SERVICE SPECIFICATION FOR A CASE FINDING (SPIROMETRY AND ASSESSMENT SERVICE)

Deleted: COPD SPIROMETRY AND ASSESSMENT

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DRAFT 27 September 2011

COVER PICTURES TO BE INSERTED

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User Note

This specification has been designed to assist commissioners in the delivery of services for Chronic Obstructive Pulmonary Disease (COPD). The text within square brackets [ ] in Sections A to C of this document should be completed by the commissioner in order to reflect local needs and to help inform responses from the Provider(s).

The specification is not mandatory and the commissioner should review the whole of the specification to ensure that it meets local needs and, once agreed with the Provider, it should form part of a re-negotiated contract or form the relevant section of the NHS Standard Contract.

A Key Outcomes

The expected high-level, key outcomes of the Service are:

- To ensure accuracy of diagnosis and severity assessment in people with COPD
- To increase the proportion of people with COPD who are diagnosed comparing recorded prevalence with predicted prevalence
- To increase the number of people accurately diagnosed at an early stage of the disease (MRC 1 and 2)
- To ensure that users of the Service have a positive experience of care

B Purpose of the Service

B1 National and Local Context

B1a National Context and Overview

Chronic obstructive pulmonary disease (COPD) describes lung damage that is gradual in onset and that results in progressive airflow limitation. This lung damage, when fully established, is irreversible and, if it is not identified and treated early, leads to disability and eventually death. The greatest cause of COPD is smoking. Other factors include workplace exposure, genetic make-up and general environmental pollution.

The main symptoms of COPD are shortness of breath and reduced exercise ability, together with a cough and production of phlegm, which may get worse at certain times of the year.

COPD is a progressive illness, and the likelihood of people dying as a result of COPD increases with age. It is estimated that around 3.2 million people have the disease. About 900,000 have diagnosed COPD and an estimated 2 million people have COPD which remains undiagnosed. Most patients are not diagnosed until they are in their fifties. In the past, many people described as suffering from COPD were diagnosed as having chronic bronchitis, emphysema or chronic unremitting asthma. In some people, chronic bronchitis and emphysema affect different parts of the same lung, and so the two conditions can often occur together.

COPD causes more than 25,000 deaths a year in England and Wales, one person dies from the condition every 20 minutes. Data from the World Health Organization (WHO) shows that death rates from diseases of the respiratory system in the UK are higher than both the European average and the European Union (EU) average with a marked difference for females where UK death rates from respiratory disease are three times higher than those in France and Italy.

Providing care and treatment for these people places a significant burden on the NHS. The profile of COPD means that it is an expensive disease for the NHS when it is not identified and treated early. It is the second most common cause of emergency admission to hospital and fifth largest cause of readmission. The direct cost of COPD to the UK healthcare system is estimated to be between £810 million and £930 million a year and, without change, this impact is set to grow.

There is a broader economic cost. The annual cost of COPD related lost productivity to employers and the economy has been put at £3.8 billion. Some 25% of people with COPD are prevented from working due to the disease. COPD causes at least 20.4 million lost working days among men and 3.5 million days among women every year – more than any other respiratory condition.

COPD is associated with deprivation, largely due to the prevalence of smoking in the lower socio-economic groups, and sometimes compounded with the likelihood that the sufferer is employed in an activity that exposes them to a poor air-quality environment. Men aged between 20 and 64 who are employed in unskilled work in England and Wales are 14 times more likely to die from COPD than men employed in professional roles. Higher rates of smoking prevalence, represented either as a geographical anomaly; ethnic trait or, for example amongst sufferers of schizophrenia (74% as opposed to 15% -26% average) present challenges for reducing health inequalities within these groups.

In some areas, services provided to people with COPD do not meet existing clinical guidelines and there are wide variations in the standard of care across the country. In addition, many people with COPD come from communities with high levels of deprivation and often experience difficulty gaining access to appropriate services. People from these communities can also often feel marginalised and suffer the stigma of the condition's close association with smoking. Also awareness of COPD among healthcare professionals and the public remains low.

Current and ex-smokers of tobacco are most at risk of developing COPD, cannabis smokers are also at risk. Additionally, those exposed to inhaled dusts and gases in the workplace and those who have an inherited genetic predisposition that leads to the early onset of emphysema are also at risk. COPD is occasionally the result of inadequate lung development in childhood or lung damage caused by childhood infections. Maternal smoking is associated with reduced lung function in school-aged children, and also effects foetal development of the respiratory system.

Raising awareness of COPD is an important strand in securing better outcomes. Many people are not aware of COPD, its symptoms and its risk factors and are therefore unlikely to change behaviours that lead them to avoid the causes and exacerbating factors, such as cigarette smoke and workplace dusts and gasses. Lack of awareness also contributes to a tendency to ignore early symptoms of cough and breathlessness, only requiring treatment when the disease is fairly advanced, by which time a major opportunity to intervene has been missed.

COPD is not curable, but it is treatable. Its progress can be halted, and it can be managed to minimise the burden it imposes. There is a great deal of evidence to show that healthcare interventions do improve outcomes in COPD but late diagnosis, unwarranted variations in treatment, incorrect diagnoses and poor prescribing all contribute to a wide variation in outcomes and costs associated with treating the disease. For the majority of sufferers COPD is a preventable disease therefore education and encouragement of positive behaviours is a key element in all preventative and treatment strategies.
The Outcomes Strategy for People with COPD has been developed in order to raise awareness and improve care and outcomes for those with COPD and to reduce the overall incidence of the disease. It recognises the need to move away from the largely reactive episodic care based in hospitals to systematic, pro-active and patient centred approach. This should be rooted in the primary setting but underpinned by improved communications and partnerships and a multi-disciplinary approach to the management of COPD including both chronic and acute care. It is recognised that success will require a fully integrated approach with joint planning and working between commissioners and providers, professional groups, the third sector and people with COPD and their carers.

Smoking

Reducing the uptake of smoking and helping people to quit is critical to the prevention of COPD. Local Authorities have a key role in tobacco control and smoking cessation and commissioners should recognise the important benefits to be gained by engaging with and working closely with Public Health at a local level. However effective smoking cessation is also an integral part of the COPD treatment regime, although clinicians have not always recognised it as such.

NICE guidance recommends that clinicians in secondary care routinely use brief interventions to help people stop smoking and that they should have ready access to specialist stop smoking services. This should include the routine offer/provision of nicotine replacement therapy for smokers admitted to hospital. Evidence based specialist support for patients to stop smoking ie: intensive counselling with pharmacotherapy should be integral to all integrated COPD services.

The success of the Outcomes Strategy and achievement of a proactive, integrated and patient centred approach will therefore require cultural and behavioural change for health professionals and patients and carers alike.

