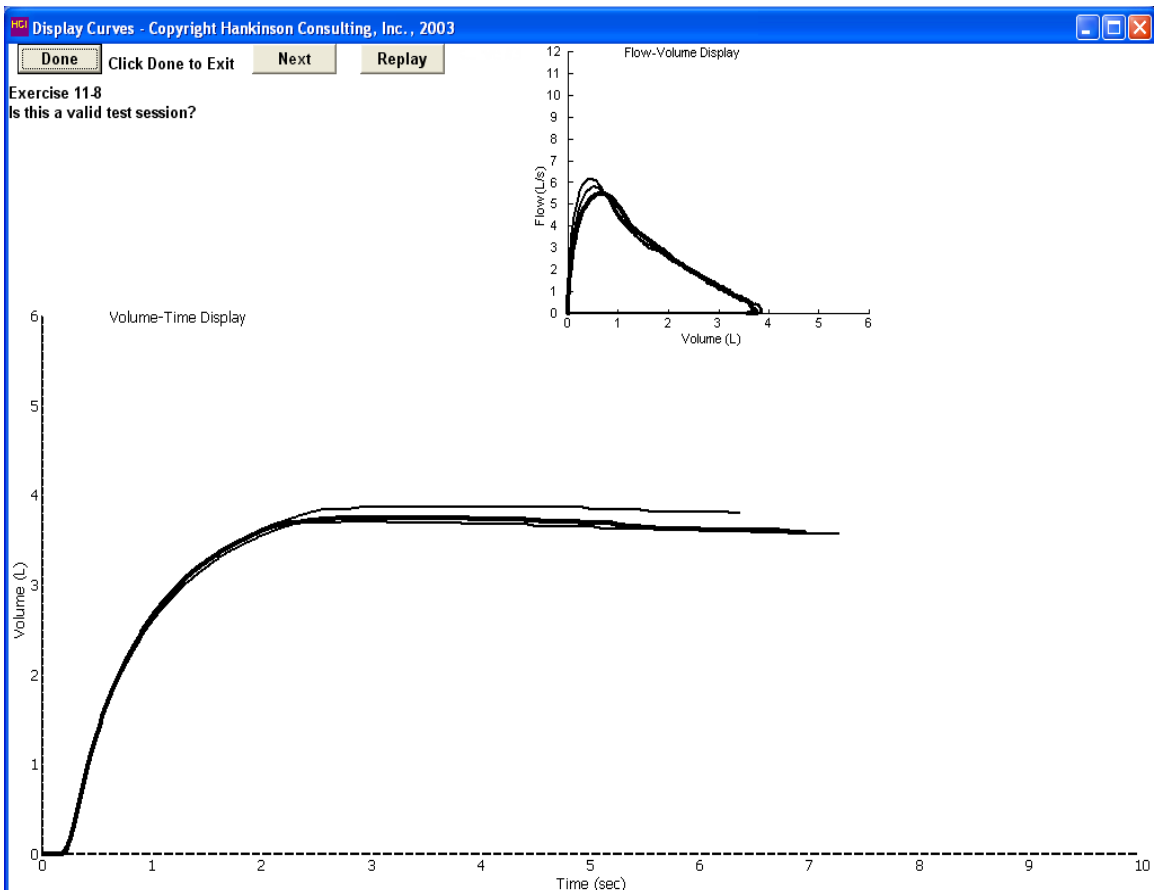
Exercise 11-5. Coach take a deeper breath.



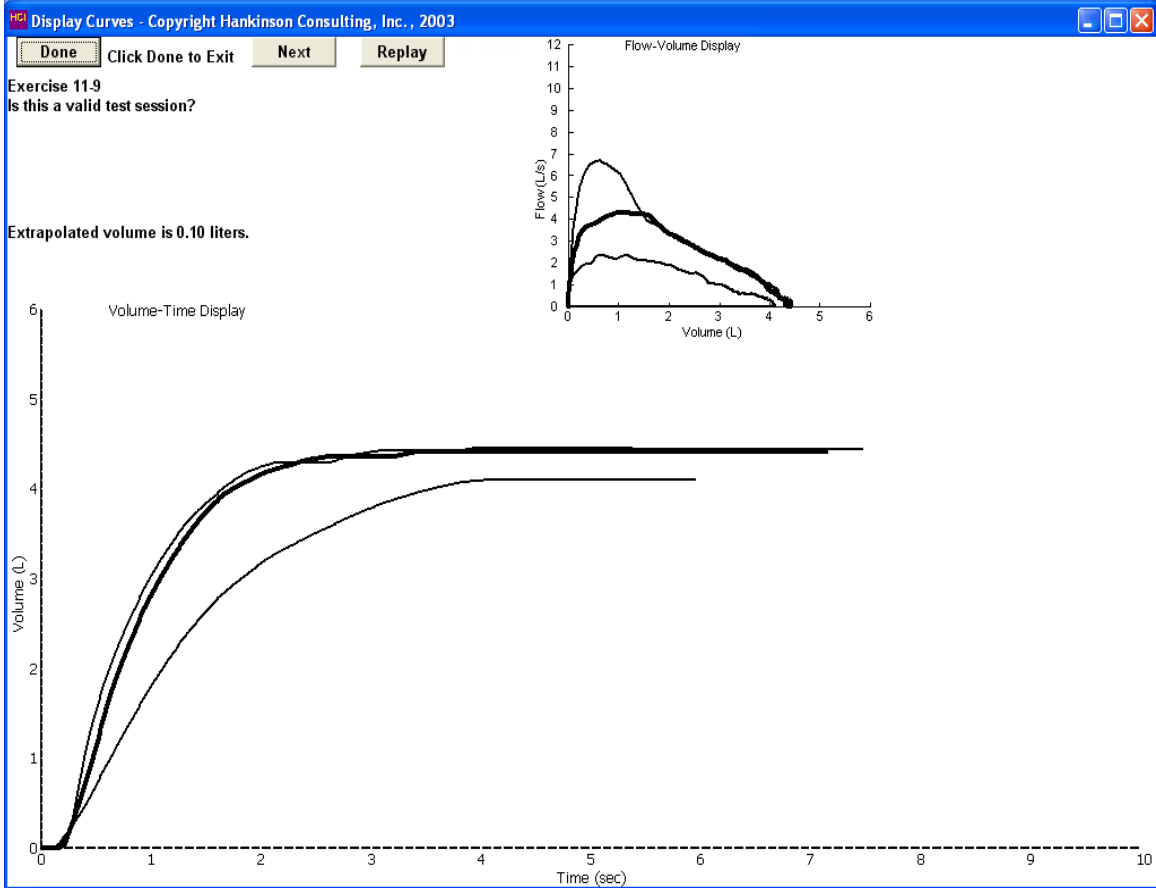
Exercise 11-6. Coach take a deeper breath.



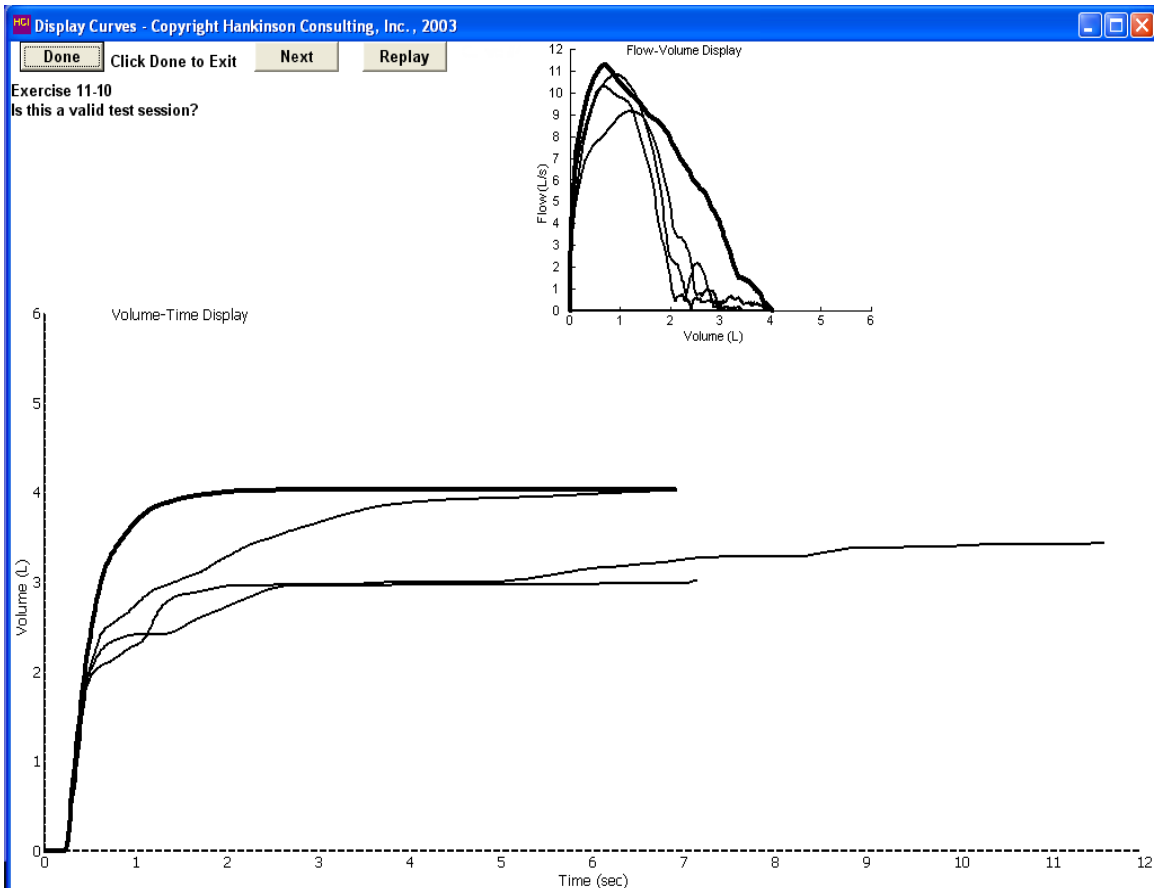
Exercise 11-7. Example of a really good test.



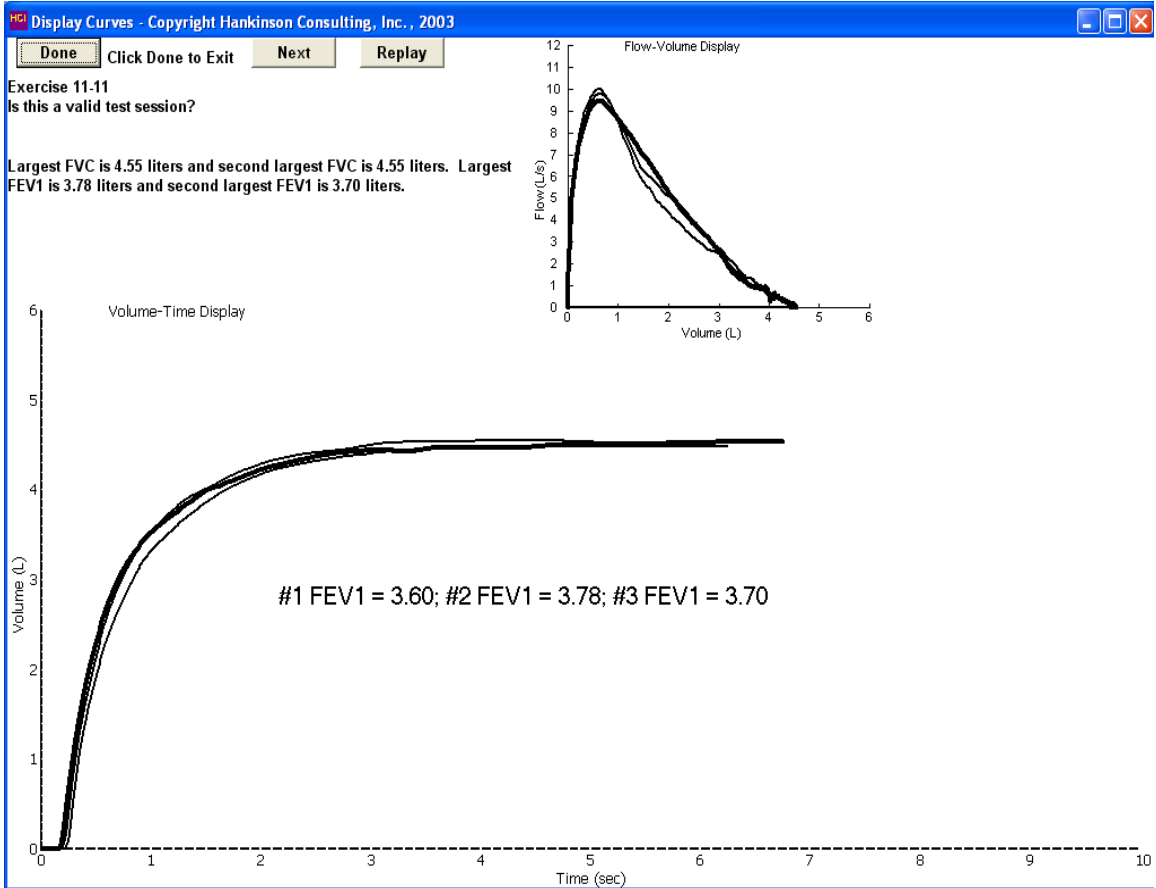
Exercise 11-8. Possible leak around the mouthpiece or in the spirometer.



