

# Clinical Physiology

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## Standard Operating Procedure for Spirometry and Reversibility studies at Arrol Park.

Version No: Version 1

Prepared By: G. Toole (Highly Specialist Respiratory Physiologist)  
Rachel Cunningham (Healthcare Public Health Programme Support Officer)  
Rebecca Turner (Healthcare Public Health Programme Manager)

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Lead Reviewer: G. Toole (Highly Specialist Respiratory Physiologist)  
Rachel Cunningham (Healthcare Public Health Programme Support Officer)  
Rebecca Turner (Healthcare Public Health Programme Manager)

Dissemination Arrangements:

- Standard Operating Procedure Distribution List (as held by Clinical Documentation Steering Group)
- NHS Ayrshire and Arran Intranet - AthenaA
- Others, as relevant

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## **1.0 Introduction**

The purpose of a spirometry test is to diagnose and monitor respiratory disease. When carrying out these tests, a clinician should aim to produce an accurate, reproducible measurement of lung volume and airflow and carry out bronchodilator reversibility.

## **2.0 Purpose of the Standard Operating Procedure**

- Ensure all staff are aware of calibration procedure as per manufacturers recommendations
- Ensure all staff are aware of the need for accurate patient demographics including accurate up-to-date height and weight are entered correctly
- Ensure staff know the indications and contraindications before testing
- Ensure staff are correctly identifying poor quality and reproducibility within acceptable guidelines (ARTP)

## **3.0 Scope of the Standard Operating Procedure**

This Standard Operating Procedure applies to all staff grades who perform Spirometry.

## **4.0 Definition of Terms**

CHI- Clinical Health Index

PFT- Pulmonary Function tests

TLC-Total Lung Capacity

O2- Oxygen

## **5.0 Standard Operating Procedure Content**

### 5.1 Equipment and clinical room

- Collect your patient list from reception at the beginning of the day. You should have the referral documents emailed you before the start of the clinic.
- Please arrive at the clinic room 30 minutes before the first patient is due to arrive to prepare the room.
- It is the clinician's responsibility to meet patients in the waiting area and show them into the clinic room
- The room and equipment should be cleaned and all disposable waste from previous investigation disposed of in appropriate waste bins and ensure all infection control procedures are followed
- Equipment should be safe and accurately calibrated using 3 litre syringe in accordance with manufacturers guidelines.
- Ensure mouthpieces, disposable aerochambers, spacers and inhalers are well stocked

### 5.2 Patient demographics

- Confirm patient's name and date of birth
- Measure accurate height(cm) and weight(kg), or arm span where patient unable to stand

- Select new patient
- Enter patient details, ensuring CHI number and name are entered accurately, correct date of birth, height and weight, operator and referring physician

### 5.3 Patient safety

- Knowledge of the scope of PFT including indications and contraindications, see appendix 8.2 for details
- If the patient has any of the list contraindications, explain to the patient that they cannot have the test carried out at this time. Inform the admin team at Girvan Community Hospital via the clinical mailbox (aa.Clinical\_Bookings at GCH-MHC) that the patient was not suitable for a spirometry test at this time and the admin team will contact the referrer.
- If you are unsure if the patient is not fit for a spirometry test, please contact the clinical physiology team for advice and guidance.
- If a patient becomes unwell, contact reception on extension 14949.
- Staff have up-to-date mandatory training, see appendix 8.2 for details

### 5.4 Infection control

- Appropriate measures are undertaken to minimise risk of infection transmission in accordance with local infection control policy
- A new unopened mouthpiece is opened in front of the patient with operator avoiding any contact with patient mouthpiece.

### 5.5 Patient instructions

- Appointment letters have information and instructions of patient prior to attending, see appendix 8.3 for details
- Each component of each individual tests is explained prior to the commencement of each test:

#### Spirometry:

Full inspiration followed by a sharp fast blast out, continuing until there is no more air to come out. Repeated at least 3 time up to maximum of 8 attempts

#### Slow Spirometry:

Full inspiration followed by a relaxed breath out until there is no more air to come out. Repeated at least 3 time up to maximum of 8 attempts

#### Reversibility study:

- This involves the administration of 4 puffs of Salbutamol via a metered dose inhaler. Following the administration of the Salbutamol, wait of 15 – 20min before repeating Spirometry as outlines above. You can ask the patient to sit in the waiting room after administering the Salbutamol. If the patient feels unwell after the initial testing, keep the patient in the room while you wait to do the reversibility test

### 5.7 Quality and Reproducibility of results

- Poor technique and lack of effort can affect quality and reproducibility of test results, staff performing PFT should be able to recognise bad blows and poor technique. See appendix 8.4

- As previously stated for Spirometry and Slow Spirometry, 3 attempts up to maximum of 8. Ensure staff are aware of reproducibility criteria.

