Spirometry Ready Reckoner

Subject preparation:

Patient preparation consists of:

1) Explaining the purpose of the test
2) Determine contraindications
3) Recording patients age, height and weight
4) Positioning the subject and performing the test.

Certain factors can affect the spirometry results, and hence should be considered before performing the Spirometry.

Absolute contraindications:

Cardiac surgery/Myocardial Infarction in the past 1 month
Recent thoracic/abdominal/eye surgery in the past 1 month
History of pulmonary embolism
History of aneurysms abdominal/thoracic/ cerebral
Presence of facial palsy/contractures
Patient unwilling to perform the test.

Activities that should be avoided before Pulmonary function testing:

Smoking tobacco in any form in the last 2-4 hrs
Consuming tea/coffee/caffeinated drinks in the past 6 hrst
Heavy meal in past 4 to 5 hour
Heavy exercise in the past ½ hour
Bronchodilators: inhaled/oral
Alcohol
Lower respiratory tract infection in the past 15 days

Medication Wash out Restrictions:

Short acting Beta2 Agonists (Eg. Salbutamol, Levosalbutamol)	6 hrs
Long Acting Beta2 Agonists (Eg. Formoterol, Salmeterol)	12 hrs
Long acting Antimuscarinic bronchodilators .e.g. L Tiotropium	24 hrs
Long acting Theophyllines	24-48 hrs
Short Acting Antimuscarinic bronchodilators .e.g. Ipratropium	8 hrs
Inhaled steroids	1 hr

If above mentioned restrictions are not observed, then the spirometry readings may not be accurate and show false high levels. Moreover, bronchodilator reversibility will be unreliable.

Stages of performing Spirometry

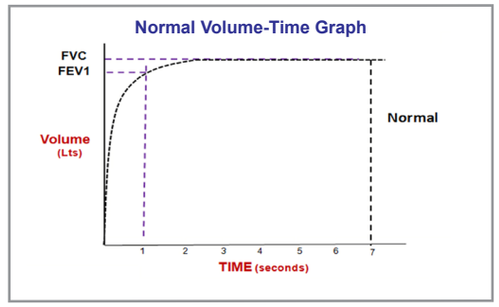
Take a nice deeeeeep breath in… Fill your chest with as much air as you can

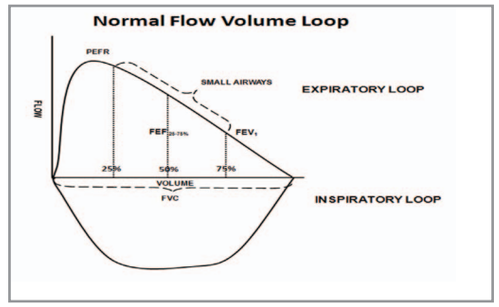
Blow as fast as you can…… Blast maximum……

Continue to remove as much air as possible

Take deep inspiration (Inspire as much air as was blown out)

Normal Flow volume & volume time graph



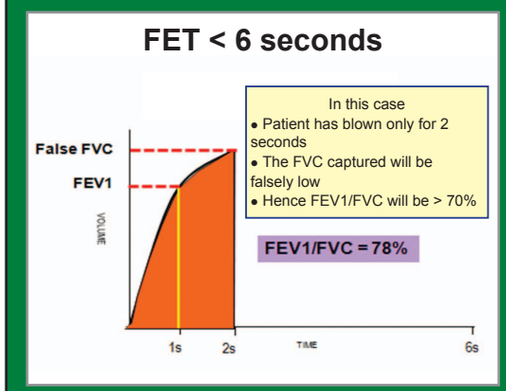


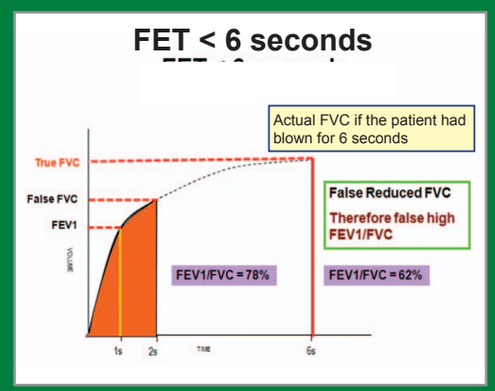
Calibration Check of Spirometers

Spirometers may sometimes generate erroneous reports or values. This may occur due to various reasons like clogging of the Pneumotach mesh due to sputum or moisture, damage to the turbine of turbine based spirometer or due to simple wear and tear. To ensure the quality of results generated, calibration check of the spirometers is essential. Calibration check can be performed by a 3 Liter or 1 Liter calibration syringe. The calibration check procedure will simply check if the spirometer is actually measuring the volume that is blown into it without much deviation. The permissible limit of deviation is ± 3.5% for the 3L syringe. Thus if 3L air is injected, the spirometer should give you a reading between 2.90 to 3.11 liters.

