

Basic Interpretation of Spirometry

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Aims

- When to do spirometry
- When not to do spirometry
- Definition of terms
- Different patterns in spirometry
- Problems
- Interpreting Time/Volume graphs

Spirometry

Spirometry is a method of assessing lung function by measuring the volume of air a patient can expel from the lungs after maximal inspiration

WHY WE DO IT !

- Diagnosis confirmation
- COPD classification
- Disease progression
- Response to treatment
- Health Promotion (Smoking Cessation)
- Targets

FINDING THE MISSING MILLIONS

National Clinical Strategy recommends “ A
diagnosis of COPD should be confirmed
by quality assured spirometry.....”

When not to perform spirometry

- Inadequate training
- Inadequate equipment
- Lack of quality control
- Contra-indications
- During or immediately after an exacerbation

Contra-indications

- Haemoptysis
- Pneumothorax
- Unstable cardiac status
- Aneurysm
- Recent eye surgery
- Recent thoracic or abdominal surgery
- Acute disorders: D&V, Exacerbations

How we do it!

- Equipment / spirometers /syringes
- Cleaning
- Temperature
- Calibration/Verification checks
- Filters

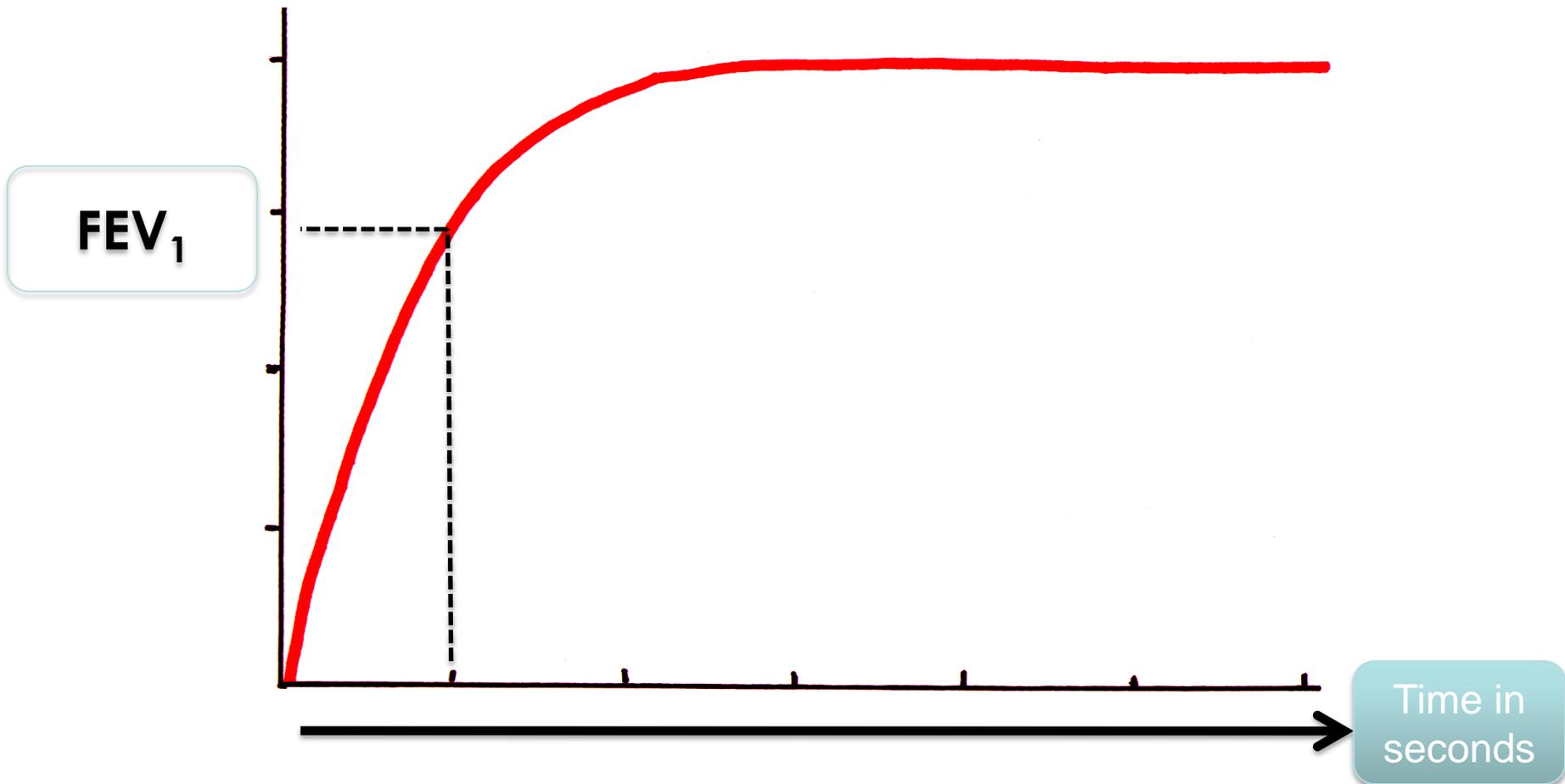
Patient preparation

- Pre-test information
- Documentation
- Patient comfort
- Explanation/demonstration
- Seated, chair with arms

Definition of terms

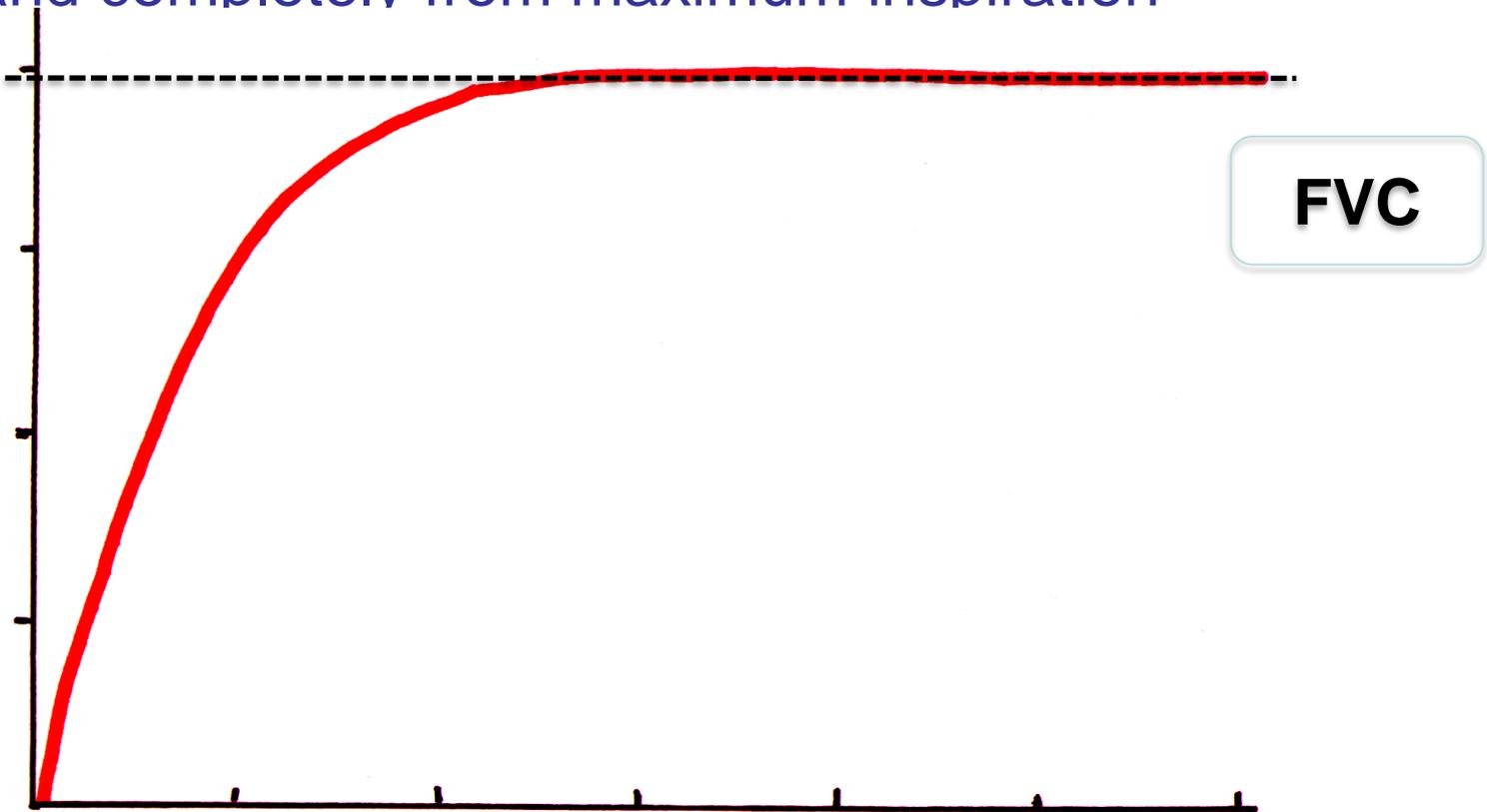
- FEV_1
- FVC
- VC (RVC,SVC,EVC)
- Ratio FEV_1/FVC or FEV_1/VC