Reproducibility criteria:

FVC/VC <150ml or 10 % whichever is greater in results  
 FEV1 <150ml or 10 % whichever is greater in 3 results

- As previously stated, following reversibility study, the above Spirometry reproducibility criteria applies to post nebulised results.

Criteria for reversibility:

No reversibility <10% improvement  
 Partial reversibility >10% - 12% with volume increase 100 – 120ml  
 Complete reversibility >12% + 120ml improvement

5.8 After spirometry tests is completed

- Provide patient with patient satisfaction survey and keep them in the room to answer any questions they may have.
- Print results of spirometry test for each patient and circle the FEV1 and FEV1/FCV, please see the image below as an example. Also write on the printout whether the patient had a good or bad technique.

```

Summary of all Forced Tests
  FEV1  FVC  PEF  FEV1/FVC  Quality  Time
PRE 1  1.70  2.28  389  73.7  Good blow  14:27:59
PRE 2  1.70  2.26  388  75.2  Good blow  14:30:41
PRE 3  1.51  2.11  387  71.6  Good blow  14:28:59
PRE 4  1.58  1.59  278  99.4  No plateau 14:29:48

FEV1 Var = 0.02L (1.19 %) FVC Var = 0.02L (0.88 %)
Variability FVC and FEV1 more than 150 mL
3 FVC and 4 FEV1 acceptable trials

POST 1  1.85  2.40  382  77.1  Good blow  14:58:52
POST 2  1.82  2.36  376  77.1  Good blow  14:59:31
POST 3  1.82  2.27  367  80.2  Good blow  15:00:05

FEV1 Var = 0.03L (1.65 %) FVC Var = 0.04L (1.69 %)
Variability FVC and FEV1 more than 150 mL
3 FVC and 3 FEV1 acceptable trials

Summary of BEST results PRE
  LLN  Pred  PRE  %Pred  Z-Score
VC    1.64  2.59  2.35  91
FVC   1.64  2.59  2.28  88  - 0.54
FEV1  1.45  2.07  1.70  82  - 1.04
FEV1/FVC 67.5 79.1 74.5 93  - 0.77
FEV1/VC 67.5 79.1 72.3 91  - 1.08
PEF(L/m) 148 308 389 126 0.84

QUALITY CONTROL GRADE: FVC A FEV1 A
  
```

Notes

- Scan the results of all the tests and patient satisfaction surveys and send these to the admin team at Girvan Community Hospital via their clinical mailbox (aa.Clinical\_Bookings at GCH-MHC). It is the admin team’s responsibility to send the results to the referrer.
- If a patient does not attend their appointment, make the team at GCH aware via their clinical mailbox so the patient can be re-appointed.

**6.0 Related NHS Ayrshire and Arran Documents**

AAA NHS Athena page

Corporate policies: Moving and Handling  
 Health and Safety

Department links: Infection Prevention and Control  
 Healthcare Quality, Governance and Standards

## 7.0 References

ARTP Handbook Part1 second edition  
ARTP statement of Pulmonary Function testing 2020

## 8.0 Appendix

### 8.1 Indication and contraindications for Spirometry

- Indications:
  - Identify the presence of any abnormality
  - Assess severity to allow prognosis and determine treatment options and urgency
  - Serial measurement to track disease progression
  - Assess debilitating effect of disease
  - Assess preoperative risk
- Contraindications:
  - Haemoptysis of unknown origin
  - Pneumothorax
  - Unstable Cardiac status, or recent myocardial infarction or pulmonary embolus
  - Thoracic, abdominal or cerebral aneurysm
  - Recent eye surgery
  - Presence of acute illness or symptom that would interrupt test, e.g. nausea or vomiting
  - Recent thoracic or abdominal surgery

### 8.2 Mandatory training

- Moving and Handling
- BLS
- Infection Control
- Clinical Governance

### 8.3 Patient instructions

#### [Pulmonary Function Tests/Spirometry](#)

#### **What is it?**

This test allows various measurements to be made of the lung capacity.