Spirometer should record a volume within ± 0.05 lts or ± 3% (whichever is greater).

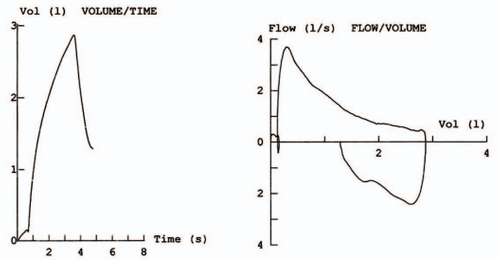
Importance of 6 secs exhalation



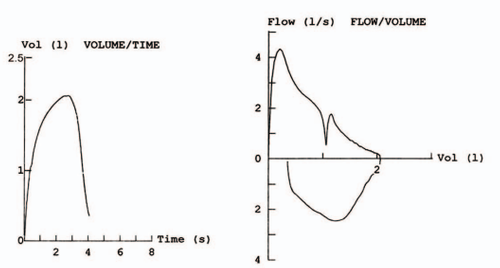


Unacceptable graphs

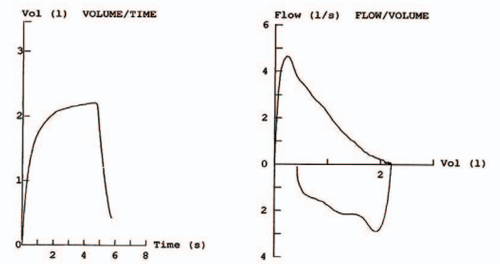
Hesitation, Delayed Start



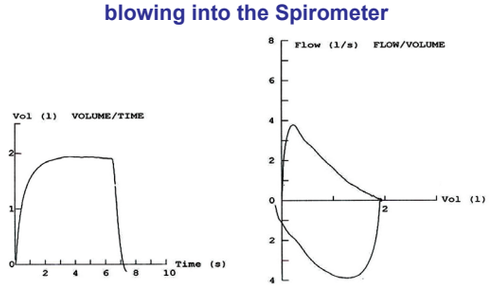
Cough in the 1st second



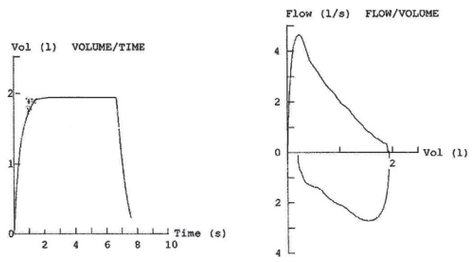
FET< 6 seconds



Inadequate inhalation before blowing into the Spirometer

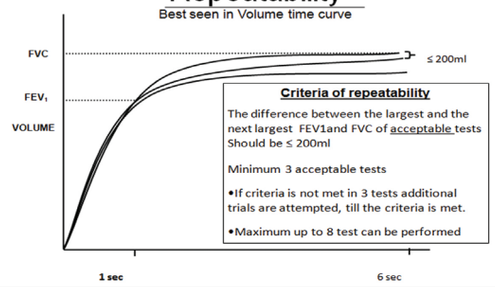


Abrupt termination: Glottic closure



Repeatability

Best seen in Volume time curve



Criteria of repeatability

The difference between the largest and the next largest FEV1and FVC of acceptable tests Should be ≤ 200ml

Minimum 3 acceptable tests

- If criteria is not met in 3 tests additional trials are attempted, till the criteria is met.
- Maximum up to 8 test can be performed

Grading the severity of Asthma

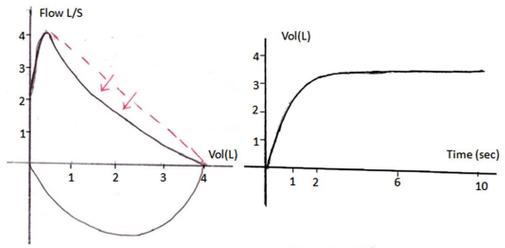
FEV1% Predicted	Grade of Severity
>80%	Mild
60% to 80%	Moderate
<60%	Severe
Note: 60-80 rule.	