The COPD Commissioning Pack

The Commissioning Pack is being issued as part of the programme of work being led by the Department of Health to improve services for COPD and asthma and is designed to assist Commissioners when procuring COPD services and this [first edition] comprises of four elements:

1) Spirometry and Assessment Service
2) Service to manage COPD exacerbations
3) Pulmonary Rehabilitation
4) Home Oxygen assessment and review

B1b Local Context

[The commissioner should insert information about the COPD Spirometry and Assessment Service which is relevant to local factors that will influence the way the Provider delivers the Service:

- Demographics
- Epidemiology
- The organisations commissioning the service
- Joint Strategic Needs Assessment (JSNA) and interrelationship with local Health & Well-being Board]

B2 Aims and Objectives

The aim of the COPD Spirometry and Assessment Service is to identify patients who have symptoms suggestive of COPD who present to their GP or who are identified through case finding. The Service will provide Patients with an accurate diagnosis and information about their condition. This will empower patients and their families to make informed decisions about management of their disease which will help maximise quality of life.

The objectives of the Service are:

- To diagnose COPD early in the course of the disease
- To provide accurate diagnosis of COPD
- To provide comprehensive assessment of impact and severity
- To ensure effective communication with and support for patients
- To assist in preventing people from dying prematurely from COPD
- To enhance the quality of life for people with COPD
- To ensure effective communication between relevant health professionals

C Scope

C1 Patients

The COPD Spirometry and Assessment Service is designed to meet the needs of adults who are deemed to be at risk and display the symptoms suggestive of COPD, but who have not already received a diagnosis confirmed by quality assured diagnostic spirometry. General Practitioners shall refer these patients to the Service.

C2 Exclusion criteria for this Service

- People under the age of 16

C3 Equity of Access to Services

[*Describe the Commissioner's requirements for ensuring that its services are accessible to all, regardless of age, disability, race, culture, religious belief, gender or sexual orientation, or income levels, and deals sensitively with all service users and potential service users and their family/friends and advocates. NB This needs to reflect The Equalities Act 2010.*]

C4 Geographical coverage/boundaries

[*Include details of any geographic coverage/boundaries, geographical restrictions including GP practices in respect of provision of a COPD service.*]

C5 Referral sources

The Provider shall accept referrals from Primary Care.

C6 Interdependencies with other services

[*Describe any relationships between the service and other Providers of health and other services in which a relationship of 'dependency' exists. This may include but not be limited to oxygen services, cardiac services, social care, mental health services, smoking cessation services and pharmacists.*]

C7 Location of Service

The Provider shall ensure that the Services are provided in order to take into account patient need and choice. Providers are to ensure that venues are easily accessible to patients, including availability of public transport and car parking.

Commissioners should also consider whether it is appropriate to provide the service "at home" or on a peripatetic basis.

C8 Days/hours of operation

[*Include full details of the times at which the Provider offers services*]

D Service Delivery

COPD Spirometry and Assessment Service - Pathway

The following diagram shows the pathway for the COPD Spirometry and Assessment Service.

The detailed requirements for each stage are set out below, including the key deliverables and associated indicators at each stage.

It shows 4 stages in the pathway and some services may happen in parallel rather than in series. Stages 1-3 reflect the core stages of the COPD assessment pathway. Stage 0 is included in the service specification to confirm the obligations to be placed on the Stage 0 Provider by the Commissioner as it is critical to the success of the service being commissioned. It reflects the pre-requisites that should be in place for stages 1-3 to be effective. Stage 1 is needed to ensure that all symptomatic patients are encouraged to use the Service.

Stage 0 – Identify and refer patient

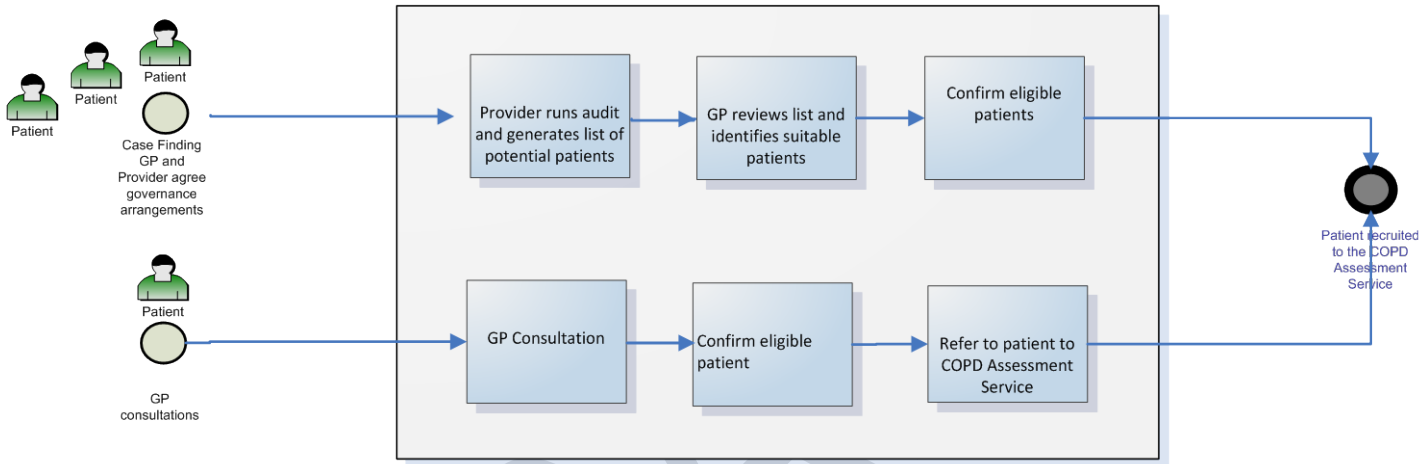
Patients will be identified and referred in one of two ways:

A Patients who present to clinician with clinical features that suggest the possibility of COPD.

- Such features might include exertional breathlessness, chronic cough, regular sputum production, frequent winter "bronchitis" and wheeze.

The clinician should refer all such patients directly to the COPD Spirometry and Assessment Service.

B Case finding for symptomatic patients with airflow obstruction: audit of primary care register



Deliverables

Targeted Audit of registered patient lists

Case finding for symptomatic patients with airflow obstruction: audit of primary care register. The Provider will liaise with the GP and agree who should conduct the audit and manage the referral process:

- The Provider shall agree with the GP the governance arrangements re the data
- The Provider shall liaise with the practice in respect of the running of the audit and the generated list of potential patients
- The GP shall review the list to identify any patients who should not be referred to the Service
- The Provider and GP shall agree a process for contacting the patient - this might include a letter in the GPs name, and/or a phone call by a nurse to advise the patient why the test was being offered - it may for example be offered as part of a general chest/lung health check/review.

