



A/Prof Jim Reid

Department of General Practice and Rural Health
Dunedin School of Medicine
Dunedin

Asthma and Spirometry - Practice Nurses Programme

Saturday, 30 July 2011

Start 5:00pm

Duration: 30mins

Speight Room



 **South GP CME 2011**

General Practice Conference & Medical Exhibition

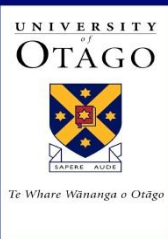
28-31 July 2011 | The Dunedin Town Hall | Dunedin

SPIROMETRY in GENERAL PRACTICE

Jim Reid

Faculty of Medicine

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Spirometry

Why

- Screening
- Diagnosis
- Progress
- For Special Approval Numbers.

SPIROMETRY in GENERAL PRACTICE

- **Would you manage hypertension without a sphygmomanometer???**
- **Would you manage diabetes without a glucometer???**

Spirometry

What is being looked for

- Obstruction
- Restriction
- Reversibility of obstruction.
- Mysteries!!!!

SPIROMETRY in GENERAL PRACTICE

PEAK EXPIRATORY FLOW RATE (PEFR)

- Measures flow in large airways
- Of limited use in COPD
- Relationship between FEV1 and PEFR is poor in COPD (closer in asthma)

SPIROMETRY in GENERAL PRACTICE

Spirometry measures airflow and lung volumes, and is the preferred lung function test in COPD

SPIROMETRY in GENERAL PRACTICE

TERMINOLOGY

- **FEV1** = the amount of air maximally exhaled in 1st second of exhalation
- **FVC** = the total volume of air that can be exhaled with maximum force, from maximum inhalation to maximal exhalation

SPIROMETRY in GENERAL PRACTICE

- **FVC & FEV1 expressed as volumes (litres)**
- **Also expressed as % of predicted values**
- **Predicted values dependent on age, height, and gender.**
- **Ratio FEV1/FVC expressed as a percentage**

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Factors that influence normal values

- **Height - tall people have larger lungs**
- **Age - Respiratory function declines with age**
- **Sex - Lung volumes smaller in females**
- **Race - Peculiarly studies show Blacks and Asians as a whole have smaller lung volumes (-12%) No studies for Maoris and Pacific People.**
- **Posture - little difference between sitting and standing. Reduced in supine position.**

Spirometry

Pitfalls

- Lack of effort
- Consistency
- Unable to maintain expiratory effort
- Exhaustion

Do FVC and VC to substantiate

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OBSTRUCTION

- $FEV1 / FVC < 70\%$
- $FEV1 < 80\%$ of predicted value
- In severe COPD the FVC may be $< 80\%$ predicted - Much less in fact

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Severity of Obstruction

FEV1

Mild

>70% Predicted

Moderate

50 - < 69% Predicted

Severe

<50% Predicted

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RESTRICTION

- **Both FEV1 and FVC < 80% BUT the FEV1/FVC ratio is normal or high**

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Severity of Restriction

FVC

Mild

>65 - 80% predicted

Moderate

>50 - 65% predicted

Severe

<50% predicted.

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Asthma

- **Both FEV1 & FVC are reduced, but can demonstrate reversibility of at least 12%.**