Grading the severity of COPD

FEV1% Predicted	Grade of Severity
>80%	Mild
50% to 80%	Moderate
30% to 50%	Severe.
<30%	Very Severe
PS: 30-50-80 Rule	

Interpretation of Spirometry

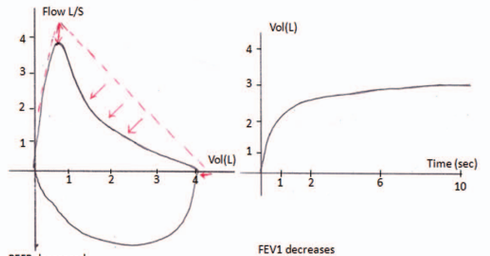
Early (Small Airways) Obstruction



PEFR slightly decreased
Slight concavity on the exhalation loop
FVC normal

FEV1 near normal
FVC Normal
Plateau attained by 6-7 seconds

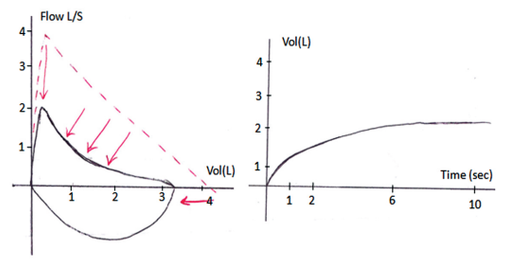
Moderately severe obstruction



PEFR decreased
Concavity on the exhalation loop deepened
FVC normal

FEV1 decreases
FVC Normal
Plateau not attained attained even at the end of 6-7 seconds

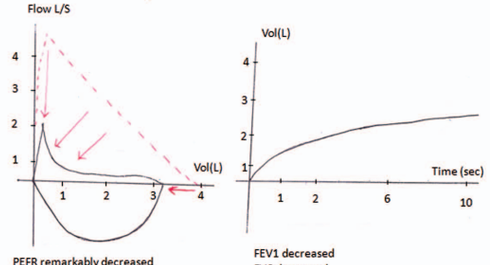
Severe Obstruction



PEFR remarkably decreased
Concavity on the exhalation loop deepened
FVC decreased remarkably

FEV1 decreased
FVC decreased
Plateau not attained

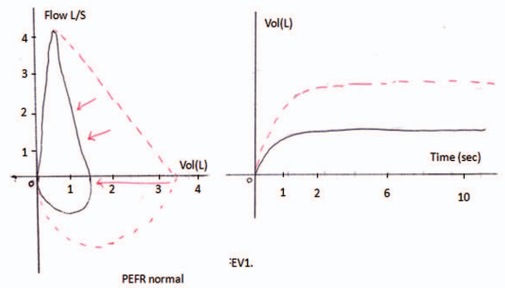
Very Severe Obstruction



PEFR remarkably decreased
Concavity on the exhalation loop deepened
(Dog Leg Pattern)
FVC decreased remarkably

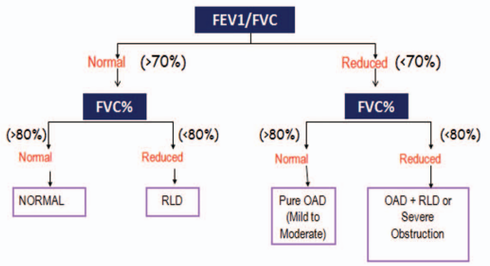
FEV1 decreased
FVC decreased
Plateau not attained

Graph of Restrictive Lung Diseases



PEFR normal
No concavity on the exhalation loop.

SPIROMETRY INTERPRETATION



Note :

1. Diagnosis of COPD is essentially based upon the post bronchodilator values
2. Clinical correlation with the patients clinical history, examination and other investigations is a must.

Published by: Chest Research Fondation, Pune, Ph.02027035361, Website: www.crfindia.com