FEV_1 (Forced Expiratory Volume in 1 second)



FVC

The maximum volume of air exhaled as rapidly, forcefully and completely from maximum inspiration



Relaxed Vital Capacity

The maximum volume of air expelled during a relaxed exhalation from maximum inspiration

FEV₁% or Ratio of FEV₁ to FVC

$$\text{FEV}_1/\text{FVC} \times 100$$

The proportion of air exhaled in one second

This percentage is important in identifying
airways obstruction

Airflow Obstruction

Definition of airflow obstruction:

$FEV_1 < 80\%$ predicted

and

$FEV_1/FVC < 70\%$

Definition of Chronic Obstructive Pulmonary Disease (COPD)

COPD is predominantly caused by smoking and is characterised by airflow obstruction that is not fully reversible.

The airflow obstruction does not change markedly over several months but is usually progressive in the long term.

(NICE 2010)

COPD Classification

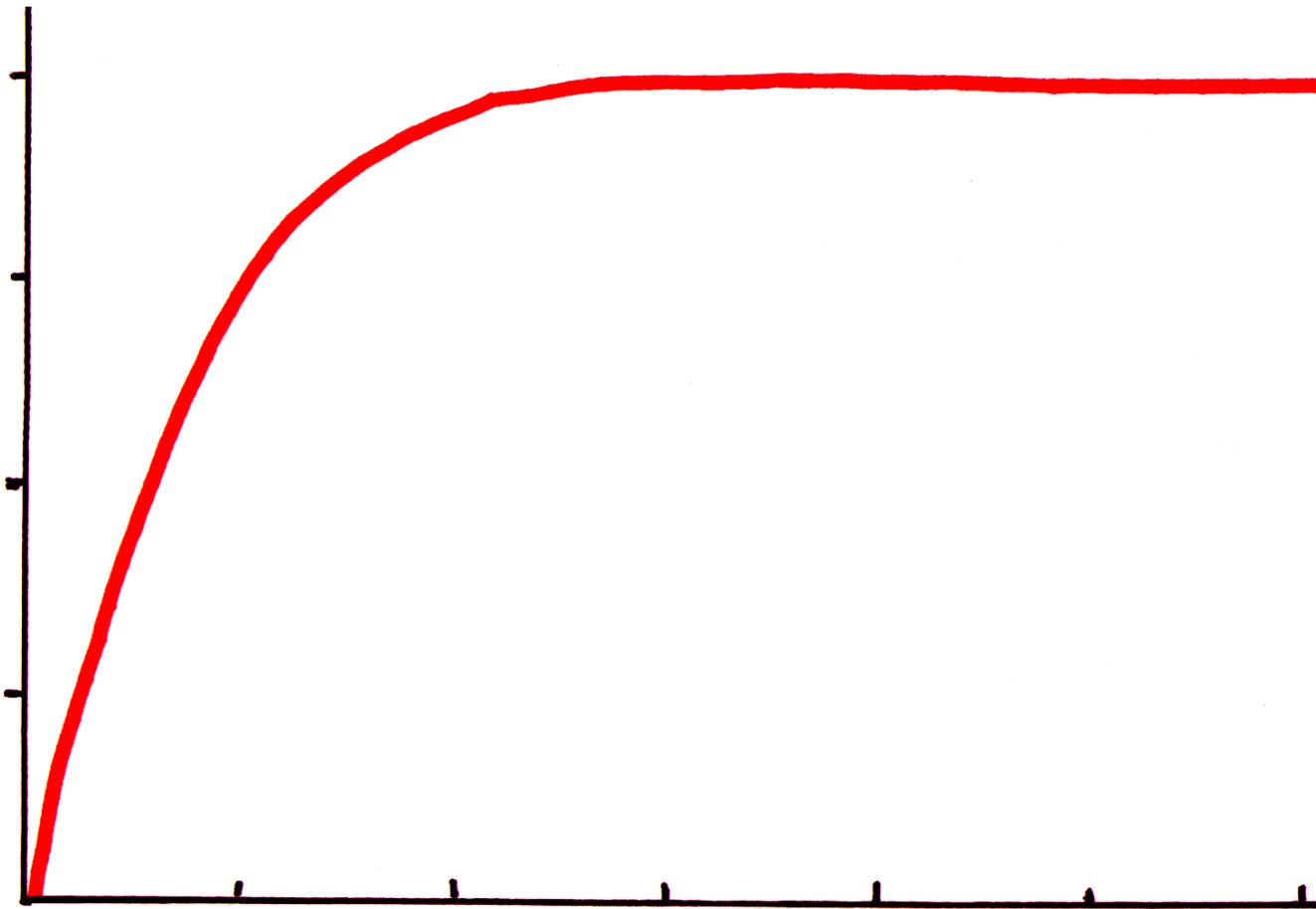
NICE Guidelines

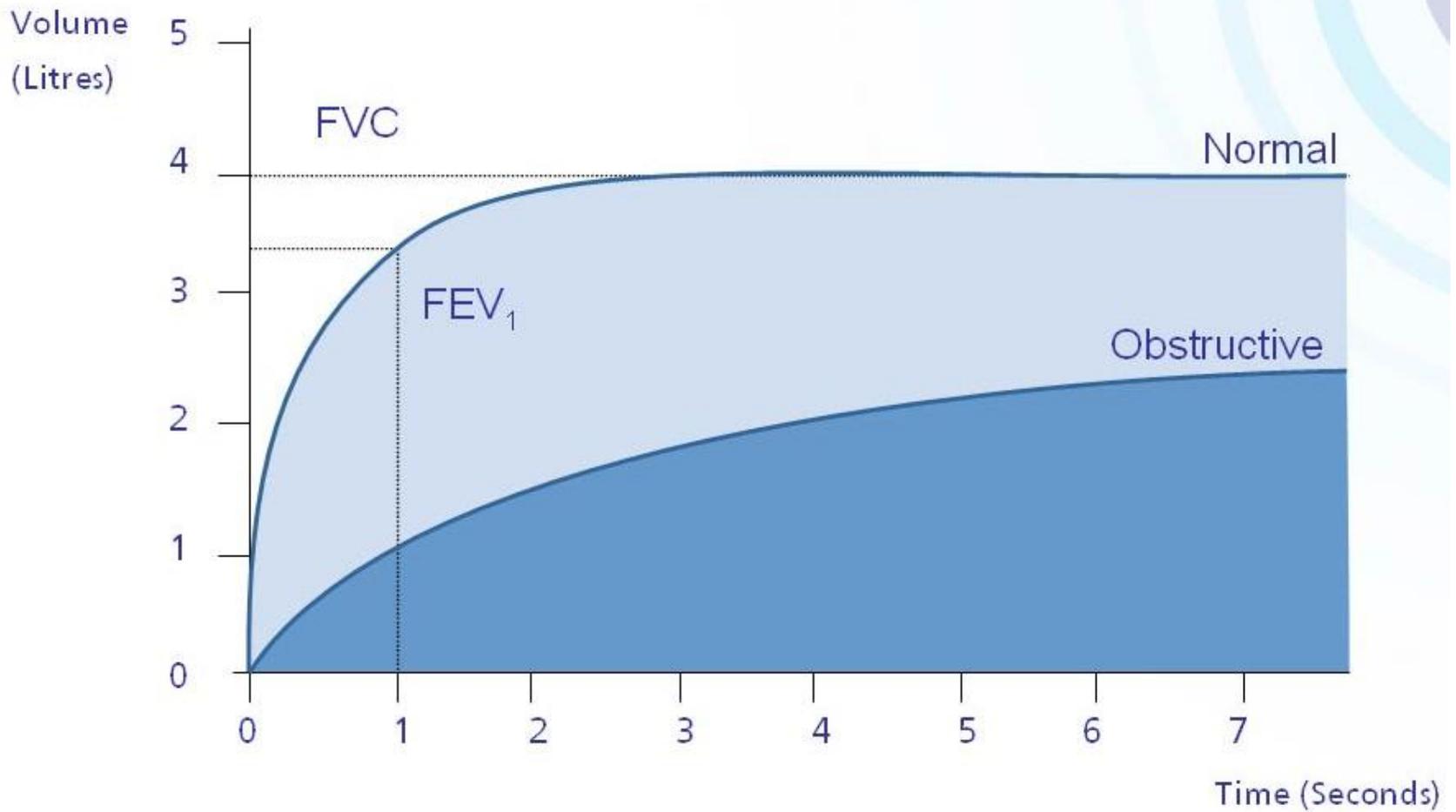
- Mild COPD $FEV_1 \geq 80\%$ predicted
- Moderate COPD $FEV_1 50-80\%$ predicted
- Severe COPD $FEV_1 30-50\%$ predicted
- Very Severe COPD $FEV_1 < 30\%$ predicted