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Within 7 days of being authorised to commence the audit, a targeted audit of primary care registered patient lists, in cooperation with primary care, to identify individuals whose medical history suggests the possibility of COPD – for example recurrent respiratory infections or use of inhalers in smokers and ex-smokers over 35 without a diagnosis of COPD or asthma.

A list of patients that meet the audit criteria and shall transmit the results of the targeted audit to the GP within 10 days of being authorised by the GP to begin the review. The information shall be transmitted securely.

Information for Commissioners

The purpose of this section is to provide information for commissioners about Stage 0; primarily what should be good practice in primary care. At a high level, this guidance identifies the patient groups that should be eligible for the COPD Spirometry and Assessment Service and includes the overview of a referral protocol that could be put in place.

From primary care there are two groups of patients who may be referred into the Service:

1 Patients who present to clinician with clinical features that suggest the possibility of COPD.
   - Such features might include exertional breathlessness, chronic cough, regular sputum production, frequent winter "bronchitis" and wheeze.

2 Patients identified through the systematic audit of GP records as having a medical history that suggests the possibility of COPD (see above).
   - Such a history might include (for example) recurrent respiratory infections or use of inhalers in smokers and ex-smokers over 35 who are not known to have a diagnosis of COPD or asthma.

In (1) the clinician would refer directly to the COPD Spirometry and Assessment Service.

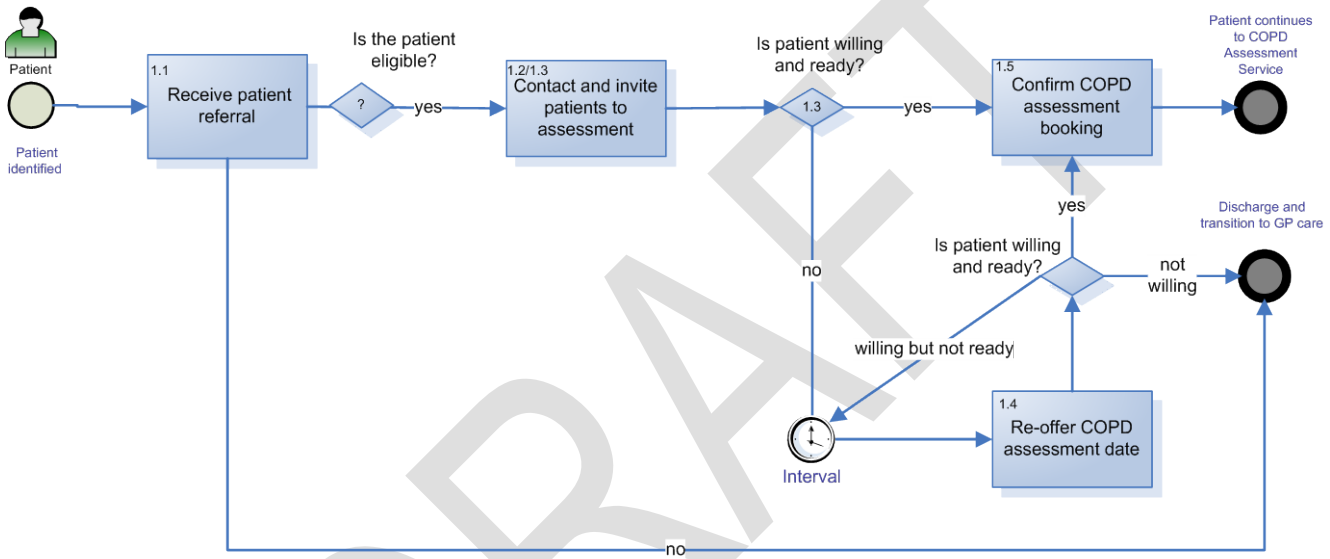
In (2) the Provider has to liaise with the GP to conduct the audit and manage the referral process.

Referral arrangements

All eligible patients should be referred to the COPD Spirometry and Assessment Service within [3] operational days of either (i) receipt of the list or (ii) the initial consultation. The commissioner may wish for certain information to be supplied by primary care to the COPD Spirometry

and Assessment Service, a proforma referral protocol is contained in Annex [A] This information should be transferred securely.

Stage 1 – Manage referral and arrange assessment



Overview
The Provider is responsible for encouraging as many referrals as possible to the COPD Spirometry and Assessment Service. Providers should therefore consider how to facilitate the optimal responses from the list of patients in order to ensure maximum recruitment to the COPD Spirometry and Assessment Service, taking into account all factors including personal circumstances of patients and carers and local

circumstances such as availability of public transport. The Provider shall ensure that all referred patients are offered a COPD assessment.	
Indicators	Outcomes
[85]% of people being offered an assessment for COPD compared with local predicted prevalence.	To increase the proportion of people with an accurate diagnosis of COPD compared with local predicted prevalence

1.1 Provider Receives Patient Referral

The Provider shall collate patient referrals and within [3] operational days of receiving a referral, the Provider shall send an acknowledgement of receipt of the referral back to the referrer. If the referral information is not complete, the Provider may reject the referral.

The Provider shall liaise with key providers, referrers and stakeholders in order to achieve integration across the system and to increase uptake.

1.2 Confirm Patient is eligible

The Provider shall check all referrals within [3] operational days of receiving them and confirm that all patients are eligible.

The Provider shall accept or reject the referral to the COPD Spirometry and Assessment Service based on the information contained in the referral information. If the Referral is rejected, the Provider shall record the reason and refer the patient onto GP-supported management.

1.2/1.3 Contact and invite eligible Patients to assessment

The Provider shall contact eligible patients and carers by telephone or pre-agreed letter within [3] operational days of receipt of referral. In either case the communication will be in the GP's name and will introduce the service and invite the patient to attend for a COPD assessment (initial offer).

The Provider shall send patients who cannot be contacted after [2] attempts, and within [10] further operational days, an offer or an assessment date in writing. The Provider will use all reasonable efforts to contact eligible patients including contact by mobile phone, text message, email or in person as appropriate.

If the offer is not accepted, or the patient cannot be contacted within [3] attempts, the patient shall be referred back to the GP.

In consultation with the patient, the Provider will determine whether the patient is willing to attend for assessment and/or ready to attend an assessment (patients who are clinically not able to attend will be deemed "unable"). The Commissioner may choose to ask a wider range of questions to identify contraindications in which case the patient may not be ready for assessment. The key high risk contraindications are well established and these must be double checked by the person performing spirometry.

The Provider shall ascertain whether the patient has had an acute exacerbation within the previous 4-6 weeks or is a chronic unstable patient. Where there has been an acute exacerbation within the previous 2 months the patient will not be ready for an assessment, the Provider shall arrange for an assessment to take place no earlier than 2 months from the start of the acute exacerbation, or such longer period as appropriate in respect of chronic unstable patients. The Provider shall then contact the patient [3 days] prior to the assessment date to confirm that the patient is still willing and ready to attend the assessment, and has not had a further exacerbation.