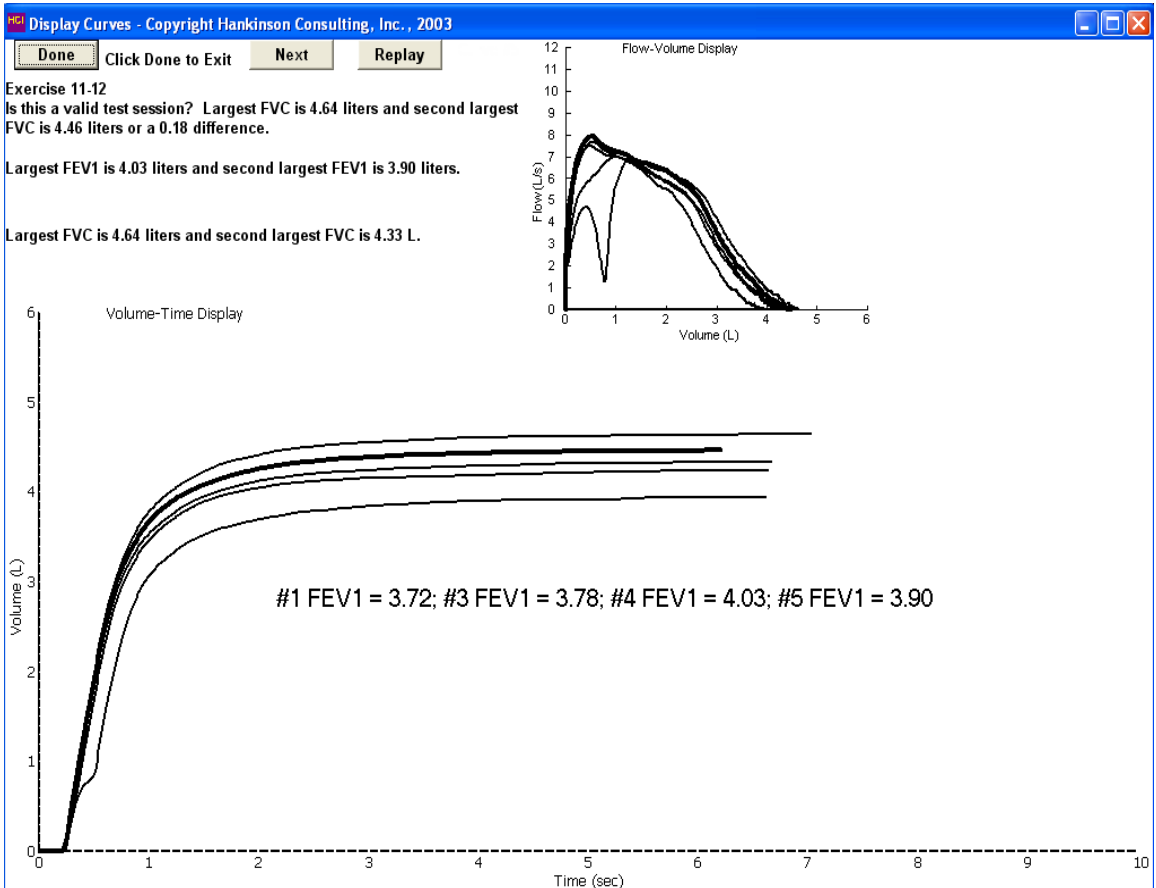
Exercise 11-9. Coach blast the air out.



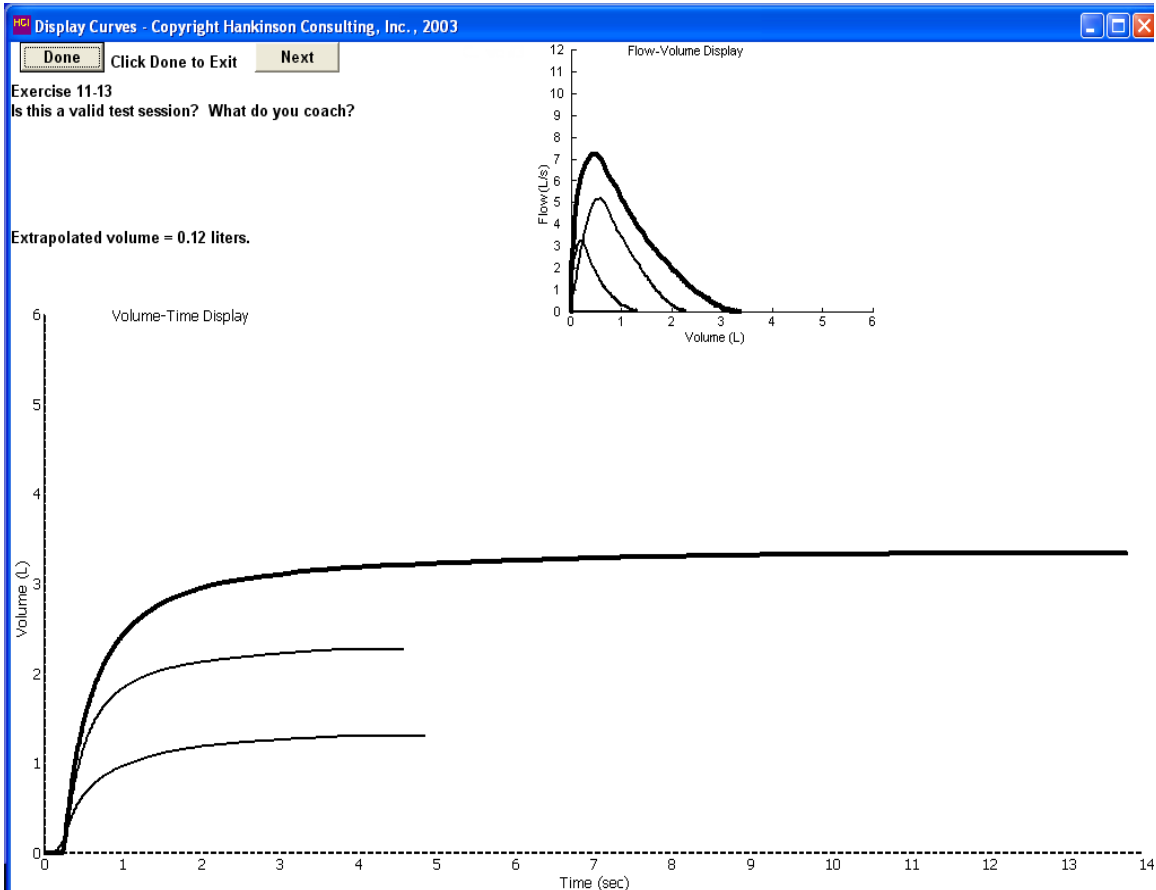
Exercise 11-10. Possible dentures or tongue in the mouthpiece.



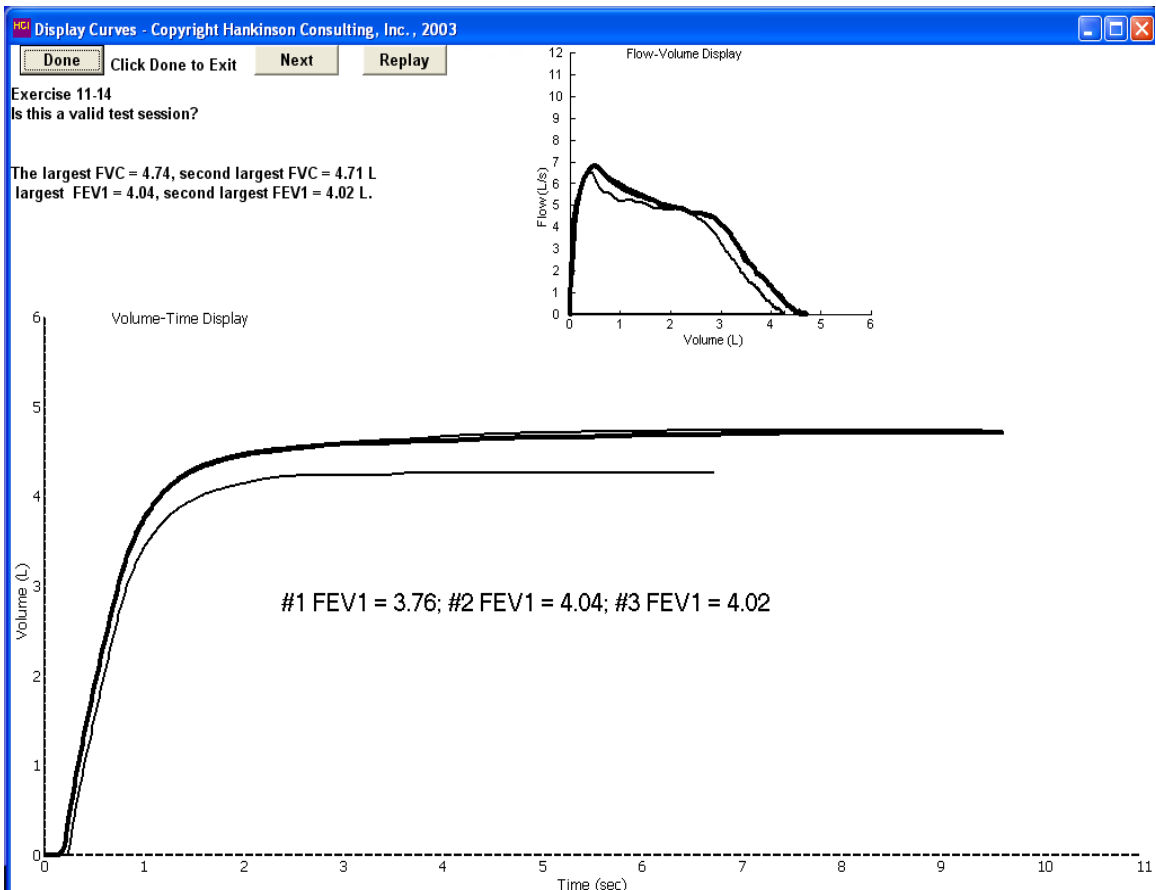
Exercise 11-11. Good repeatable test.



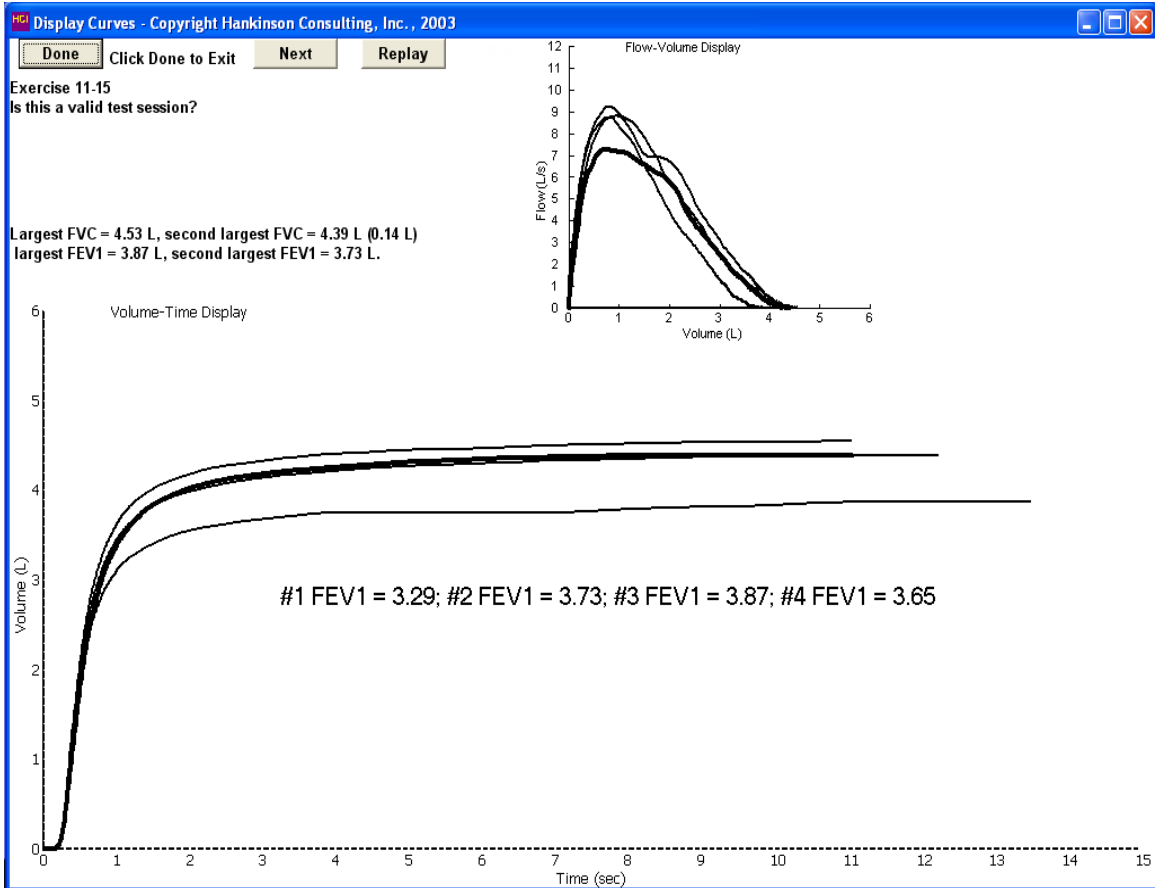
Exercise 11-12. Coach take in deeper breath and blast air out.