Different Patterns in Spirometry

- Normal
- Obstructed
- Restricted
- Combined/Mixed

Normal spirometry trace

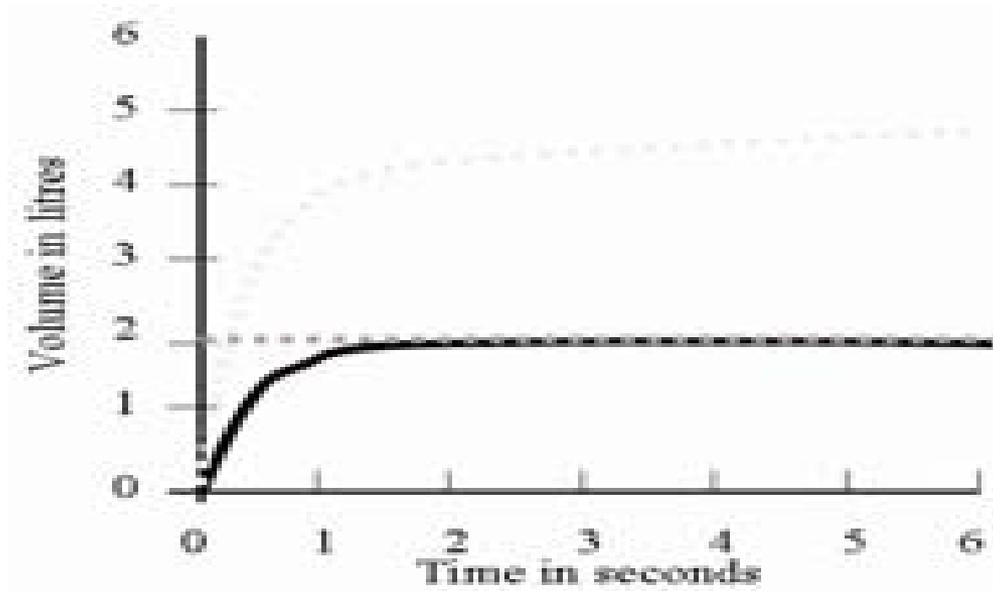




Restrictive Spirometry

Restrictive: due to conditions in which the lung volume is reduced, eg fibrosing alveolitis, scoliosis.

The FVC and FEV1 are reduced proportionately.



Reporting Spirometry

- Results should be the greatest values achieved from 3 technically acceptable blows. (FEV₁ within 5%)
- *Poorly performed spirometry is worse than no spirometry!*

QUALITY?

National strategy cites an example:

31% of spirometry measurements in 38 practices in Rotherham met the required standard of 3 readings within 5% (in contravention of BTS and GOLD spirometry standards)

New Guide to Spirometry!!!