Where the patient is ready and willing, they shall be offered an assessment date that is within [10] operational days of successful contact.

The Provider shall record the date of successful contact and the proposed assessment date.

The Provider shall record the number of patients willing and ready for assessment and those not willing and/or not ready for assessment.

1.4 Re-offer assessment date

The Provider shall re-offer (second offer) an assessment date to patients who are not ready and/or not willing within a mutually agreed timeframe of the initial offer.

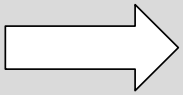
Where a patient accepts a re-offered assessment date, the Provider shall record the date when the patient confirms that acceptance.

Where a patient is not willing to accept a re-offered assessment date, the Provider shall record the date when the patient confirms that he/she is not willing to accept the second assessment date. If the patient is not willing to accept the second offer they shall be referred to GP-supported management.

Where a patient is willing but not yet ready to accept a re-offered assessment date, the Provider shall record the date when the patient confirms that he/she is willing but still not ready. The patient shall be re-offered (third offer) an assessment date within a mutually agreed timeframe of the previous offer.

The Provider shall record the onward referral of non-willing patients to GP-supported management and the date the onward referral is made. The offer and re-offer process is shown in the table below.

Decision process for Stages 1.3–1.4

<table>
<tr><th>Patient</th><th>Offer 1</th><th>Offer 2</th><th>Offer 3</th><th>Refer to General Practitioner</th></tr>
<tr><td>Not willing</td><td>Within [Commissioner to Specify] operational days from receipt of referral</td><td>Within [Commissioner to Specify] operational days from receipt of referral unless firm refusal at offer 1</td><td>  </td><td rowspan="4">GP to consider management of patient within their service and/or re-referral</td></tr>
<tr><td>Not ready</td><td>Within [Commissioner to Specify] operational days from receipt of referral</td><td>On date agreed with patient</td><td>Offered a date within a mutually agreed timescale.</td></tr>
<tr><td rowspan="3">Not contactable</td><td colspan="3">Attempts to Contact within Three week period</td></tr>
<tr><td>Contact 1</td><td>Contact 2</td><td>Contact 3</td></tr>
<tr><td>Within [Commissioner to Specify] operational days from receipt of referral</td><td>Within (8) operational days from receipt of referral</td><td>Within (15) operational days from receipt of referral. If no response; written letter offering assessment date</td></tr>
</table>

Where the patient is ready and willing they shall be offered an assessment date within [10] days of successful contact.

1.5 Confirm COPD Spirometry and assessment booking

Once the patient and/or carer have accepted a proposed assessment date, the Provider shall advise patient how to prepare for the appointment.

The Provider shall ask the patient to avoid if possible:

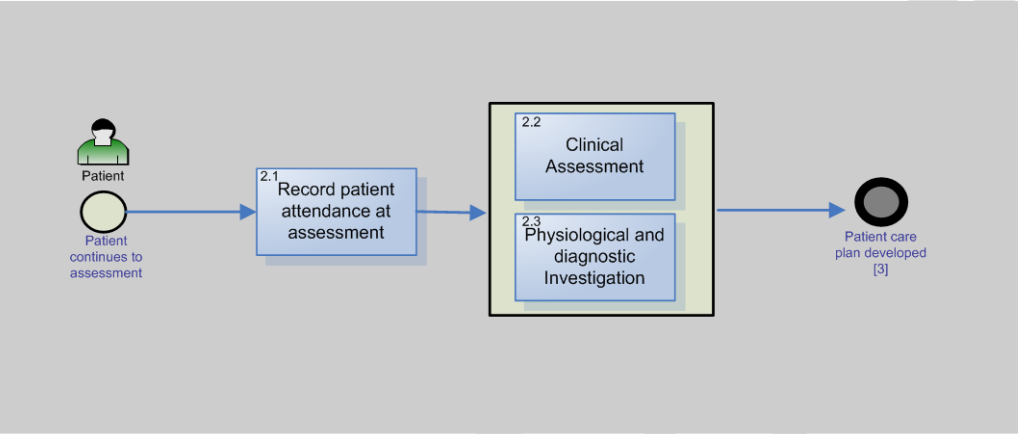
- Smoking for at least 24 hours before the test
- Eating a large meal before the test
- Exercise or exertional activity before the test
- Wearing tight clothing
- Bronchodilators prior to the test

The Provider shall ask the patient to bring inhalers to the appointment (in the event that the patient has had a previous diagnosis of COPD but not through quality assured diagnostic spirometry).

The Provider shall ask the patient to continue usual inhaler therapy. Patients should be asked to avoid short acting bronchodilators – e.g. salbutamol, bricanyl – in the four hours before the test. Long acting LABA bronchodilators should not be taken in 8 hours before test, and long acting anticholinergics (tiotropium) for 36 hours.

The Provider shall send confirmation of the date, time and all relevant information to the patient and carer regarding the COPD assessment and ensure that, even if it is not possible for the patient to avoid the above things, that they make every effort to attend the assessment.

Stage 2 – Clinical Assessment and Diagnosis



NB diagram amend to 2.2 History & Examination, 2.3 Assesment of Airflow Obstruction, QADS, 2.4 Diagnosing COPD, 2.5 Differential diagnosis and assessment of severity of disease, 2.6 Co-Morbidities, 2.7 Other Investigations, 2.8 Referral for Specialist Advice..?

Overview
At this stage, the Provider shall undertake an assessment of the patient which shall take place in an appropriate setting. Diagnosis shall only be made after a comprehensive assessment which should include a clinical assessment and physiological investigation. The Provider will be responsible for making a diagnosis and communicating this to the patient. The Provider shall make recommendations about further investigations or referrals to the patient's GP where appropriate.

Performance Indicators	Outcomes
• [75]% of people have an accurate diagnosis of COPD compared with local predicted prevalence • [x]% of people diagnosed with COPD at an early stage of the disease compared with the total number of patients diagnosed with COPD	• To increase the proportion of people with an accurate diagnosis of COPD compared with local predicted prevalence • To increase the number of people diagnosed at an early stage of the disease

2.1 Record Patient Attendance at Assessment

Having recruited patients to the COPD Spirometry and Assessment Service, the Provider shall undertake an assessment of the patient. The assessment shall take place within (10) operational days of the patient confirming that they are willing and ready in accordance with stages 0 and 1. The assessment undertaken in stages 1-2 should be carried out on the same day and in a single location.

The Provider shall ensure that each patient is seen by the examining Healthcare Professional[1] within [10] minutes of their appointment time.

2.2 History and Examination

All parts of the clinical assessment shall be undertaken by an appropriate Healthcare Professional.