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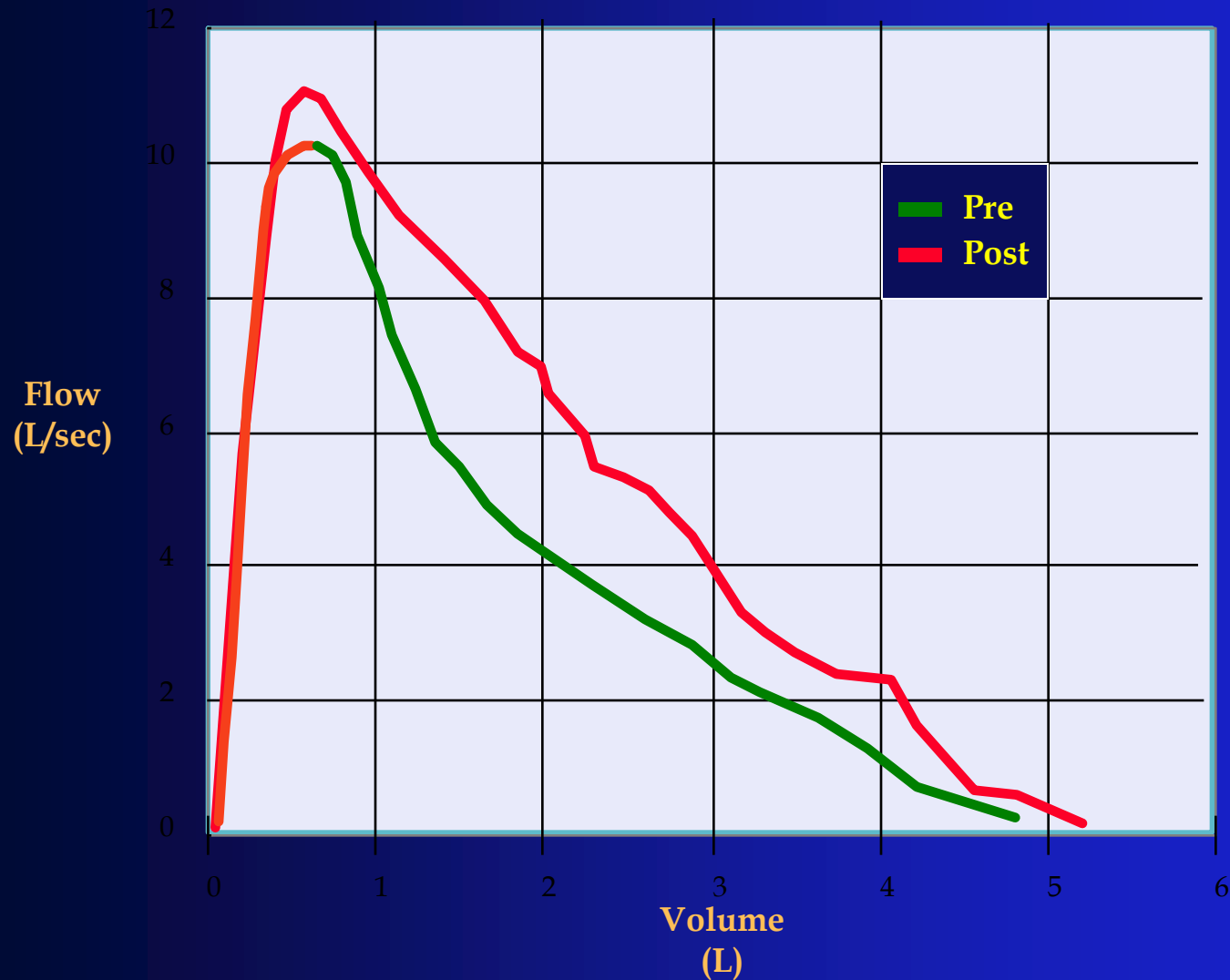
Two types of measurement

- **Flow / Volume Curve**
- **Volume / Time Curve**

Flow / Volume Curve

- X axis represents volume
- Y axis represents flow rate
- Shape depends on mechanical properties of lung.