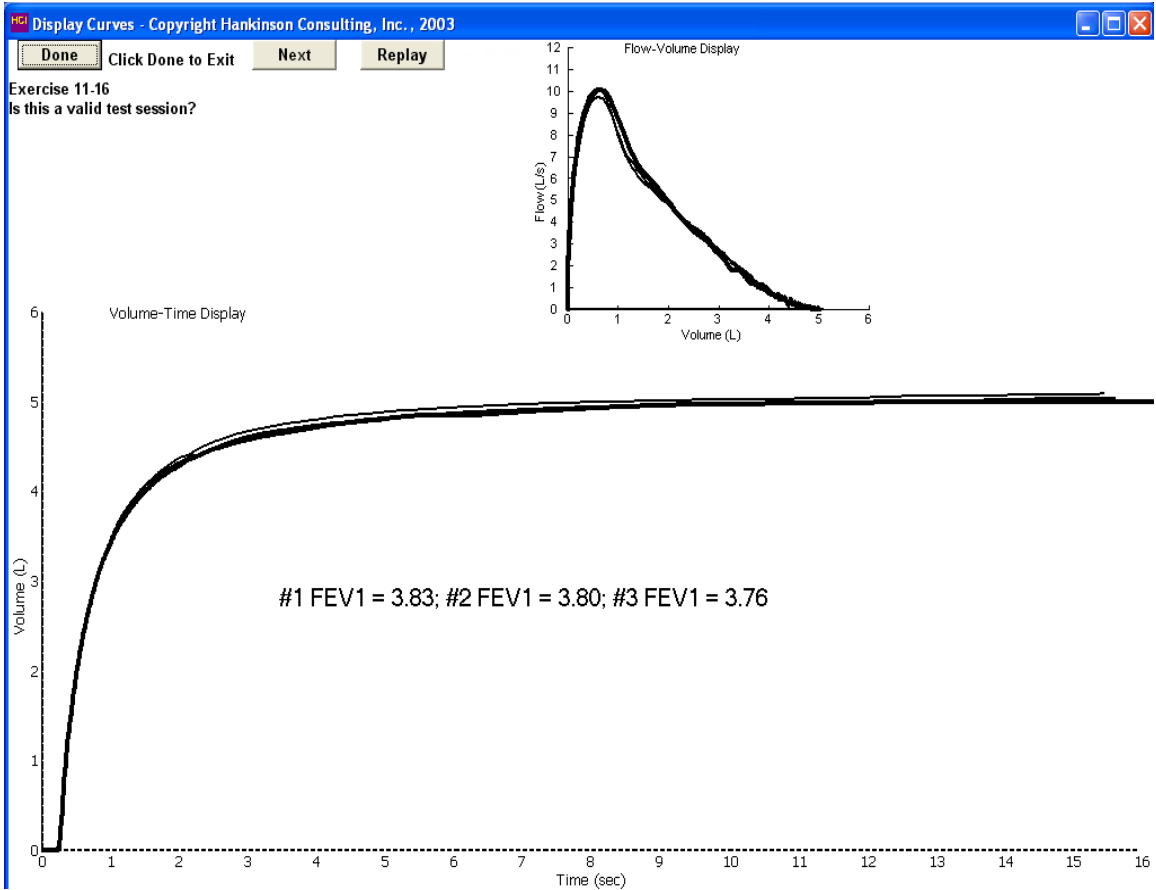
Exercise 11-13. Varying inhalation volumes, coach take in a deeper breath.



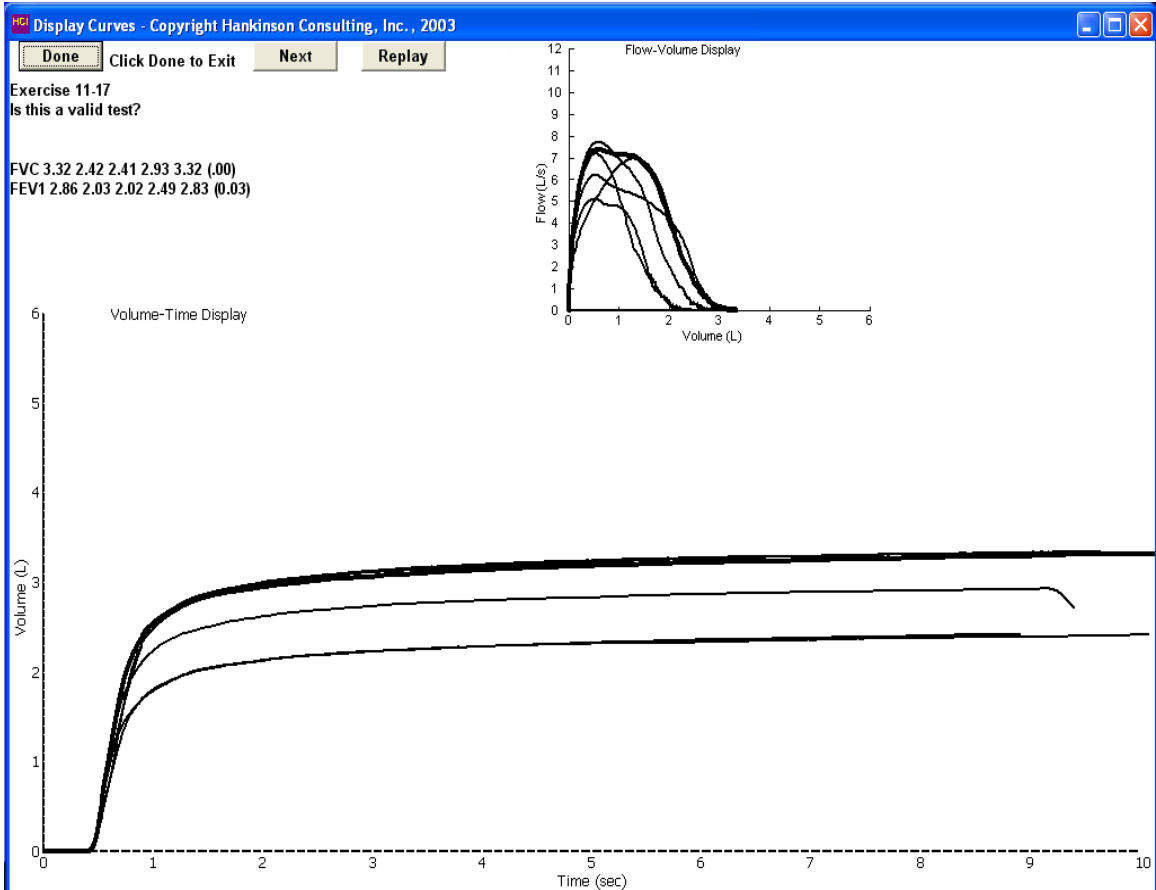
Exercise 11-14. Unusually flat flow-volume curve could indicate large airway obstruction, dentures, or collapsed mouthpiece.



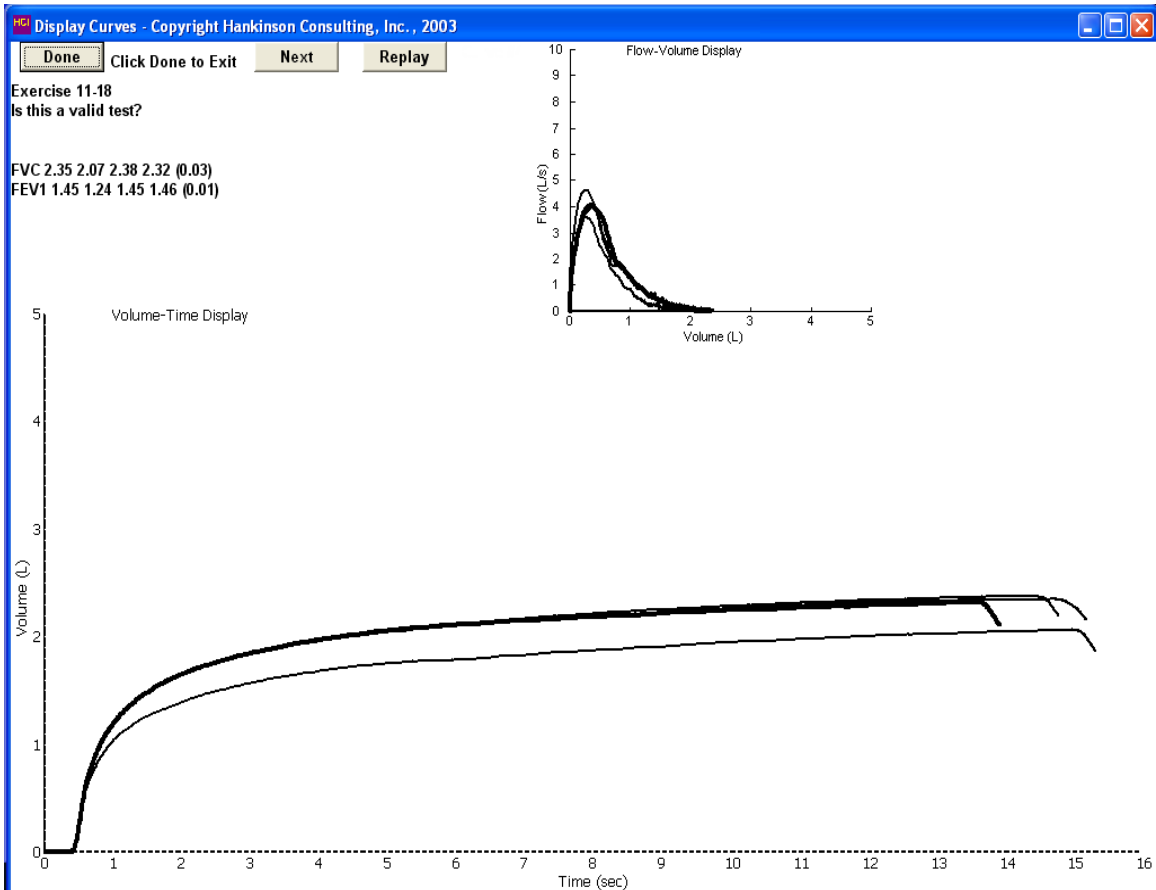
Exercise 11-15. Coach take in a deeper breath.



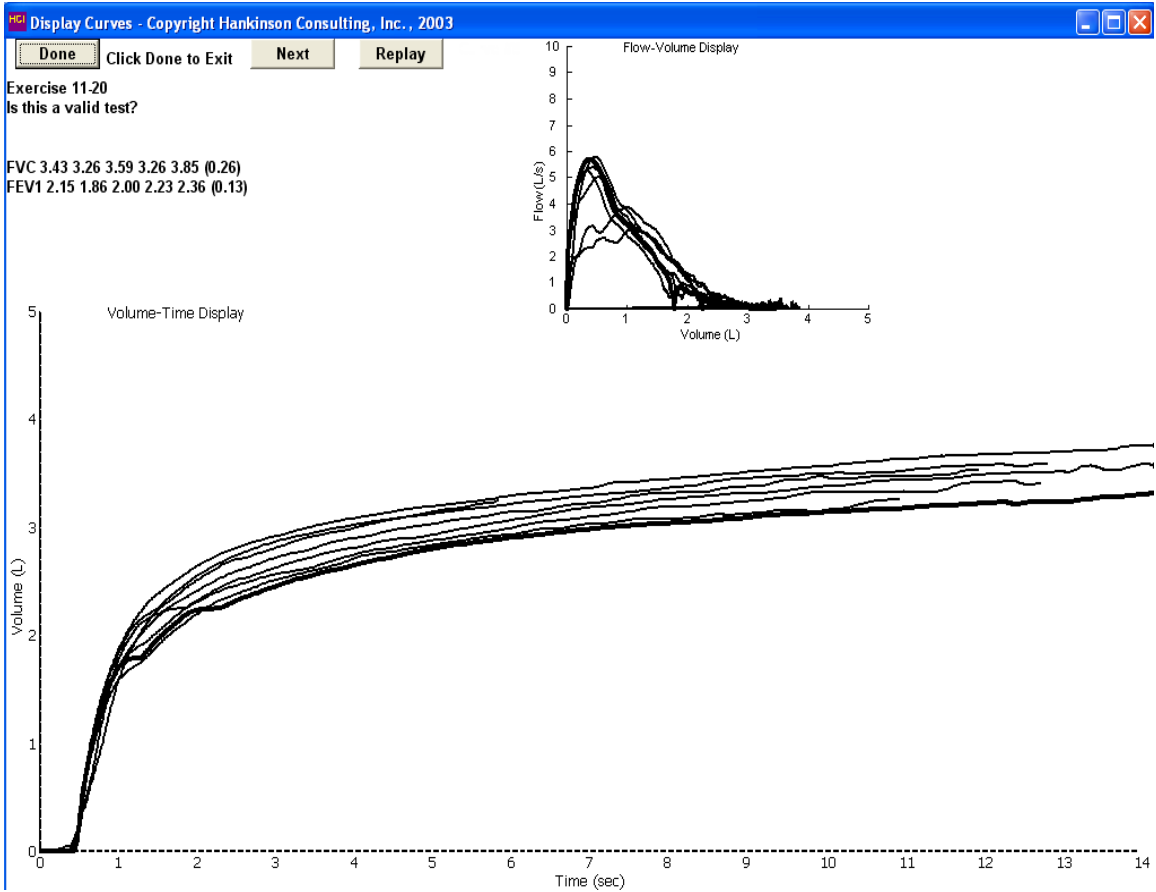
Exercise 11-16. Example of good repeatable test.