The Provider shall ensure that the patient has adhered to pre-visit requirements and confirm that there are no contraindications.

The Provider will perform a full respiratory focussed clinical assessment to include history and clinical examination.

The Provider shall ensure that an up-to-date smoking history is established in accordance with NICE guidelines. The history shall include an assessment of pack years smoked (number of cigarettes smoked per day, divided by 20, multiplied by the number of years smoked).

2.3 Assessment of Airflow Obstruction

[1] That is a person qualified in a healthcare related profession in line with the acute standard contract definition.

The Provider shall undertake a quality assured diagnostic spirometry test which shall be performed on the same day and in the same location as the clinical assessment (2.2).

Quality Assured Diagnostic Spirometry

A Guide setting out the full requirements for quality assured diagnostic spirometry is set out in full at Appendix B.

The provider should ensure that the requirements of the guide are complied with at all times.

The Provider shall, depending on the extent that any of the pre-test advice has been followed by the patient, use their discretion to decide whether or not to proceed with the test. If they decide not to proceed they will rebook the test.

The Provider shall assess the patient for contra-indications to spirometry and perform baseline oxygen saturation prior to the spirometry test (in [ ] patients – Oxygen saturation at rest on air (or state inspired oxygen concentration). Anybody at or below 92% (room air) should have a blood gas measured to check pH and PaCO2 levels and shall be referred for LTOT assessment.

The Provider shall ensure that the testing is undertaken in an appropriate setting and during the test.

The Provider shall explain and demonstrate to the patient what will happen during the tests and ensure that the patient understands what is required of them, and why it is important to perform each manoeuvre as best they can.

The Provider shall explain to the patient:

- the nature of the test
- the type of blow required
- that a minimum of 3 acceptable and a maximum of 8 test results are needed.

The Provider shall make sure that there is no more than 0.1L (100ml) variation between each blow.

Post-bronchodilator testing

As required by the Guide the Provider shall perform post-brochodilator testing where:

- the baseline spirometry reveals an obstruction
- reversibility testing shall be performed where it is needed, for example to differentiate between COPD and Asthma (Reversibility should be divided in "Acute Reversibility" -the response to inhaled bronchodilator agents within an hour and "Chronic Reversibility" the response to medication or interventions over 24 hours or more.) and
- the patient's COPD is chronic and needs to be monitored.

The Provider shall ensure that the bronchodilator is administered. The usual dose is 400mcg salbutamol via spacer.

The Provider shall record:

- the post-brochodilator results using the largest post-bronchodilator FEV1 and the largest VC or FVC to determine the FEV1/VC ratio
- the flow/volume and time/volume graphs
- any technical comments on the spirometry

Repeat Spirometry Testing

Where a patient has two COPD exacerbations either requiring hospital admission or treated elsewhere and reported in any 12 month period or they have a large "step change" in deterioration they may require a repeat spirometry test. For patients near end-stage disease the Provider should consider replacing spirometry with oximetry, blood gases, and oscillometry or some other non-volitional method.

2.4 Diagnosing COPD

Diagnosis

The diagnosis shall be made by a healthcare professional with expertise in differential diagnosis of respiratory conditions.

The Provider shall make a diagnosis based on the findings of the clinical assessment and physiological tests in accordance with the recommendations set out in NICE guideline 101. As certain symptoms are not specific to COPD, and other disorders may present with similar symptoms, the Provider should consider differential diagnosis. Some Patients may not have a respiratory illness.

The Provider shall grade severity in accordance with NICE guidance which grades the disease by reference to airflow obstruction from Stage 1 – mild to Stage 4 – very severe.

Where the Provider has been unable to arrive at a diagnosis, or has arrived at a diagnosis other than COPD the Provider shall advise whether additional investigations (see below), or a referral to a specialist should be recommended to the GP and patient.

2.5 Differential diagnosis and assessment of severity of disease

The Provider shall ensure that all patients with a confirmed diagnosis have an assessment of severity of disease and identification and assessment of co-morbidities.

They will ensure that patients receive appropriate information about their disease and their care plan.

The Provider shall provide a comprehensive assessment of severity for each patient which will include the degree of breathlessness, the frequency of exacerbations and an evaluation of COPD related health status using a validated measure and FEV1.

Breathlessness shall be assessed by using the Medical Research Council (MRC) dyspnoea scale.

The assessment of severity will include the following essential tests:

- Degree of airflow obstruction (indicated by percent predicted FEV1)
- Degree of breathlessness (using a validated measure eg: MRC dyspnoea score see Appendix C)
- Frequency of exacerbations
- Evaluation of COPD related health status (using a validated measure eg; COPD Assessment Test see Appendix D)
- Body mass index (people with COPD who have a BMI <20 should be referred for specialist dietary advice as should those with a BMI >30 and people with a BMI between 20 and 30 should be offered advice on healthy eating).
- Pulse oximetry (92% or below on room air requires a blood gas sample)

- Alpha-1-antitrypsin (as recommended by and in accordance with NICE Guidelines)
- Sputum culture
-
- Full lung function tests to characterise phenotype
- a full blood count
- Also the Provider will refer for a Chest radiograph (where one has not been done within the last [12] months)

2.6 Co-morbidities

- The Provider shall record a list of co-morbid conditions. (Refer to NICE COPD Guideline 2004 page 27 sect 1.2.4)

2.7 Other investigations

The Provider shall identify whether the patient should have additional investigations, this may assist in arriving at an alternative diagnosis. The tests may include, but not be limited to:

- Serial domiciliary peak flow measurements
- Transfer factor for carbon monoxide (T_LCO)
- High resolution CT scan of the thorax or CT pulmonary angiogram
-
- ECG, NT-pro-BNP blood test and or echocardiogram if cardiac pathology suspected

- Blood gas analysis

The Provider shall record:

- The number of patients who have a diagnosis of COPD;
- The number in each MRC category and the % distribution of MRC scores
- The number of patients in each spirometry severity category and the % distribution of severity scores
- Co morbid conditions
- Referrals

2.8 Referral for specialist advice

The Provider shall consider whether to recommend to the patient and GP that the patient should be referred to a specialist.

Stage 3.0 – Communicate the diagnosis [and initiate care plan]

Overview
The Provider shall ensure that the results of the Clinical Assessment Box [2.2] and Physiological Examination [Box 2.3] are brought together for a diagnosis to be made in accordance with NICE guidelines. Once the diagnosis has been made the Provider shall communicate it to the patient in an appropriate setting on the same day and in the same

location.

The Provider shall provide the patient with their diagnosis and shall explain the treatment and /or the need for further investigation to the patient in a way that the patient understands.

The Provider shall communicate the diagnosis in a manner that minimises unwarranted anxiety and shall provide information and reassurance that empowers the patient and carer to make informed decisions about the management of the condition and their individual well-being.