#### **Why is it done?**

It will confirm the diagnosis of several lung problems, and allow the Doctor to assess the degree of the problem. He/she will then be better able to treat you.

## **How is it done?**

You will be weighed, and your height will be measured. You will then be asked to breathe into a machine using a special mixture of gases. These will cause you no harm – all are present in air, but the proportions are carefully measured. You will be asked to perform various breathing exercises under the instruction of the physiologist.

### Preparations for the test

- 1) No smoking for 24 hours prior to test
- 2) No alcohol consumption for at least 4 hours
- 3) Avoid vigorous exercise in the 30 minutes preceding this test
- 4) Wear loose fitting clothing when attending for this test
- 5) Avoid eating a substantial meal in the 2 hours preceding this test
- 6) No short acting bronchodilators(no inhalers) for 4 hours preceding this test

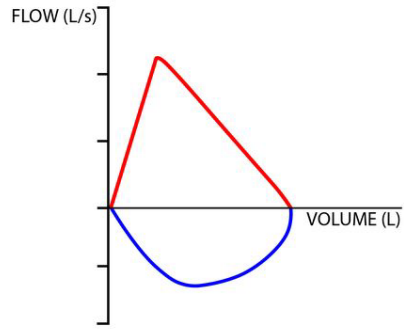
This test will be carried out by a Cardiac Clinical Physiologist, and no results will be available at this time. You will not see a doctor on your attendance today.

The test is entirely harmless, and will last approximately 50 minutes. If you have any worries or doubts, please discuss them with the physiologist.

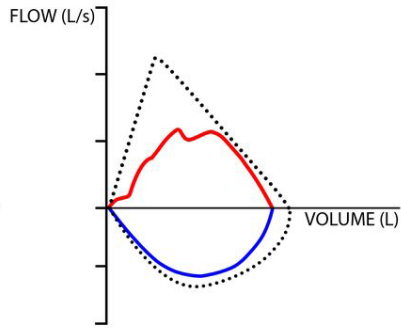
### 8.4 Recognising poor technique

- Poor effort
- Short blow
- Coughing
- Early end and restart
- Hesitation

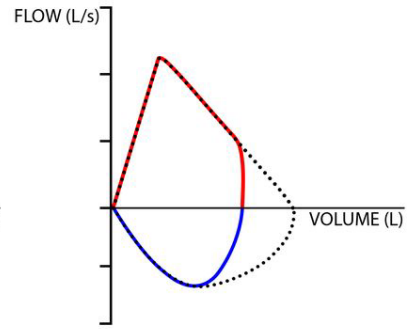
**(A) Normal Flow-Volume Curve**



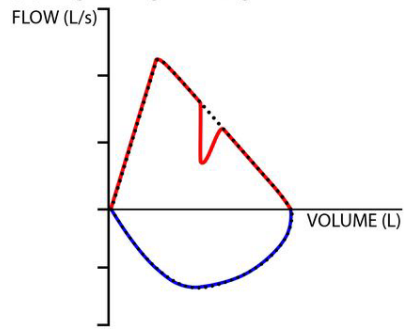
**(B) Poor Effort**



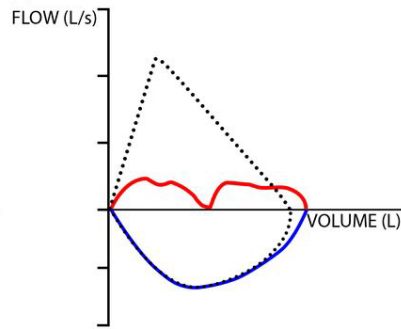
**(C) Short Blow**



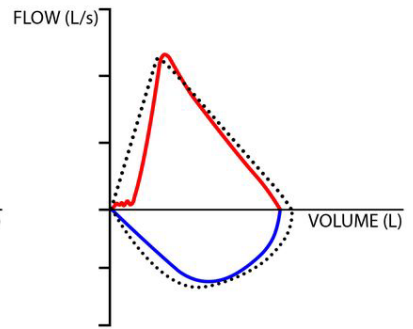
**(D) Cough During Recording**



**(E) Premature Finish And Restart**



**(F) Hesitation**



..... Good Technique