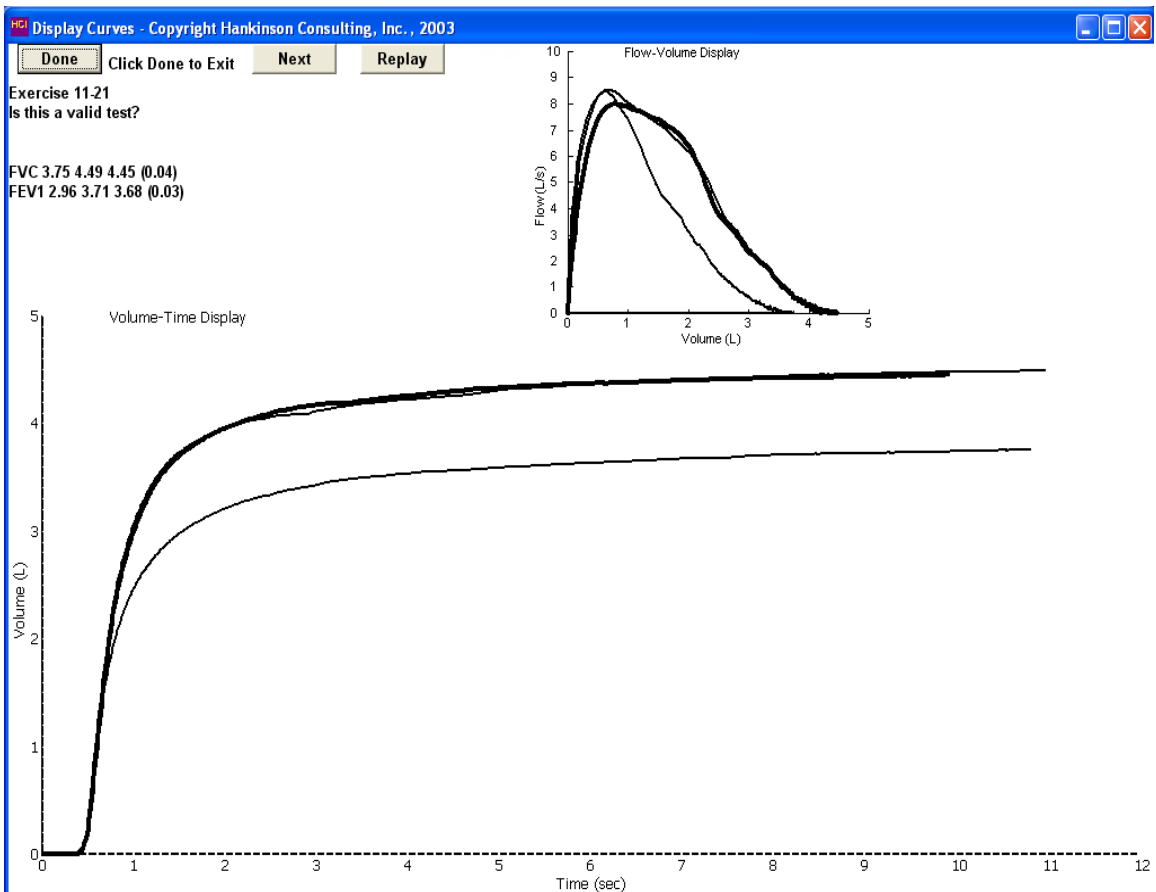
Exercise 11-17. Coach take in a deeper breath and blast the air out.



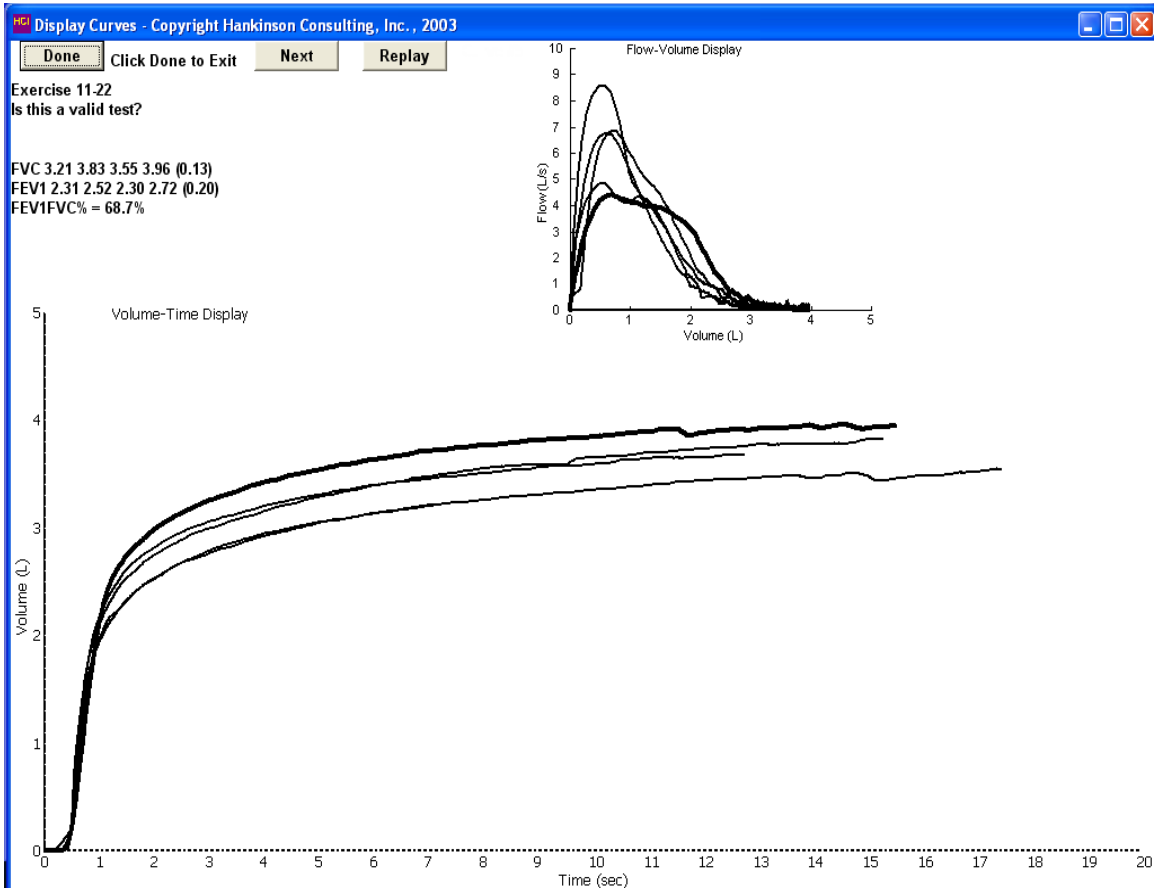
Exercise 11-18. Example of subject with airways obstruction requiring 15 seconds to plateau.



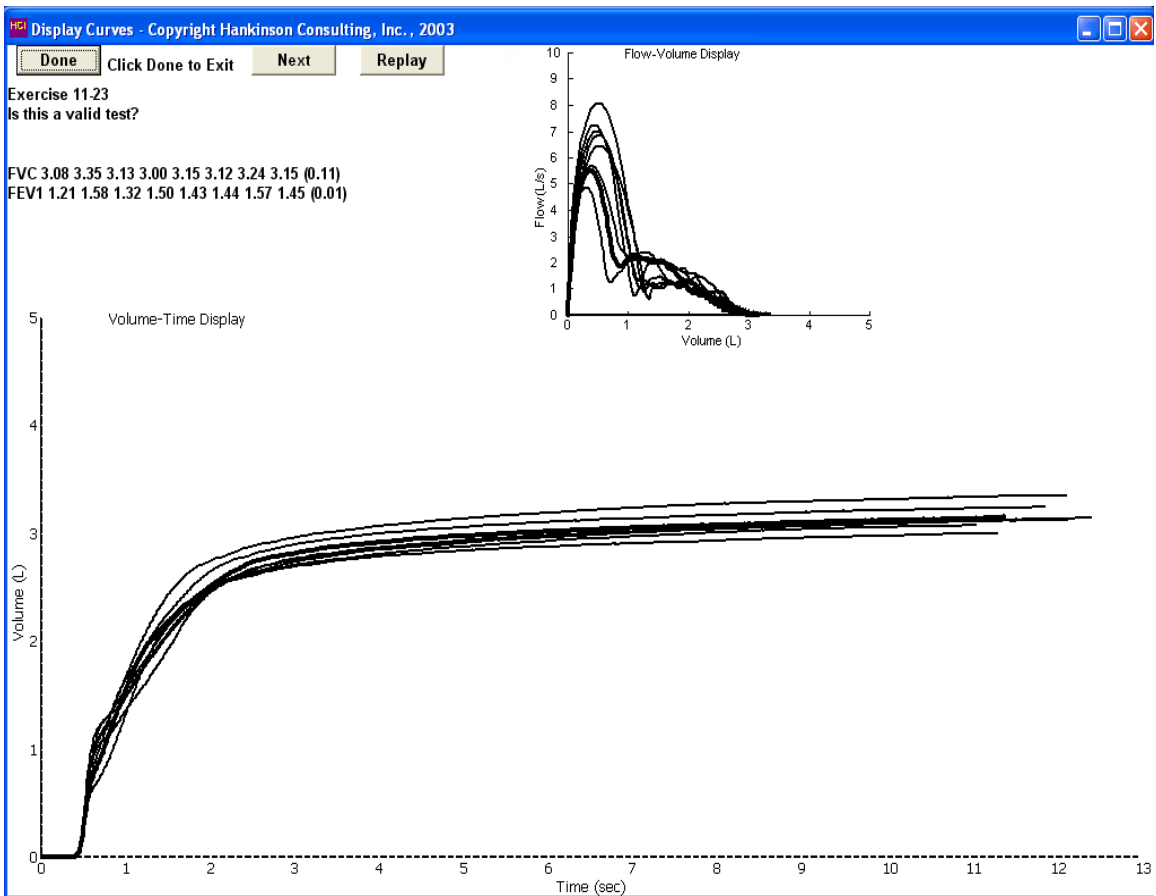
Exercise 11-20. Coach take in a deeper breath and blow out longer (no plateau).



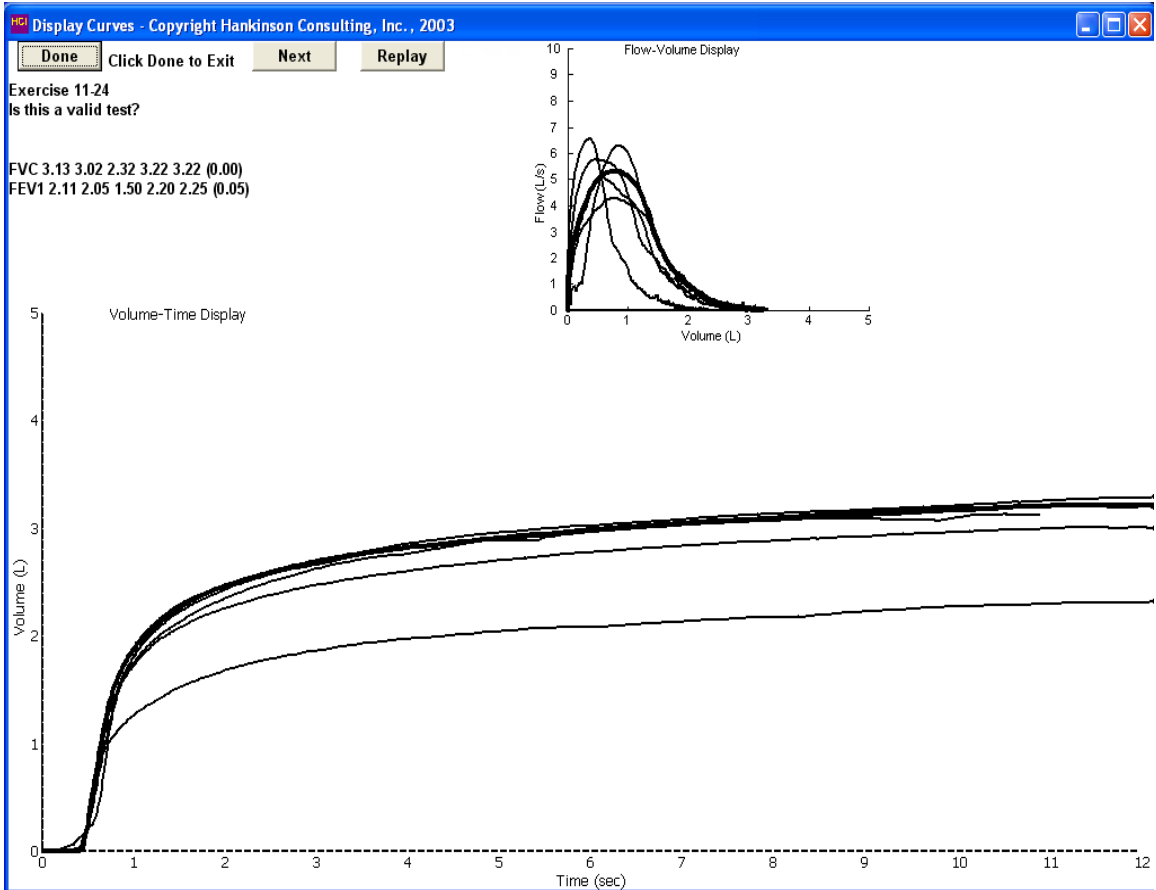
Exercise 11-21. Coach take in a deeper breath and blast the air out.



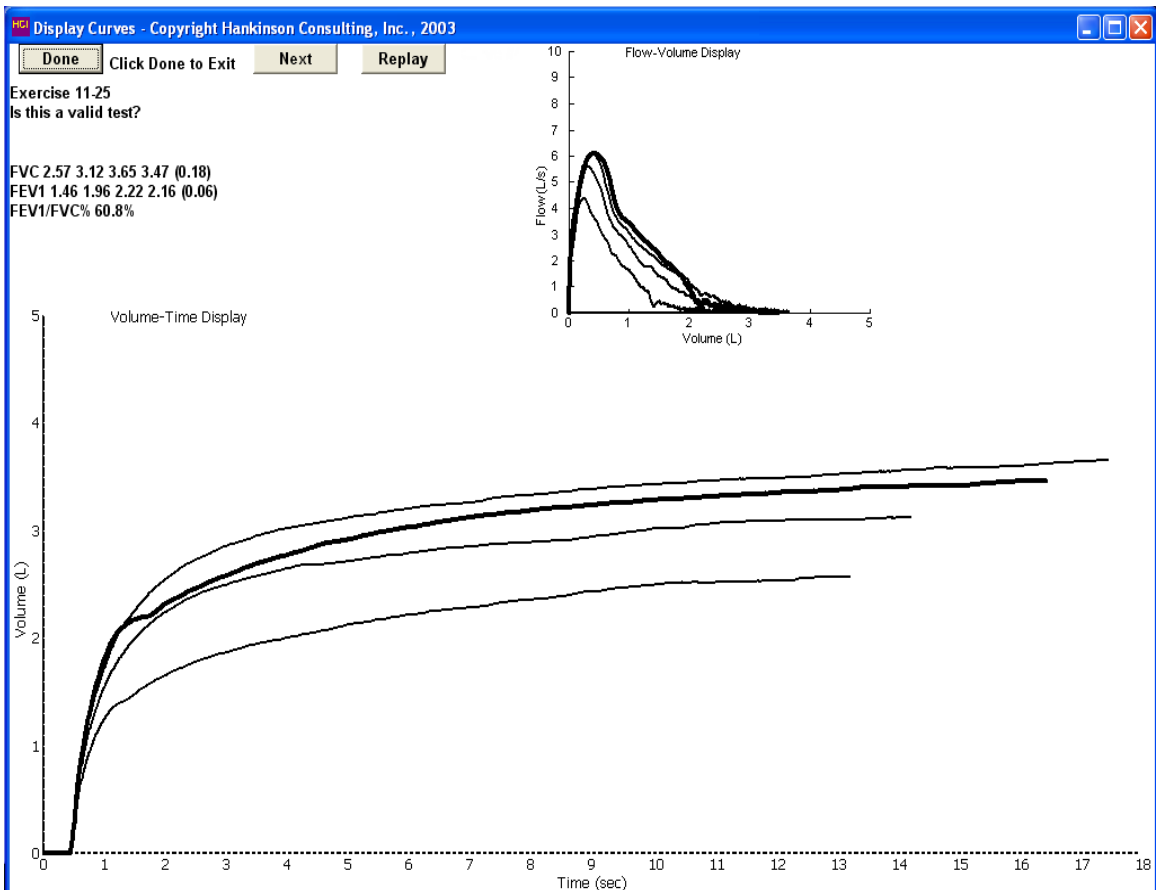
Exercise 11-22. Coach take in a deeper breath and blast the air out, some variability may be due to airways obstruction.



