



Using microspirometry effectively in clinical practice

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Quality assured microspirometry

- 1. Using the microspirometer in practice**
2. Monitoring rationale
 1. Case finding / “screening” rationale

Calibration

- Need to consider that equipment should be calibrated – and quite a lot of our measuring equipment is?
- How do you calibrate your peak flow meters?
- “Biological calibration”



Biological Calibration

- Clinician (who does not have asthma) should have had their own quality spirometry performed and know what their own PFR (peak flow rate) and FEV1 (forced expiratory volume at 1 second).
- Machine should be 5% of ideal (different to calibration syringe (3%) as human variability too)
- Ideally calibrate at each session
- Recommend “practice calibration” every three months (safety net)

Adapted from Levy ML, Quanjer PH, Booker R, Cooper BG, Holmes S, Small I. Diagnostic Spirometry in Primary Care: Proposed standards for general practice compliant with American Thoracic Society and European Respiratory Society recommendations. Primary Care Respiratory Journal. 2009;18(3):130-47

Keep a record

PFR range for 5% = 740 - 820
FEV₁ range for 5% = 3.8 - 4.2

| MICROSPIROMETRY | | | 10/15 |
|-----------------|-----|------|-------|
| 2015 | PFR | FEV | |
| 31/10 | 774 | 3.94 | (urt) |
| 5/11 | 780 | 4.14 | |
| 8/11 | 768 | 4.11 | |
| 30/11 | 780 | 4.0 | |
| 18/12 | 779 | 3.89 | |
| 21/12 | 767 | 4.06 | |
| 24/12 | 781 | 4.09 | |
| 30/12 | 782 | 3.99 | |
| 31/12 | 781 | 3.99 | |
| 4/1/2016 | 780 | 3.91 | |
| 5/1 | 773 | 4.01 | |
| 13/1 | 781 | 4.28 | |
| 14/1 | 777 | 4.02 | |
| 21/1 | 771 | 4.14 | |

- PFR 780 (range 740 – 820)
- FEV₁ 4.0 (3.8 – 4.2)

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Using microspirometry with patient (similar to peak flow meter)

- New mouth piece
- Blow out as fast / hard as you can (for at least one second) – we will need to do several short tests and we want maximum effort
- Should take at least three readings and ideally two would be within 100mls or 5%
- Record best (and second best readings) and if needed the degree of effort apparent

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Quality assured micro-spirometry

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Monitoring of COPD – FEV1 or full spirometry

- Quality Outcome Framework (QOF) asks for FEV1¹ not full spirometry nor further FVC, FEV1/FVC ratio)
- NICE Guidelines suggest FEV1 important every year (not full spirometry, nor FVC, FEV1/FVC ratio)² (GOLD less convinced if FEV1 needed)
- Major prognostic indicators look for FEV1 alone (not other parameters (eg. BODE³ / DOSE⁴))
- GOLD Strategy (2017) has removed FEV1 / spirometry from monitoring

1- NHS Information Centre. Quality and Outcome Framework 2012. 2013

2- National Collaborating Centre for Chronic Conditions COPD. Management of chronic obstructive pulmonary disease in adults in primary and secondary care (partial update). Clinical Guideline 101. London 2011

3- Cote CG, Pinto-Plata VM, Marin JM, Nekach H, Dordelly LJ, Celli BR. The modified BODE index: validation with mortality in COPD. European Respiratory Journal. 2008;32(5):1269-

4- Jones RC, Donaldson GC, Chavannes NH, Kida K, Dickson-Spillmann M, Harding S, et al. Derivation and Validation of a Composite Index of Severity in Chronic Obstructive Pulmonary Disease: The DOSE Index. Am J Respir Crit Care Med. 2009;180(12):1189-95

A patient attends and is more breathlessness with COPD

- Pulmonary Embolus
- Carcinoma of Lung
- Anaemia
- Heart Failure
- Pneumonia
- Anxiety
- Bronchiectasis
- Pneumothorax
- Pleural effusion
- Deconditioning

None of these will be picked up by annual spirometry

Effective use of resources



- STOP – doing diagnostic spirometry every year on routine review
 - This will save around 20-30 minutes of spirometry time per patient which can be used for other screening and clinical tasks
- 10,000 patient list size (average prevalence of 190 patients) = 95 hours of spirometry time freed up from routine review
- Use the time to listen to the patient and react to their symptoms and do a great review

Quality assured micro-spirometry

1. Using the microspirometer in practice
2. Monitoring rationale
 1. **Case finding / “screening” rationale**

Case finding for COPD

Consider a diagnosis of COPD for people who are:

- over 35, **and**
- smokers or ex-smokers, **and**
- have any of these symptoms:
 - exertional breathlessness
 - chronic cough
 - regular sputum production
 - frequent winter 'bronchitis'
 - wheeze

The missing millions are out there!