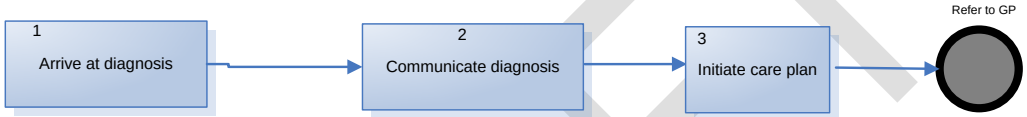
Where appropriate, the Provider shall explain to the patient/patient's carer or family, the next steps in their treatment; what to do in an emergency and who to contact.

The Provider is to initiate a care plan and share it with the patient, and their GP.

The Provider shall ensure that the Patient is fully consulted and informed as to what the next steps are.

Performance Indicators	**Outcomes**
• % smokers with a new diagnosis of COPD who are offered stop smoking support and pharmacotherapy annually	• Smokers with a new diagnosis of COPD are offered stop smoking support and pharmacotherapy
• Number and % patients with a new diagnosis of COPD who are MRC3+ who are referred to pulmonary rehabilitation annually	• Patients with a new diagnosis of COPD who are MRC3+ are referred to pulmonary rehabilitation
• Number and % patients with a new diagnosis of COPD with hypoxia (saturations less than 92%) annually	-
• Number and % patients with a new diagnosis of COPD with hypoxia (saturations less than 92%) referred for LTOT assessment	• Patients with a new diagnosis of COPD with hypoxia (saturations less than 92%) are referred for LTOT assessment
• % of patients and carers surveyed who are satisfied with the service	• To ensure that users of the services have a positive

	experience



Communicating diagnosis to patient

The Provider shall meet the patient and carer in order to communicate the diagnosis. The meeting should take place on the same day and in the same location as the clinical assessment and physiological measurement. The communication of the diagnosis shall take place face-to-face in a quiet, private and comfortable setting.

The Provider shall ensure that sufficient time is allowed to communicate the diagnosis and the severity of the illness sensitively, for the patient to assimilate the news of the diagnosis and to address any initial concerns and questions the patient and carer may have. The Provider shall allow at least [ ] minutes [DQ: time or "reasonable period"] to communicate the diagnosis to the patient and carer, to discuss and agree the components of the care plan.

The Provider shall communicate the diagnosis to the patient in simple direct language avoiding use of medical jargon and shall communicate in a respectful manner.

The Provider shall communicate the diagnosis to the patient's GP together with all appropriate information in respect of it including the test results, severity assessment and information on co-morbidities identified.

Documenting results

The Provider shall employ a system of data collection, storage, retrieval and transmission to capture the information set out below in respect of the COPD Spirometry and Assessment Service. Patient confidentiality and data protection should be considered at all times in this process.

1 A comprehensive record of the identities and numbers of patients who have presented in response to an invitation issued as a result of targeted case-finding or GP referral.

2 Appropriate records of the clinical examination, physiological investigations and spirometry tests.

3 A comprehensive record of symptoms and signs and evidence of complications or serious disease and diagnoses and communications to the patient.

Good practice suggests that all efforts should be stored graphically and as raw data with the selected best efforts indicated and an indication of the quality shown. Any technical problems or patient limitations or errors should also be recorded.

Once a patient has been diagnosed with COPD the following should be recorded for inclusion on the disease register:

- FEV1, whether the readings are pre- or post-bronchodilator and severity characterisation according to NICE 2010 guidelines
- other symptoms that contributed to the diagnosis of COPD (cough, sputum and breathlessness)
- functional impairment (e.g. MRC dyspnoea scale)
- exacerbation frequency
- BMI
- smoking history and status (what methods, if any, of smoking cessation are being provided)
- oxygen and blood gas assessment
- educational knowledge of COPD

- co-morbidities (include psychological conditions (anxiety, panic disorder and depression), cardiovascular disease, diabetes and osteoporosis)
- ethnic group and
- when identification of advanced disease has taken place, a record of signposting or discussion of wishes for palliative and end-of-life care.

[Initiate Care Plan

For each patient that has been through the COPD Spirometry and Assessment Service, the Provider shall initiate a care plan to discuss with the patient and carer and to share with the GP. The care plan shall cover both patient and carer needs and preferences and the Provider shall ensure that the plan is appropriate to the patient's individual circumstances.

The Provider shall discuss with the patient the content of the care plan ensure that the patient's needs and preferences are reflected fully in the plan. The Provider shall ensure that patients, who are still smoking, regardless of their age, receive evidence based advice to stop smoking and understand the implications of continuing to smoke. The Provider will give the patient information on the most effective ways to stop smoking and information on local smoking cessation services. Where the patient agrees, the Provider shall make a direct referral to the service.

The Provider will explain and offer pulmonary rehabilitation services to all MRC3+ patients with a new diagnosis of COPD Pulmonary Rehabilitation services and patients who agree will be referred to the service.

As a minimum, the care plan shall cover:

- Next steps in investigation and management
- Information about how to stop smoking and smoking cessation services

- Information about pulmonary rehabilitation
- Education and self management including advice on stopping smoking, healthy living, eating, diet, medication and treatment including proper use of medicines, steroid packs and inhaler techniques and what to steps to take when becoming ill.
- How and when to access medical help.
- Local information sources, including libraries and voluntary organisations such as the British Lung Foundation.
- Information about local care and support groups, including carers organisations and third party organisations such as Breath Easy Groups.

The Provider shall ensure that all patients diagnosed with COPD make an appointment with their GP as soon as possible after the diagnosis and assessment.].

Patients with an uncertain diagnosis

Where the Provider is recommending further interventions or an onward referral to a specialist, the Provider shall follow the same process as set out above for patients with a clear diagnosis. In addition, the Provider shall explain the basis of the recommendation for additional interventions or referral and encourage the patient to arrange an appointment with their GP.

The Provider shall ensure that this communication stage empowers the patient to make informed decisions about the management of the condition and their individual well-being.

Communicate serious illness notification to GP

Where a certain diagnosis is made, the Provider shall communicate a 'serious illness notification' to the patient's general practitioner with [1] day of the diagnosis being shared with the patient. This can take a format similar to that used for a diagnosis of cancer and communication should be by email or fax.

Produce Discharge Letter

When the patient has agreed the Care Plan it will be copied to the patient's GP, alongside a discharge letter summarising the main points of the Care Plan. For patients diagnosed with COPD or asthma, the Provider should recommend that the patient is entered onto the QoF COPD or asthma register.

When the patient is discharged from the Service the Provider should also send to the GP appropriate advice on when and how they should follow up with the patient, what the next steps in treatment and medication are and how the patient's care plan should be managed and developed.