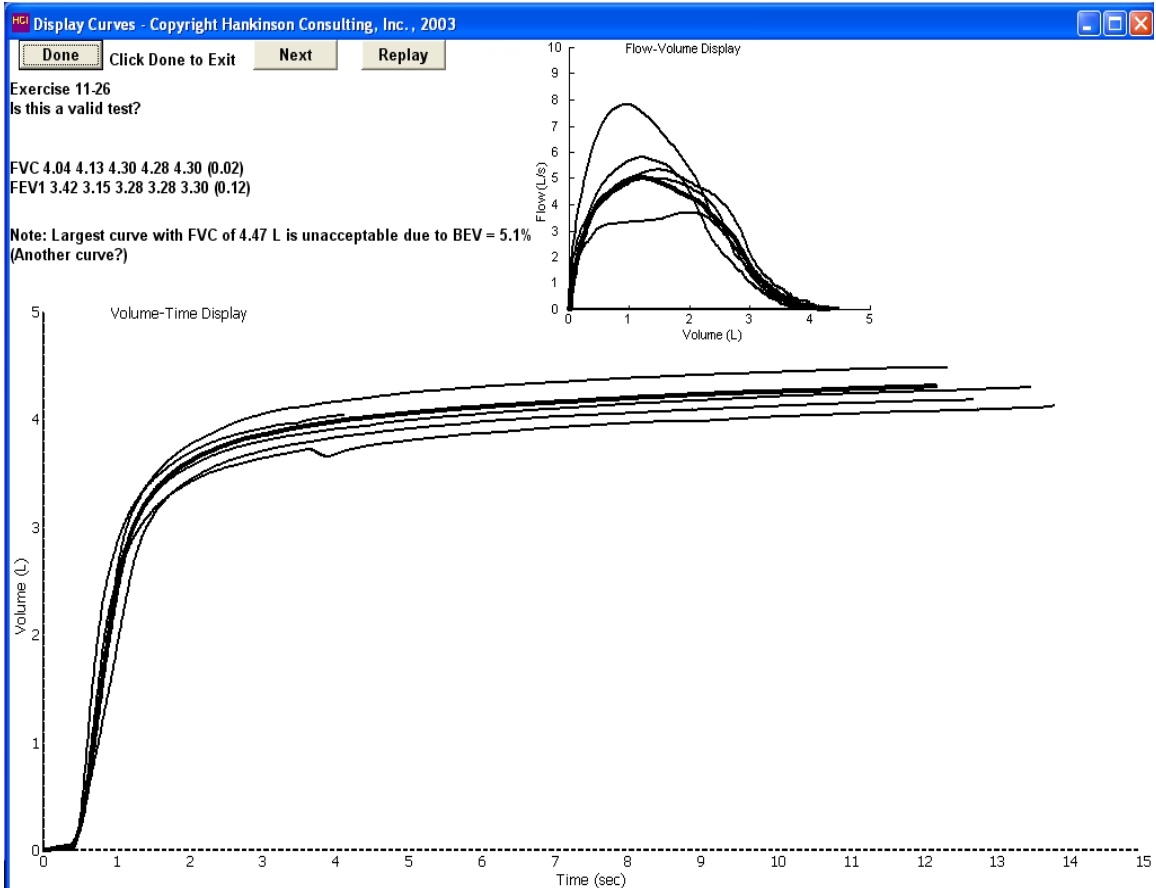
Exercise 11-23. Although possible airways obstruction, check for dentures or tongue in mouthpiece.



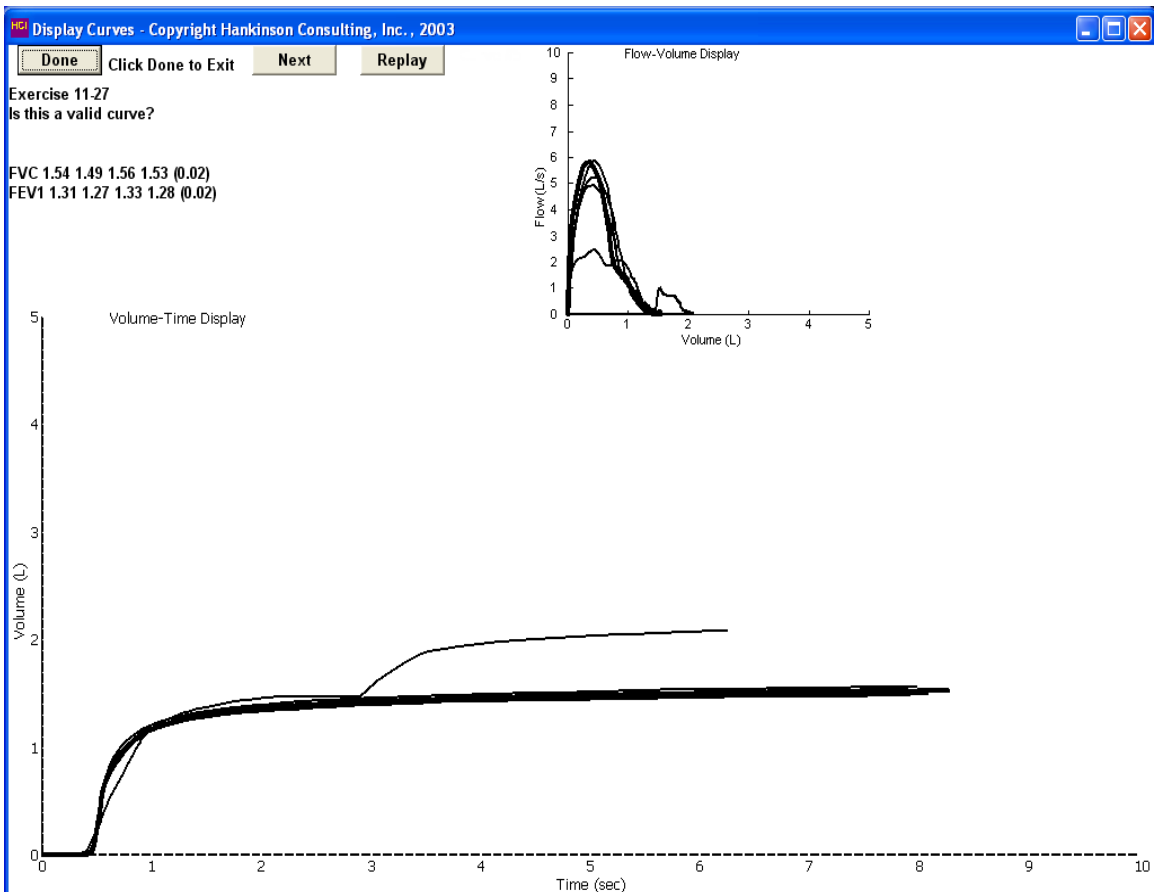
Exercise 11-24. Coach take in deeper breath and blast the air out.



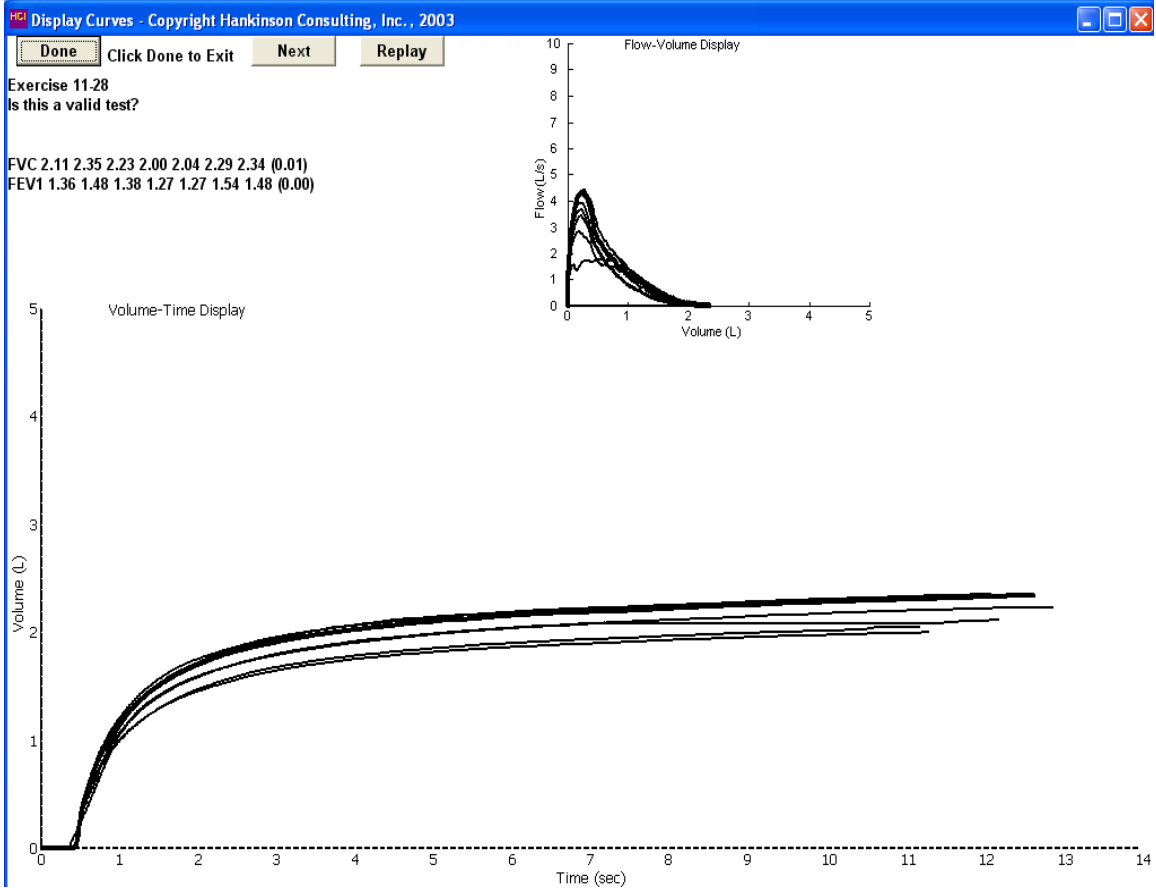
Exercise 11-25. Coach take in a deeper breath.



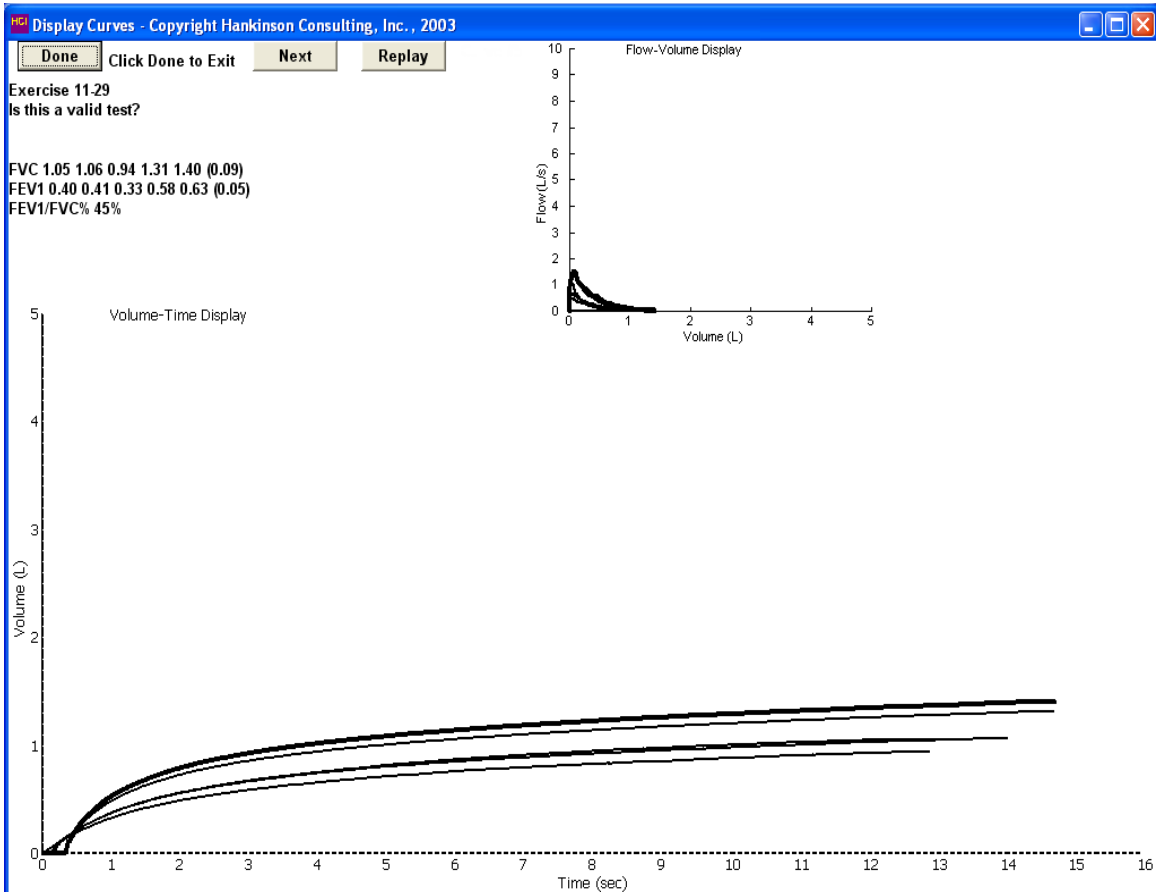
Exercise 11-26. Coach take in a deeper breath and blast the air out.