- A Guide to Performing Quality Assured Diagnostic Spirometry
- www.pcc.cic.org.uk

Problems!

- Slow start
- Short Blow
- Cough
- Leaks around mouthpiece
- Sub-maximal effort
- Unable to achieve 3 acceptable results
- Inadequate rest between attempts

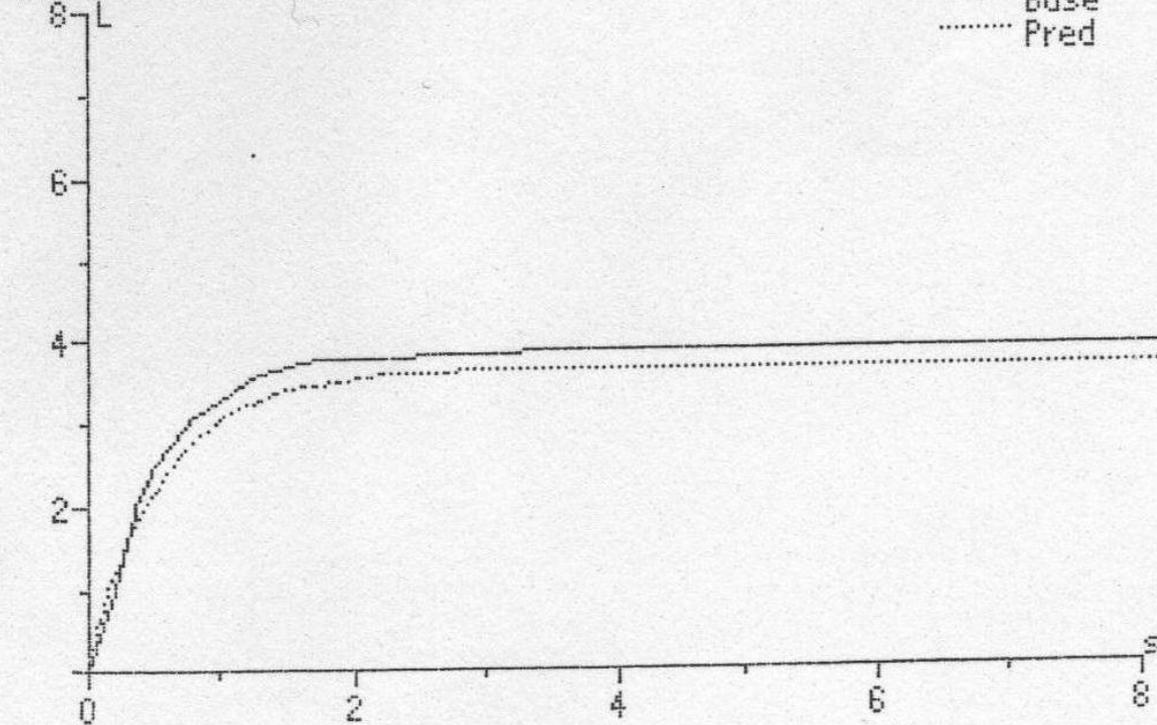
Parameters of Lung Function

	<u>Normal</u>	<u>Obstructive</u>	<u>Restrictive</u>	<u>Combined</u>
FVC	>80%	Normal	Reduced	Reduced
FEV ₁	>80%	Reduced	Reduced	Reduced
FEV ₁ / FVC	>70%	Reduced	Normal/ High	Reduced

Reading the tracing

- Is the spirometry valid ?
- Check sex/age/height/weight/BMI
- Check tracing for problems
- Identify ACTUAL ratio ? obstruction
- Identify FEV1 and % predicted
- Check VC and FVC ? Air trapping ? Reduced volumes
- Remember to use largest measurement from valid blows, (these may not all be from one blow)
- Do the figures fit with the tracing?
- Interpret together with history, symptoms and medication

Volume Time Curve



Normal Values: ECCS (Adult);
Zapletal, Solymar, Coeswell (Child)
Results at BTPS.

Technician: _____

Training

- **Do not perform spirometry without training**
- ARTP (www.artp.org.uk)
- EQUIP (www.essexequip.nhs.uk)
- Education for health
(www.educationforhealth.org.uk)

Thank you for listening

Any Questions ?