Review and Audit

The Provider agrees to allow the [Commissioner]:

- to review and audit the provision of the Service at least annually and to provide a summary of the overall results and its performance of the Service to confirm compliance with the Indicators; and

- to have reasonable rights of audit and access to any of the Provider's premises, personnel, the Provider's systems, sub-contractors and their facilities and premises and the relevant records (including the right to copy) and other reasonable support as the [Commissioner] may require whilst the Service is being provided [and for twenty four (24) months following the end of [the Contract]] in order to verify any aspect of the Service or Provider's performance.

E. Indicators

When reporting progress against outcomes the Provider may wish to consider measures and calculations similar to those set out below:

Outcome	Expected outcomes			Indicator description	Indicator threshold	Measurement	Remedy
	Yr 1	Yr 2	Yr 3				
To increase the proportion of people with an accurate diagnosis of COPD compared with local predicted prevalence	*TBA*[1]	*TBA*	TBA	The number of people being offered an assessment for COPD compared with local predicted prevalence	TBA[2]	(x) Number of people with a diagnosis (y) Local predicted prevalence of COPD in local area [x/y] x 100 = percentage of people offered an assessment for COPD	Remedial Action Plan to ensure compliance with the required threshold. Withholding of [2]% of monthly revenues under Clause 32 until the Remedial Action Plan has been implemented. [*Commissioner to insert any bespoke consequences to apply in accordance with Clause 31.6 of the NHS Standard Contracts. For further guidance on this see* Agreeing a COPD Assessment Service.]
To increase the number of people accurately diagnosed at an early stage of the disease (MRC 1 and 2)	*TBA*	*TBA*	*TBA*	Number of people diagnosed with COPD with a severity of 1 or 2 on the MRC scale.	*TBA*	(x) Number of people diagnosed with COPD with a severity of MRC 1 or 2 (y) Number of people diagnosed with COPD [x/y] x 100 = percentage of people diagnosed with COPD at stage 1 or 2 on the MRC scale	Remedial Action Plan to ensure compliance with the required threshold. Withholding of [2]% of monthly revenues under Clause 32 until the Remedial Action Plan has been implemented. [*Commissioner to insert any bespoke consequences to apply in accordance with Clause 31.6 of the NHS Standard Contracts. For further guidance on this see* Agreeing a COPD Assessment Service]
To ensure that people using the service and their carers have a positive experience.	*TBA*	*TBA*	TBA	Number of people and carers who have a positive experience	85%	(x) Number of surveys with satisfactory score (y) Total number of surveys received [x/y] x 100 = percentage of people and carers who are satisfied with the	Remedial Action Plan to ensure compliance with the required threshold. Withholding of [x]% of monthly revenues under Clause 32 until the Remedial Action Plan has been implemented. [*Commissioner to insert any bespoke consequences to apply in accordance with Clause 31.6 of the NHS Standard Contracts.*

[1, 2]Commissioners will need to determine a baseline position prior to agreeing expected outcome measures and indicator thresholds should be set on an annual basis at the expected outcome target.

						assessment service.	*For further guidance on this see* Agreeing a COPD Assessment Service]
% smokers with a new diagnosis of COPD who are offered stop smoking support and pharmacotherapy annually							
Number and % patients with a new diagnosis of COPD who are MRC3+ who are referred to pulmonary rehabilitation annually							
Number and % patients with a new diagnosis of COPD with hypoxia (saturations less than 92%) annually							
Number and % patients with a new diagnosis of COPD with hypoxia (saturations less than 92%) referred for LTOT assessment							

F. Dashboard

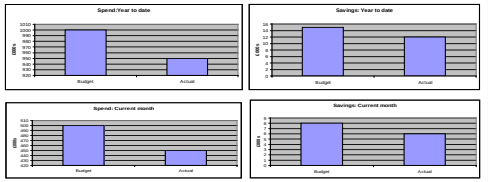
The Provider shall report performance on a monthly basis using a dashboard template similar to that below:

Proforma COPD Assessment Service Dashboard Report

Activity for GP Consortia

GP Practice	Referrals made in month	Patients completing early interventions in month
Practice A		
Practice B		
Practice C		

Financials



Performance

Outcome	Month X	Yr to date
Increase in the proportion of people with an accurate diagnosis of COPD compared with local predicted prevalence		
Increase the number of people accurately diagnosed at an early stage of the disease (MRC 1 and 2)		
Increase in the number of patients and carers who have a positive experience of the service		

Provider analysis

Provide a description of the key performance issues for the provider. Where possible this information should be benchmarked. Where relevant, outline contractual levers being used, e.g. withholding monies

Patient complaints:

The commissioner should agree these information requirements with the Provider and these should be inserted into the NHS Standard Contract.

G. Activity

G.1 Activity plan

Recruited Patients	Activity for period
Patients who are diagnosed as having no illness	
Patients who are diagnosed with COPD	
Patients for whom a diagnosis can not be made and further investigation is needed	
Patients who are diagnosed with possible COPD and need an onward referral	
Patients diagnosed with other respiratory conditions	
TOTAL	

G.2 Individual Patient agreements (cost per case)

H. Finance

Annual contract value

Service	Basis of contract	Currency	Price	Thresholds	Total annual expected cost
	Cost per case				£
Total					

APPENDIX A

Pro-forma Referral Protocol

Referral to COPD Spirometry and Assessment Service

Name:

(make reference to symptomiser need history)

Address:

Name & Address of GP:

Telephone / Fax usual practice details:

Patient ID (as your memory service)

Carer Information:

Date of referral:

Reason for referral/ presenting history

History:

Current medications (include inhaled/nebulisers)

Most recent results if available:

Chest X-Ray (send latest X-Ray report)

Full Blood count

APPENDIX B

A Guide to Performing Quality Assured Diagnostic Spirometry

Diagnostic quality-assured spirometry is the recommended objective test performed to identify abnormalities in lung volumes and air flow[1]. It is used in conjunction with physical assessment, history taking, blood tests and x-rays, to exclude or confirm particular types of lung disease, enabling timely diagnosis and treatment. To be valid the test must only be performed by people accredited and therefore competent in performing and interpreting spirometry. Spirometry services should be audited according to agreed accreditation standards[2].

Equipment requirements and standards

- A spirometer which meets the ISO standard 26782[3]
- One-way mouthpieces and nose clips
- Bacterial filters (if indicated on selected patients)
- Height measure and weighing scales –calibrated according to manufacturers instructions.
- Nebuliser or single patient use volumatics (for reversibility testing and ongoing monitoring)
- Single-patient use mask/mouthpiece for nebuliser
- Short acting bronchodilators

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<u>Before the day of the test</u>

Step 1: Determine type of spirometry test required

Broadly spirometry is performed for three purposes:

1. **Base-line spirometry**
   Investigative: to investigate lung function where diagnosis has not been established
2. **Post bronchodilator spirometry**
   Investigative: to diagnose obstructive conditions where baseline spirometry shows obstructive pattern
   Monitoring: to monitor clinical progress in diagnosed COPD and asthma
3. **Reversibility testing**
   Reversibility testing may help to differentiate asthma from COPD but is rarely required. It can be unreliable and differentiation is usually based on clinical features.