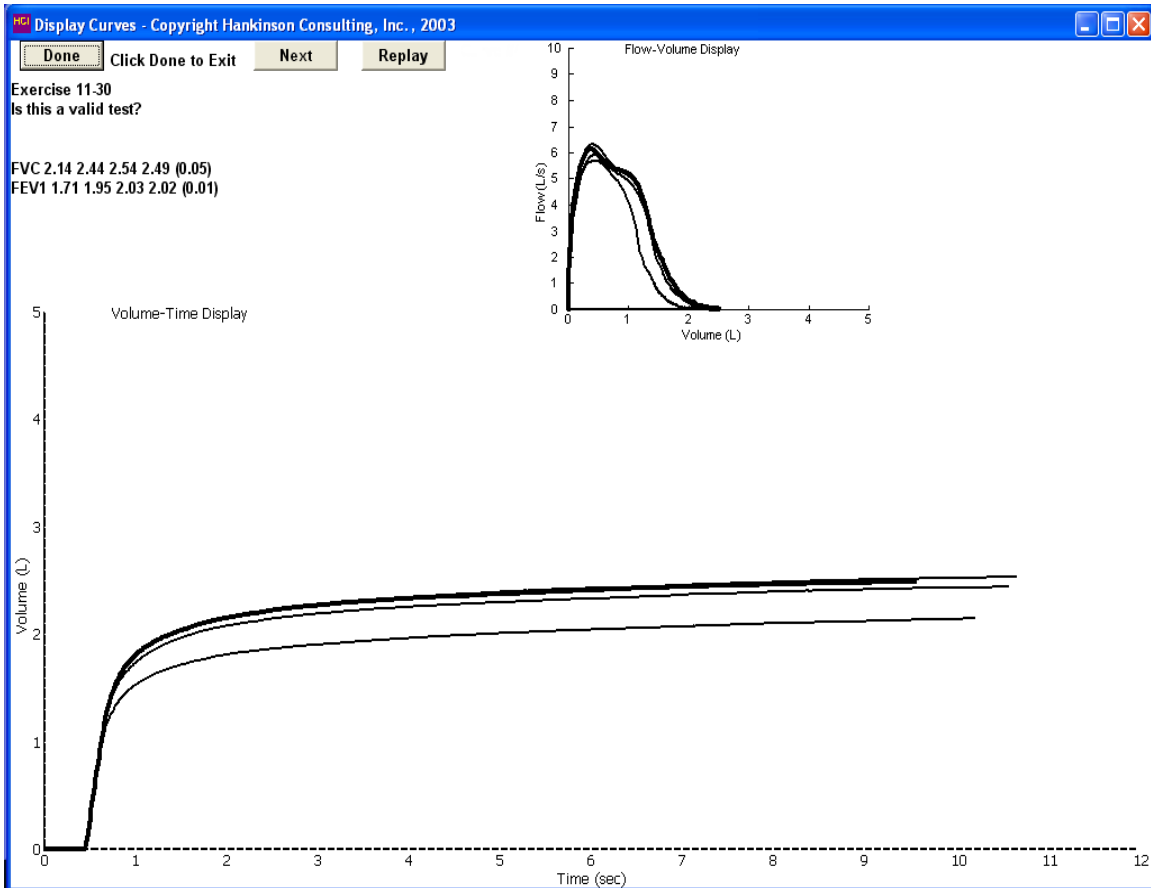
Exercise 11-27. Extra breath at end of one maneuver could cause falsely elevated FVC. Use a noseclip.



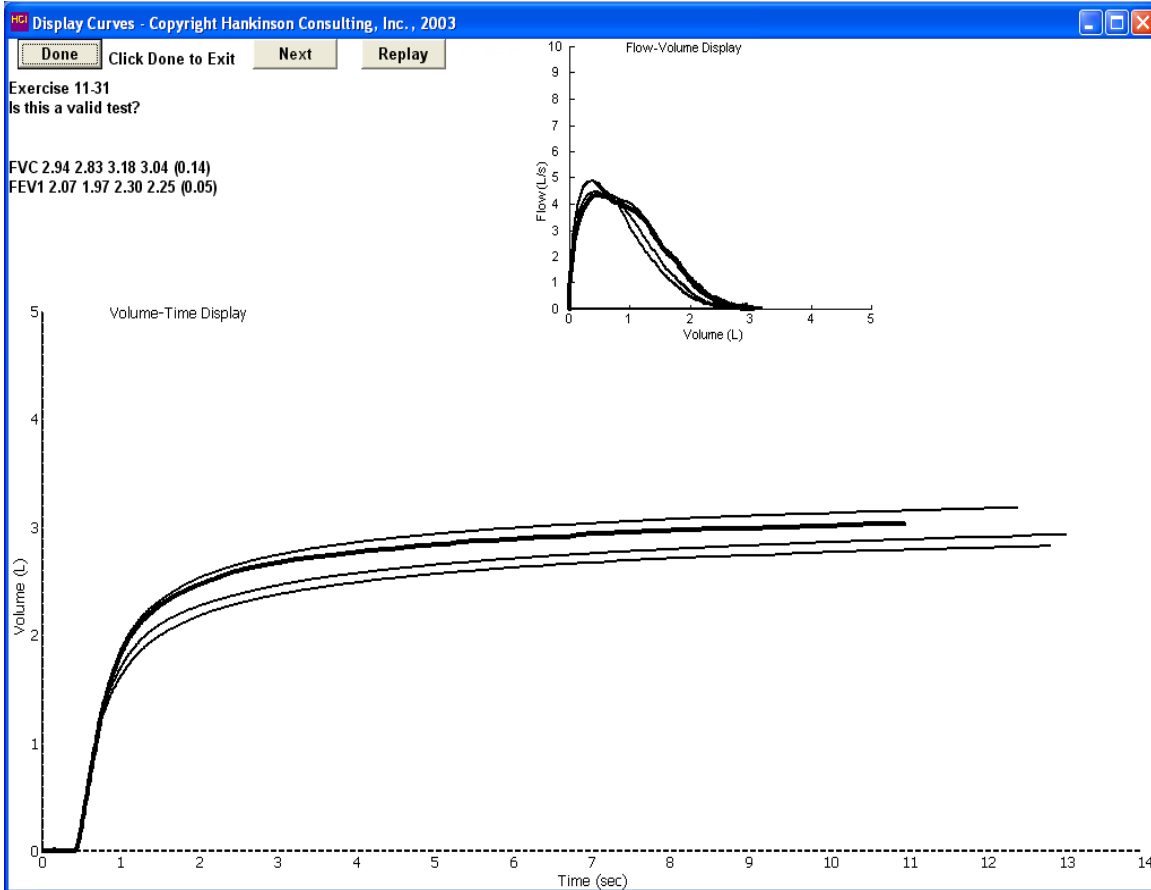
Exercise 11-28. Coach take in a deeper breath.



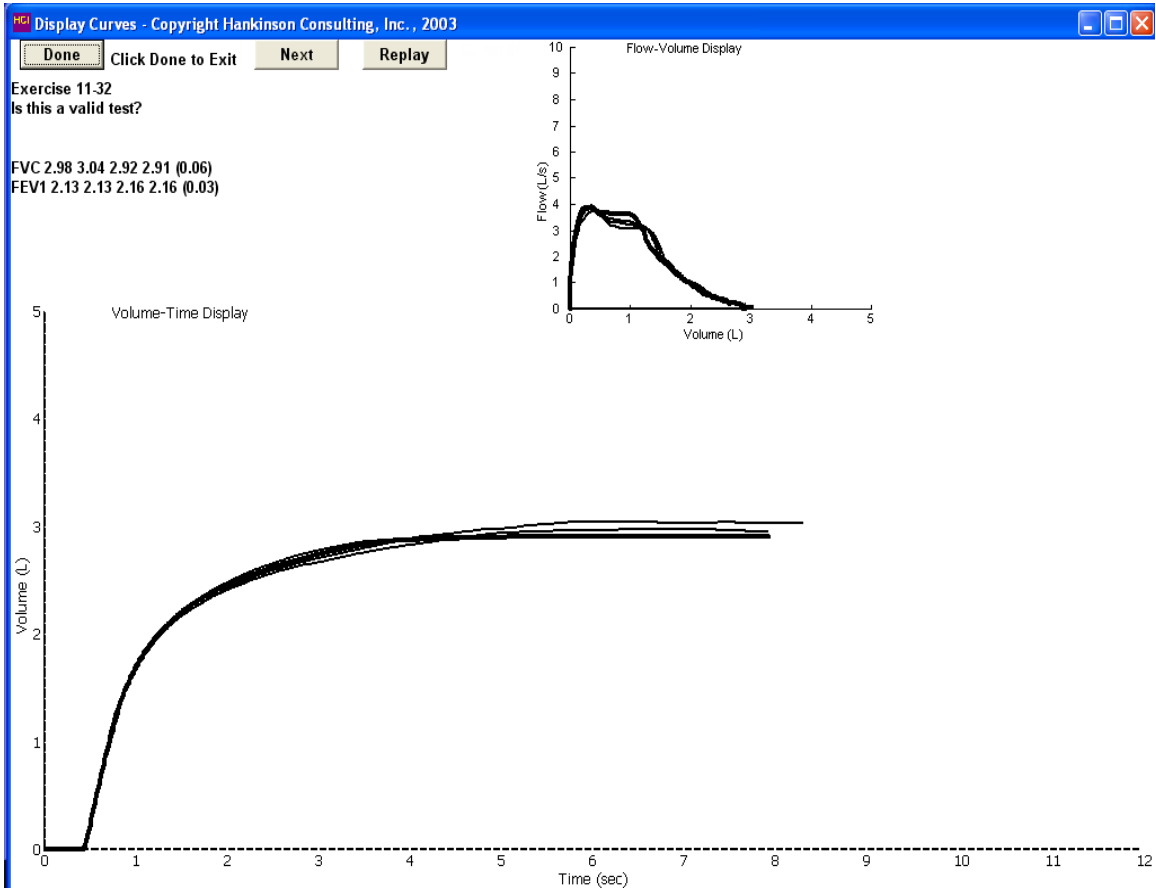
Exercise 11-29. Example of severe airways obstruction, coach take a deeper breath.



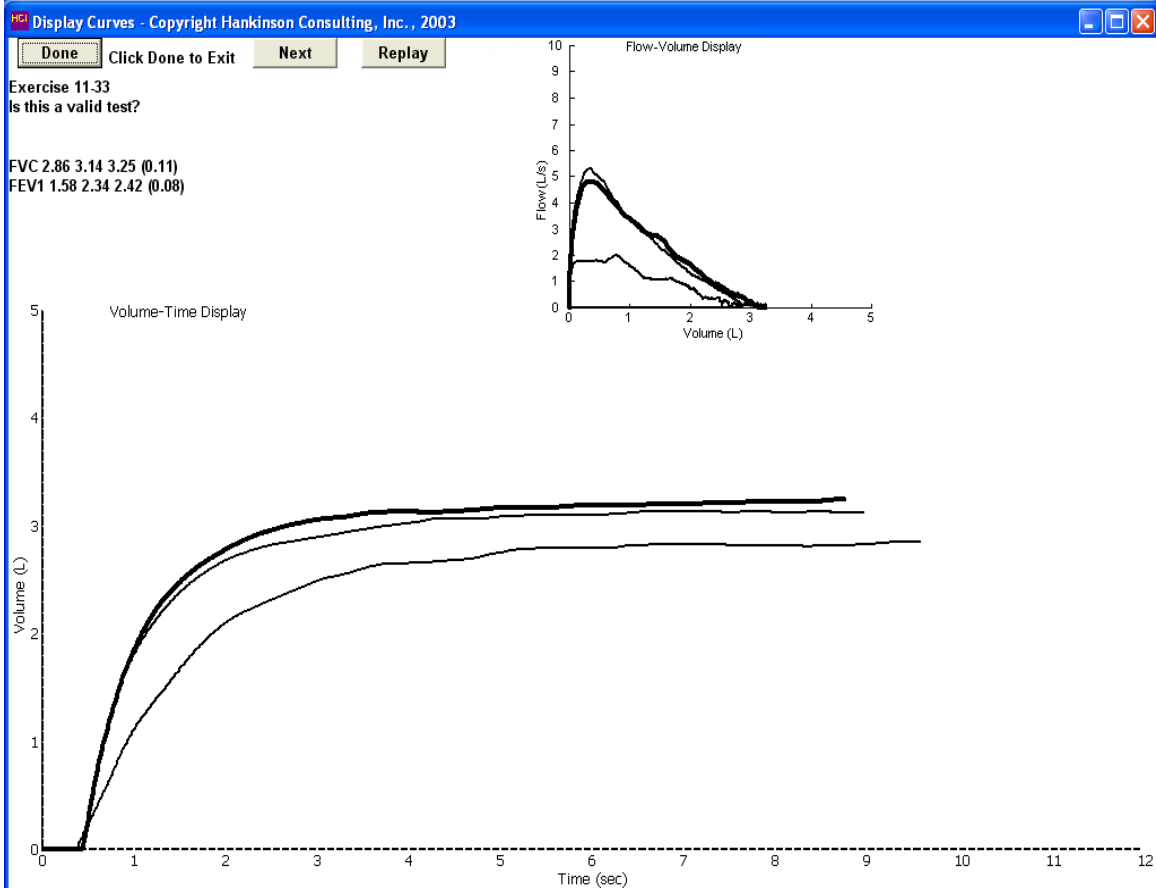
Exercise 11-30. Coach take in a deeper breath.