Flow / Volume Curve



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Volume / time curve

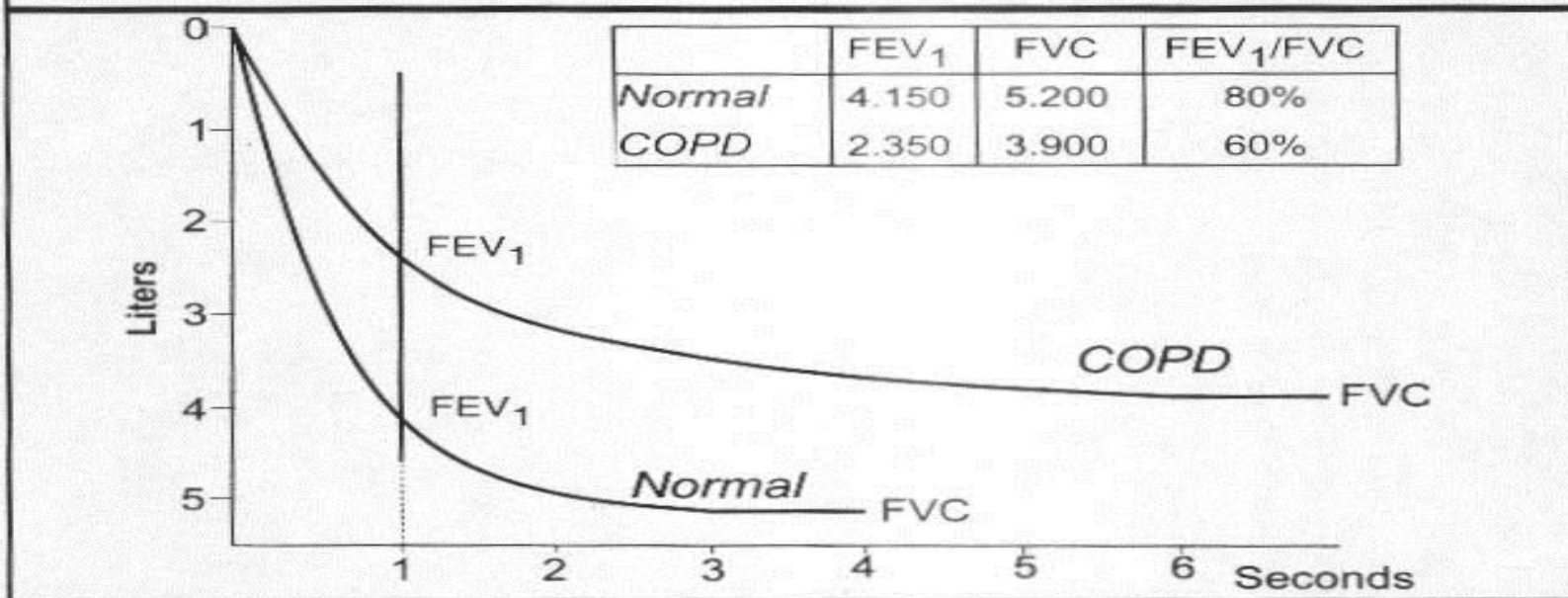
- Must be smooth
- Must plateau

ie Spirometry is only worth doing if it is done properly

COPD DIAGNOSIS

Vol / Time Curve

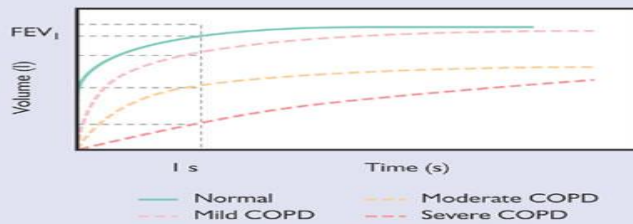
Figure 2: Example of Spirometric Tracings and Calculation of FEV₁, FVC, and FEV₁/FVC Ratio



Patients with COPD typically show a decrease in both FEV₁ and FEV₁/FVC. The degree of spirometric abnormality generally reflects the severity of COPD. However, both symptoms and spirometry should be considered when developing an individualized management strategy for each patient.

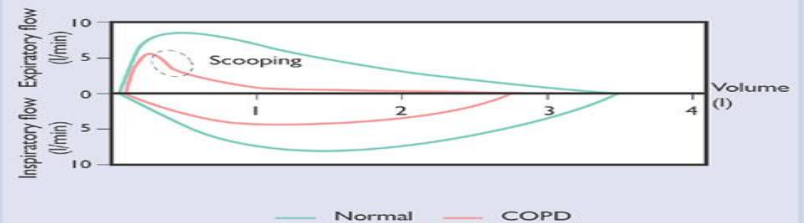
SPIROMETRY

Spirograms in COPD of varying severity



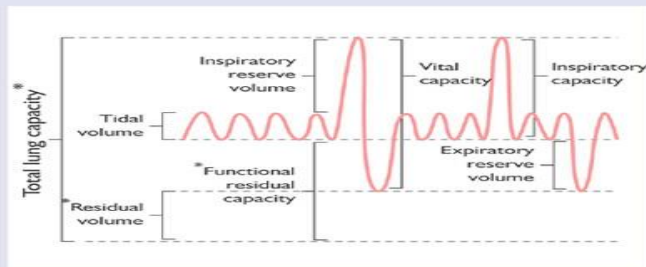
Forced vital capacity (FVC) plateau can take > 12 s

Flow volume loop: single breath forced maneuver



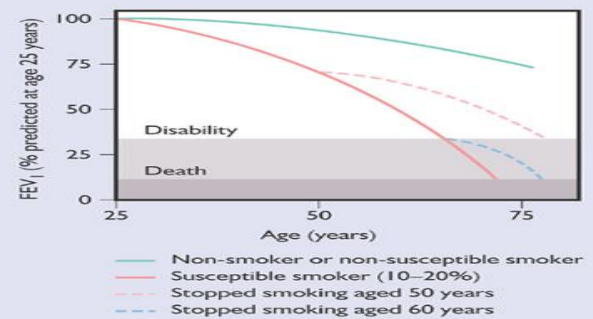
Pneumotachograph: 'scooping' caused by expiratory airway collapse

Lung volumes



* Total lung capacity, residual volume and functional residual capacity are measured by plethysmography

Natural history: decline in FEV₁ with age



Fletcher C, Peto R. *Br Med J* 1977;1:1645–8

SPIROMETRY

FEV6

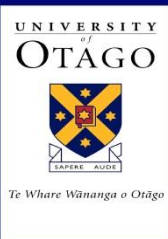
- Advantages?
- Disadvantages.
- Lung age

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Lack of Response to therapy?

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- Compliance to treatment
- Inhaler technique

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COMPLIANCE (Adherence)

- **Understanding.** 30% of patients do not know the difference between preventer and reliever. (Reid. J.J. unpublished data).
- **Forgetfulness**
- **Denial**
- **Wrong diagnosis**

And now.....ASTHMA!

Inhaler Technique

- Needs formal teaching
- Needs reinforcement
- Consider inhaler type
- Consider spacer.