- Screening of smokers over 40 in general practice may yield 10 - 20% undiagnosed COPD cases, with a substantial proportion of these having severe disease¹
- Findings:

Moderate in 57.4%, severe in 36.8% and very severe in 5.8%

Tinkelman DG, Price D, Nordyke RJ, Halbert RJ. COPD screening efforts in primary care: what is the yield? Prim Care Respir J. 2007;16(1):41-8

Three easy areas to case find in primary care

1. Smokers with symptoms over the age of 35 years (especially in smoking cessation clinics)
2. People with other long term conditions (diabetes / CHD)
3. People presenting with “another episode of bronchitis” (the FEV1 does not change a lot in COPD during an exacerbation)^{1,2}

1- Prieto Centurion V, Huang F, Naureckas E, Camargo Jr C, Charbeneau J, Joo M, et al. Confirmatory spirometry for adults hospitalized with a diagnosis of asthma or chronic obstructive pulmonary disease exacerbation. BMC Pulmonary Medicine. 2012;12(1):73

2- Rea H KT, Adair J, Robinson E, Sheridan N. Spirometry for patients in hospital and one month after admission with an acute exacerbation of COPD International Journal of Chronic Obstructive Pulmonary Disease. 2011;6:527 - 32

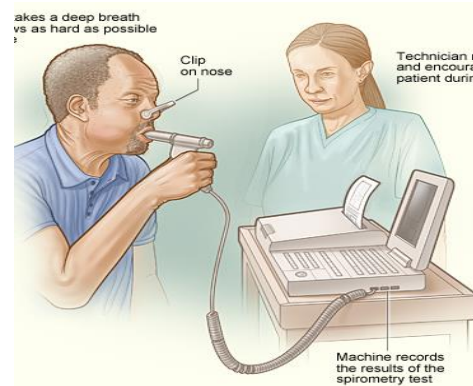
LLN for White Caucasian Males

| FEV1 cm | Units: L | | Male Whites | | | | | | | | | | |
|------------|----------|-----|-------------|------|------|------|------|------|------|------|------|------|------|
| | Ins | Age | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 |
| 122 | 48 | | 1.07 | 1.17 | 1.36 | 1.54 | 1.55 | 1.50 | 1.45 | 1.40 | 1.34 | 1.28 | 1.21 |
| 130 | 51 | | 1.24 | 1.37 | 1.58 | 1.79 | 1.80 | 1.75 | 1.68 | 1.62 | 1.56 | 1.48 | 1.40 |
| 137 | 54 | | 1.40 | 1.54 | 1.78 | 2.02 | 2.04 | 1.98 | 1.90 | 1.83 | 1.75 | 1.67 | 1.58 |
| 145 | 57 | | 1.60 | 1.76 | 2.03 | 2.31 | 2.33 | 2.25 | 2.17 | 2.09 | 2.00 | 1.91 | 1.81 |
| 152 | 60 | | 1.79 | 1.97 | 2.28 | 2.58 | 2.59 | 2.52 | 2.43 | 2.33 | 2.24 | 2.13 | 2.02 |
| 160 | 63 | | 2.02 | 2.22 | 2.56 | 2.91 | 2.93 | 2.84 | 2.73 | 2.63 | 2.52 | 2.41 | 2.28 |
| 168 | 66 | | 2.27 | 2.48 | 2.87 | 3.26 | 3.28 | 3.18 | 3.06 | 2.94 | 2.83 | 2.70 | 2.55 |
| 175 | 69 | | 2.49 | 2.73 | 3.16 | 3.58 | 3.61 | 3.50 | 3.37 | 3.24 | 3.11 | 2.97 | 2.81 |
| 183 | 72 | | 2.76 | 3.04 | 3.51 | 3.97 | 4.01 | 3.89 | 3.74 | 3.60 | 3.45 | 3.29 | 3.11 |
| 191 | 75 | | 3.06 | 3.36 | 3.88 | 4.39 | 4.43 | 4.29 | 4.13 | 3.98 | 3.82 | 3.64 | 3.45 |
| 198 | 78 | | 3.33 | 3.65 | 4.22 | 4.78 | 4.82 | 4.68 | 4.50 | 4.33 | 4.15 | 3.96 | 3.75 |
| 206 | 81 | | 3.65 | 4.01 | 4.63 | 5.25 | 5.29 | 5.12 | 4.93 | 4.75 | 4.56 | 4.34 | 4.11 |

Quanjer PH, Stanojevic S, Cole TJ, Baur X, Hall GL, Culver BH, et al. Multi-ethnic reference values for spirometry for the 3 –95-yr age range: the global lung function 2012 equations. European Respiratory Journal. 2012 December 1, 2012;40(6):1324-43

FEV1 is below the Lower Limit of Normal (LLN)

- Ask patient to book for full diagnostic spirometry (if bronchitis presentation perhaps when they think they are back to normal in 5-6 weeks time) – give information
- **Indicate it will help to manage their lung health much better (need for inhalers, antibiotics with flare ups) this should be positive and active**



Microspirometry is not for diagnosis



Top Tip – use microspirometry for routine
review and for case finding
list size of 10,000 will free up around 200 hrs
per year

But use high quality
diagnostic
spirometry to make
the diagnosis



Holmes S, Beer K (2014) Review of Spirometry use at Park Medical Practice – actual calculated
value for list size of 10,000 was 221hr