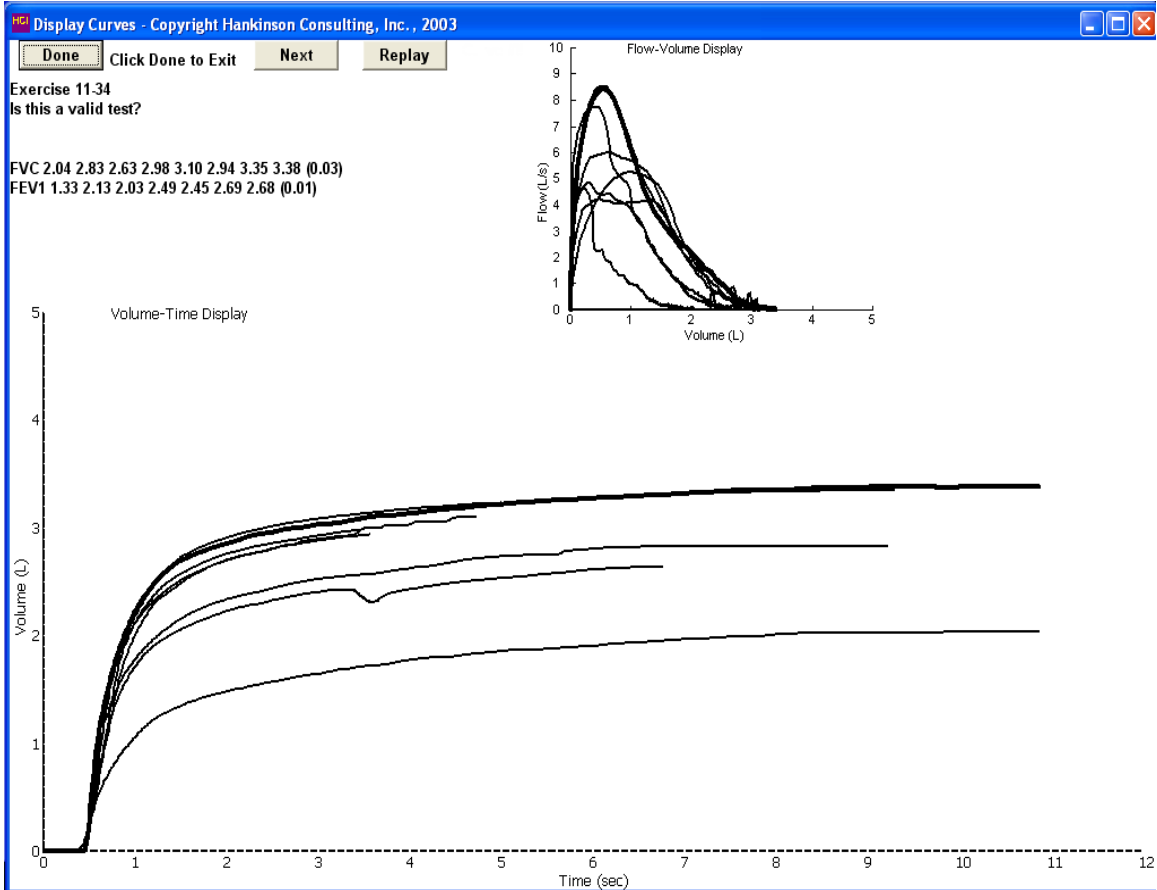
Exercise 11-31. Coach take in a deeper breath.



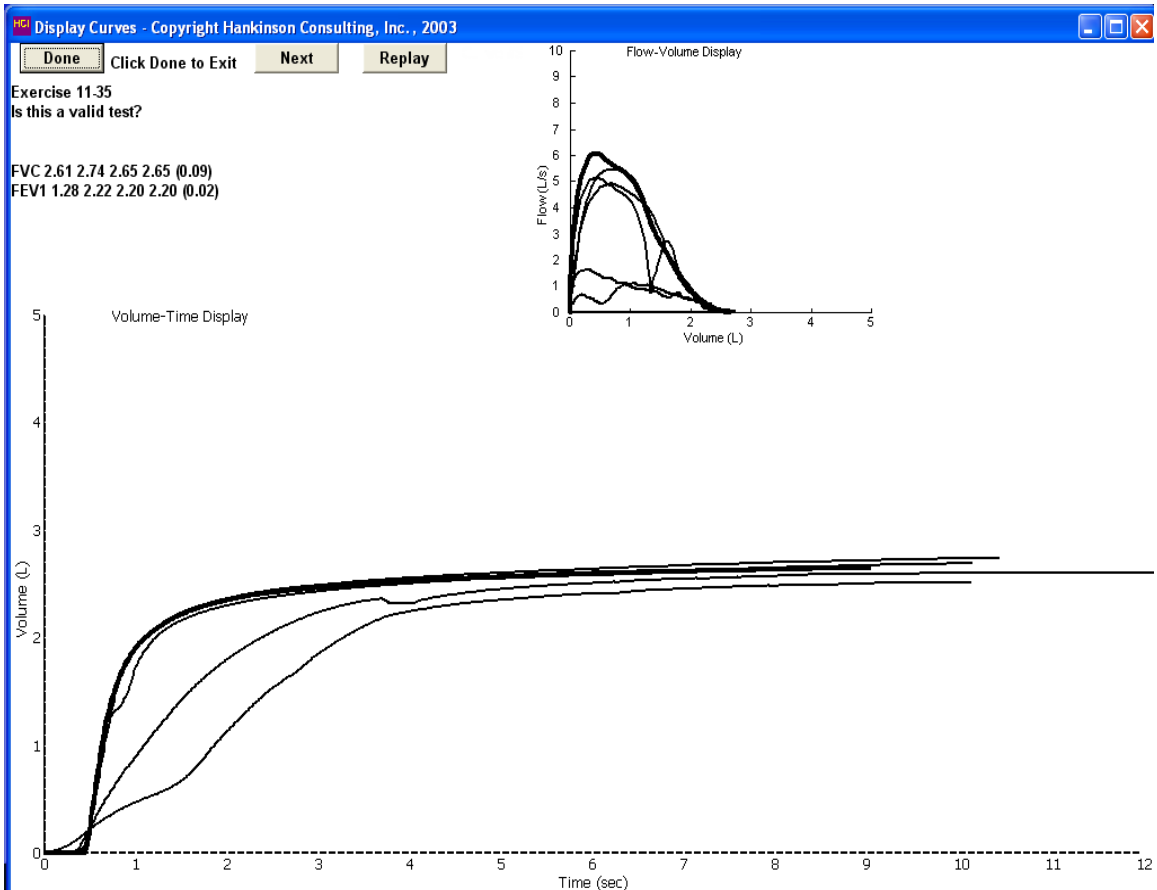
Exercise 11-32. Flat top to flow-volume curve could indicate dentures or tongue in the mouthpiece.



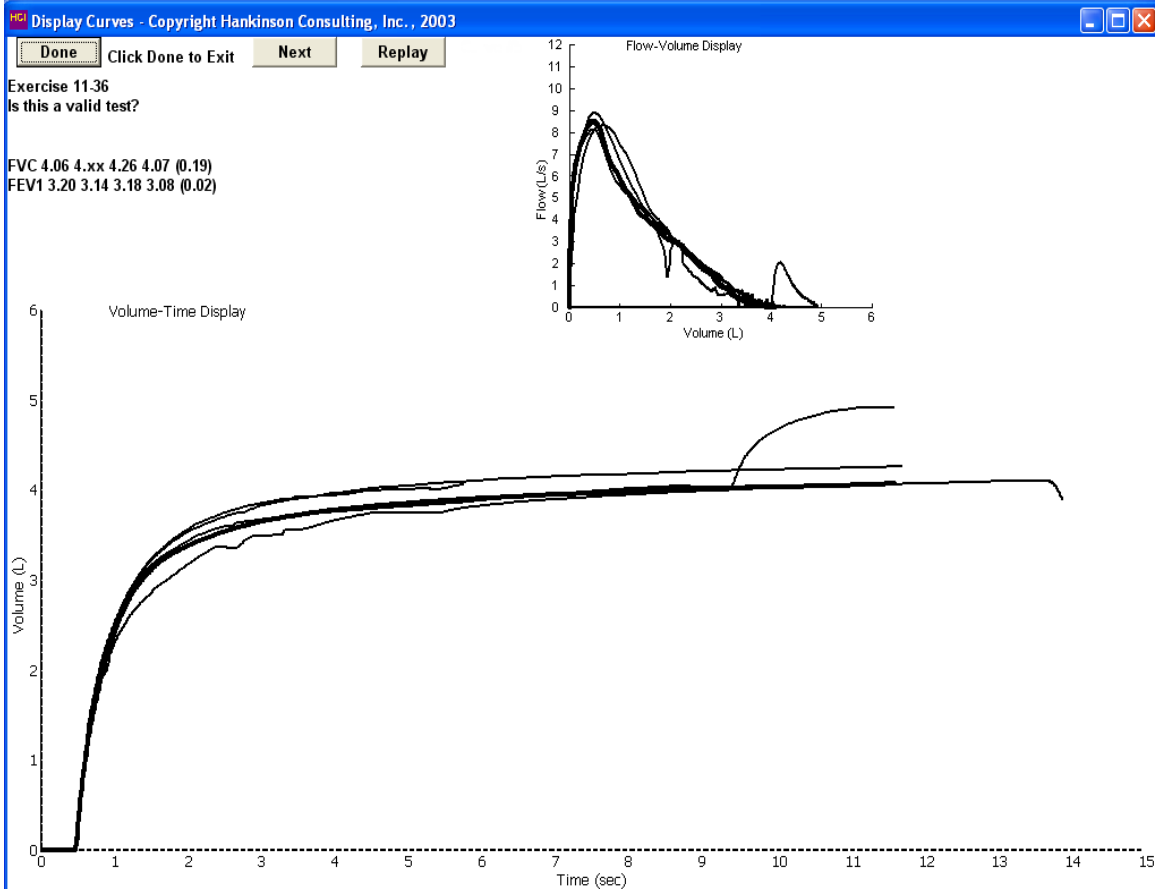
Exercise 11-33. Coach take in a deeper breath and blast the air out.



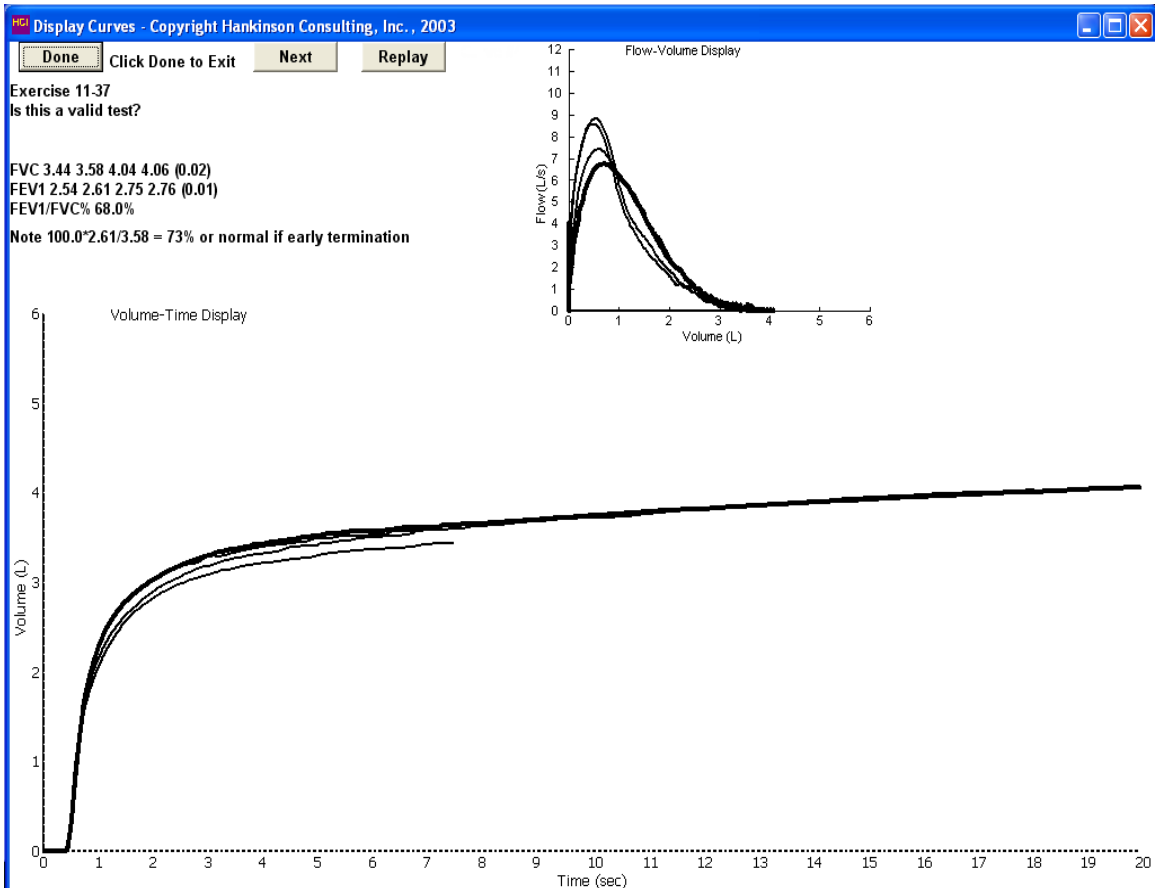
Exercise 11-34. Coach take in a deeper breath and blow out longer.



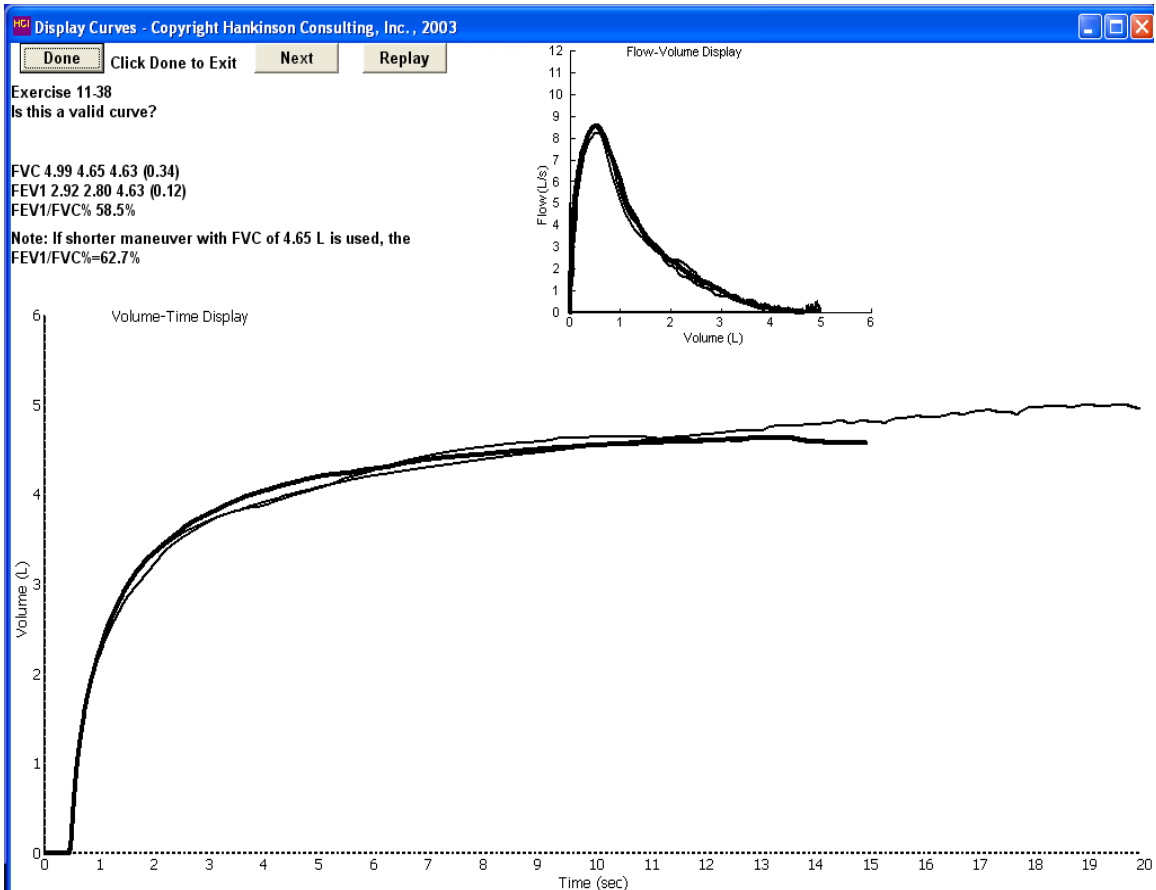
Exercise 11-35. Coach blast the air out.



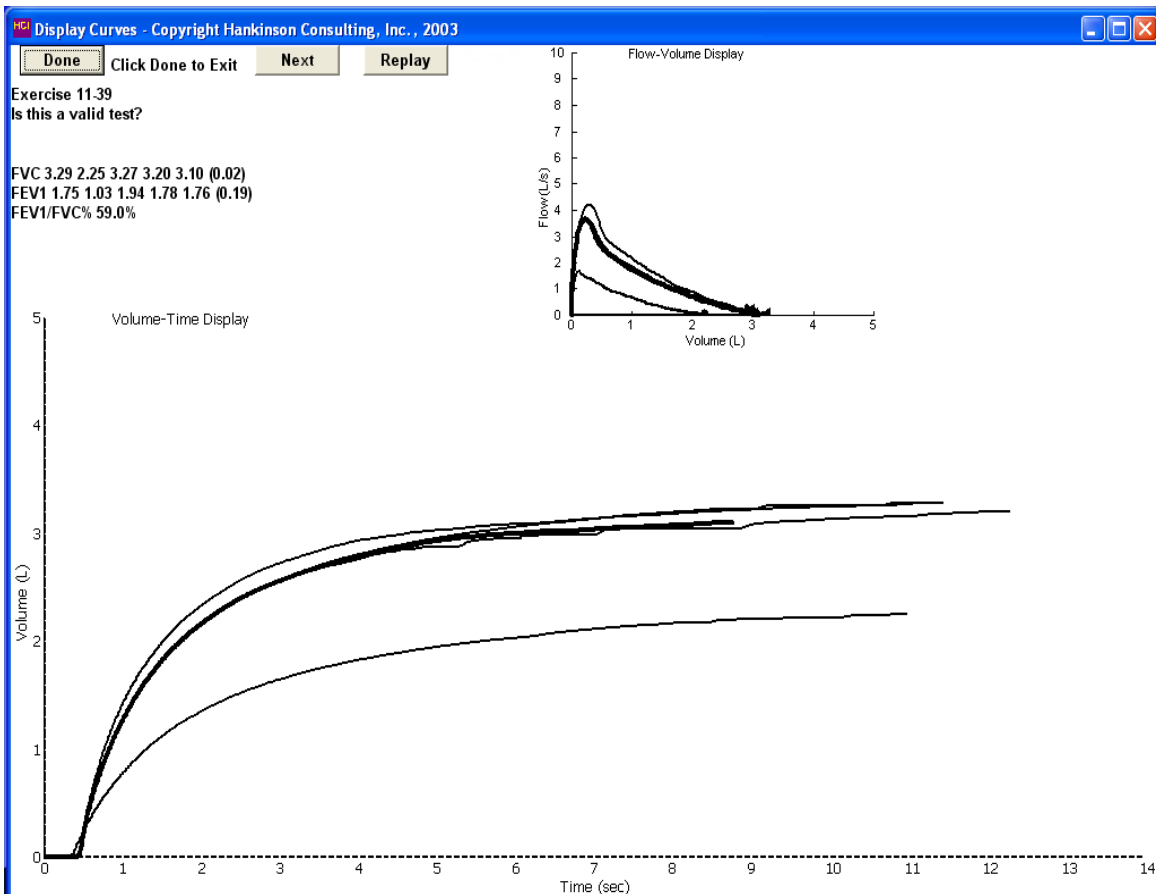
Exercise 11-36. Extra breath use a noseclip – possible problem with falsely elevated FVC.



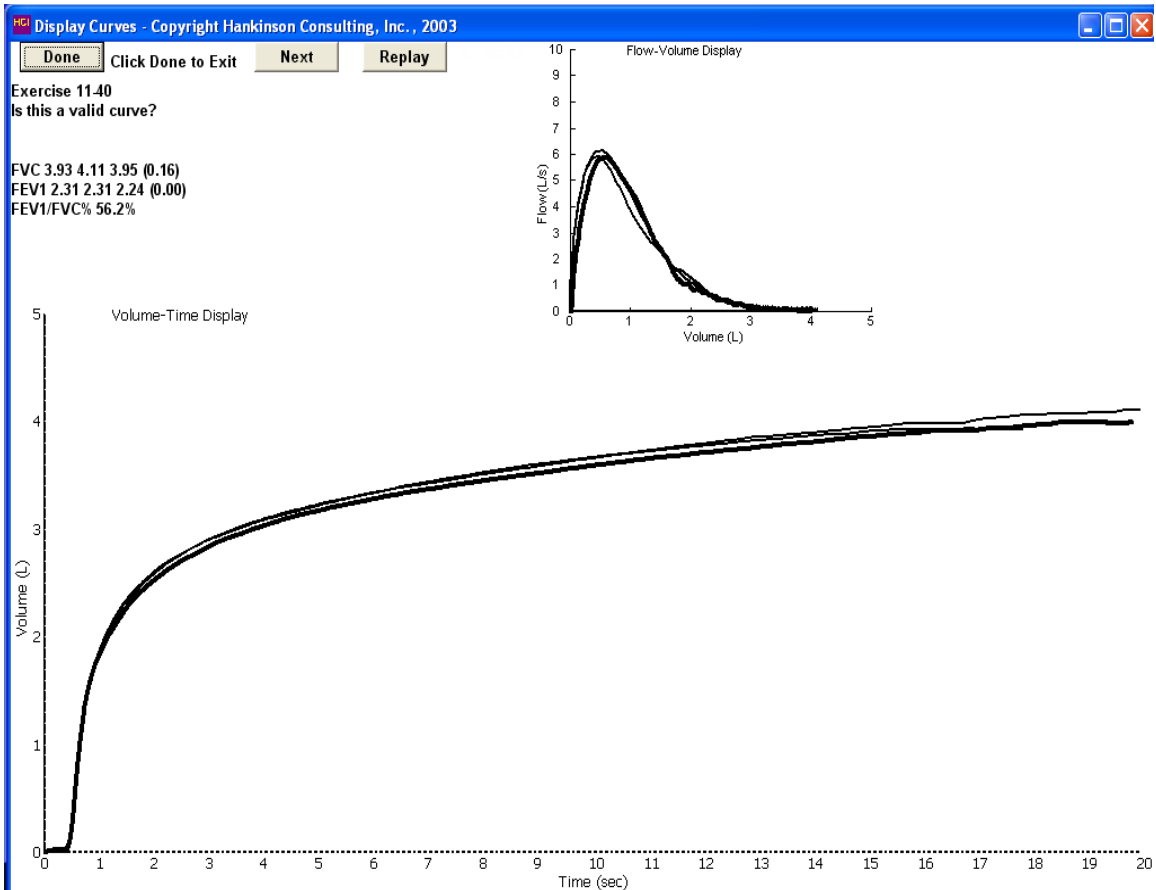
Exercise 11-37. Example of mild airways obstruction which would have been misclassified if early termination.



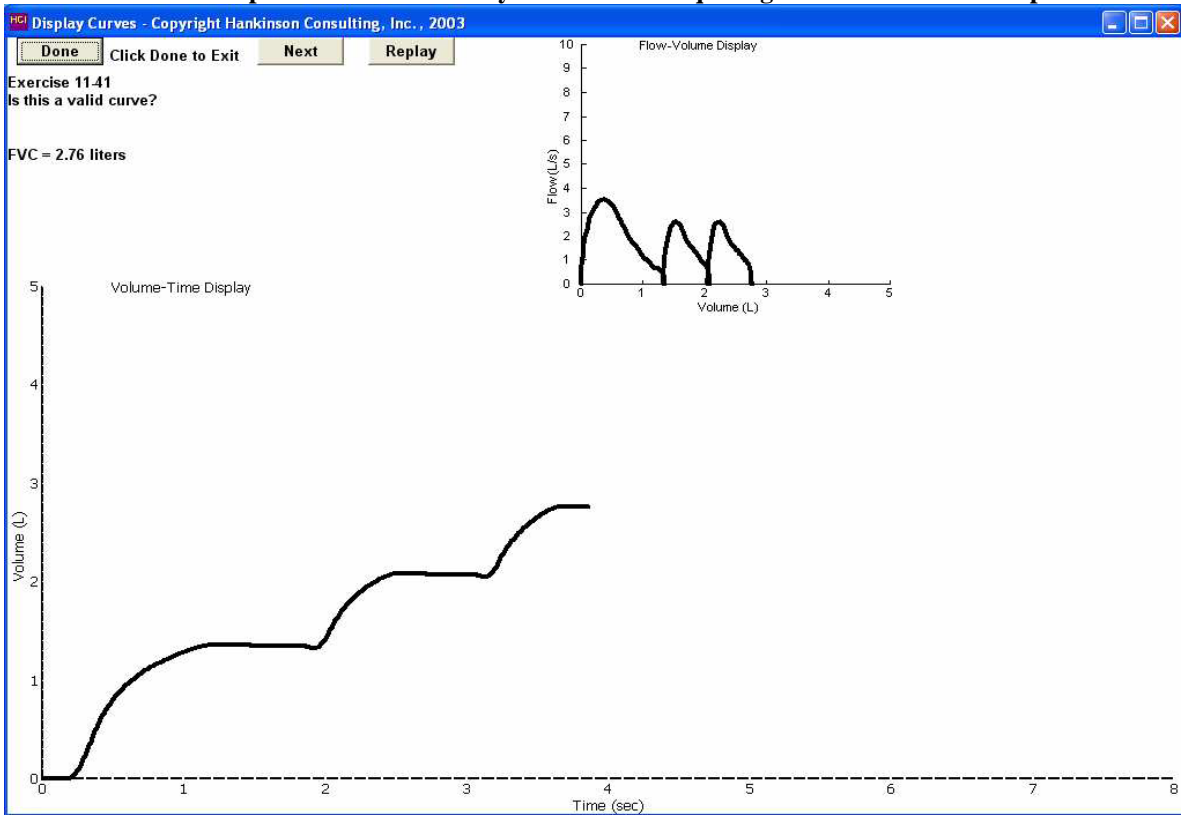
Exercise 11-38. Example of airways obstruction requiring a longer exhalation.



Example of mild airways obstruction.



Exercise 11-40. Example of moderate airways obstruction requiring 20-seconds to reach a plateau.



Exercise 11-41. Example of extra-breaths, resulting in falsely large and reported FVC of 2.76 liters.