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Step 2: Pre-test advice to patient – this will depend on the purpose of the spirometry[2,4,5]

<table>
<tr><th>Investigative</th><th>Monitoring</th><th>Reversibility testing</th></tr>
<tr><td>Spirometry tests required:
Base-line test
If obstructive base-line picture - proceed to post-bronchodilator test (see below for standard)</td><td>Spirometry tests required:
Post-bronchodilator test (see below for standard)</td><td>Spirometry tests required:
Base-line test
Post-bronchodilator test (see below for standard)</td></tr>
<tr><td colspan="3">Ask the patient to avoid:
Smoking for at least 24 hours before the test
Eating a large meal before the test
Exercise before the test
Wearing tight clothing</td></tr>
<tr><td rowspan="2"></td><td colspan="2">Ask the patient to bring inhalers to the appointment</td></tr>
<tr><td>Continue usual inhaled therapy</td><td>Before the test avoid:
Short acting bronchodilators for 4 hours
Long acting beta 2 agonist bronchodilators for 8 hours
Long acting anticholinergic bronchodilators 36 hours before test</td></tr>
<tr><td colspan="3">Check if any contra-indications (see below) or allergies and ensure patient has prescription for bronchodilator</td></tr>
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Step 2 - Cleaning

Any necessary cleaning and maintenance processes should be carried out on a regular basis according to manufacturer's instructions[2,] with reference to local guidelines and protocols where necessary.

On the day of the Spirometry Test – Calibration

Calibration of your spirometry test equipment should be performed using a 3 litre syringe following the manufacturer's recommended procedures. For the device to be within calibration limits it must read +/- 3% of true[5]. Calibration should be *verified* prior to every clinic/session or after every 10th patient (whichever comes first) using a 1 or 3 litre syringe

The standard[5]:

- Use an annually certificated calibration/verification 3L syringe - this must have an accuracy of ±15ml
- Document calibration/verification results consistently, including a simple log of problems as they arise

On the day of the Spirometry Test – the procedure

Step 1: Assess the patient for contra-indications to spirometry. It should not be assumed that these have already been assessed by the referrer, and for some patients a degree of clinical judgement may be required in interpreting contraindications.

Absolute

- Active infection e.g. untreated acute exacerbation of COPD or AFB positive TB until treated for 2 weeks
- Conditions that may be cause serious consequences if aggravated by forced expiration
  e.g. dissecting / unstable aortic aneurism, current pneumothorax, recent surgery including ophthalmic, thoracic

Relative

- Suspected respiratory infection in the last 4-6 weeks
- Undiagnosed chest symptoms e.g. haemoptysis
- Any condition which may be aggravated by forced expiration
  e.g. history of prior pneumothorax; unstable vascular status recent (within 1 month) myocardial infarction, uncontrolled hypertension or pulmonary embolism or history of haemorrhagic event (stroke); previous thoracic, abdominal or eye surgery

Step 2: Measure the patient's height and weight. Enter required values into the spirometer

The standard[5]:

- Height – measured without shoes. If unable to measure height use arm span instead[2].
- Age
- Sex

Step 3: Explain and demonstrate the procedure to the patient so that they understand what is required of them, and why it is important to perform each manoeuvre as best they can. You will need to explain that there will be two different blows performed for this procedure; the Vital Capacity **(VC*)*** and the Forced Vital Capacity **(FVC),** and that they will need to perform each type of blow on several occasions.

Step 4: Prepare patient and the equipment to perform the **baseline VC**. Apply nose clip.

The standard: [4, 5, 6]

- Patient is sitting comfortably
- A minimum of three acceptable VC manoeuvres must be obtained.
- Repeatability criteria are met when there is no more than 0.1L (100ml) between each VC blow. Some spirometers will inform the user when this has been achieved.
- Verbally encourage them to continue to exhale as long as possible
- Observe both the patient and the time volume curve as each VC is performed to ensure they:
    - Breathe in to maximal inspiration
    - Do not obstruct the mouthpiece with their teeth or tongue.
    - There are no leaks from the mouthpiece
    - Remove false teeth if loose
- Usually this will be achieved within no more than four VC manoeuvres
- If the patient is unable to achieve ATS quality criteria, record why this has not been possible. Another appointment may be required, or seek specialist advice and/or referral.

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Step 5: Prepare the patient and the equipment to perform the **baseline FVC**. *Nose clip is not essential*

The standard:[2, 4, 5 ,6]

- Patient is sitting comfortably
- A minimum of three acceptable FVC manoeuvres must be obtained.
- Repeatability criteria are met when there is no more than 0.1L (100ml) between each FVC blow. Some Spirometers will inform the user when this has been achieved.
- Encourage maximum effort at the start of each blow, verbally encouraging them to continue to exhale to obtain optimal effort
- Observe both the patient as each FVC is performed to ensure they:
    - Breathe in to maximal inspiration
    - Do not obstruct the mouthpiece with their teeth or tongue.
    - There are no leaks from the mouthpiece
    - Remove false teeth if loose
- Observe the flow/volume curve as each FVC manoeuvre is being performed to identify:
    - Slow starts
    - Early stops
    - Variability in flow within manoeuvre
- Ensure the patient exhales fully and that this is demonstrated on the graph showing a time/volume plateau.
- Do not perform more than eight FVC manoeuvres in one session. If the patient is unable to achieve these standards - record why this has not been possible, arrange a further appointment to repeat the test if appropriate, or refer for specialist assessment.

Step 6: Record baseline spirometry results in electronic or paper template, using the largest FEV1 and VC or FVC (if performed to standards) to determine the FEV1/VC ratio[4].

Step 7: Post-Bronchodilator testing – Post-bronchodilator spirometry testing should be performed if baseline spirometry reveals an obstructive picture, if reversibility testing is required (to differentiate asthma and COPD) and for chronic disease monitoring. Bronchodilator administration should be standardised as follows:

The standard:

- Administer bronchodilator
  (usually 400mcg salbutamol via spacer or 2.5mg via nebuliser)

- Repeat spirometry after 15 minutes

Step 8: Record post-bronchodilator spirometry results in electronic or paper template using the largest post-bronchodilator FEV1 and largest VC or FVC to determine the FEV1/VC ratio[4]. Ensure there is also a copy of the trace attached to their healthcare records. The use of spirometry electronic templates is preferred because it promotes continuity of care, effective communication across service providers, and data retrieval for audit purposes.

The standard:[4,5.]

- In primary care the VC should always be measured and recorded, as well as the FVC. The ratio (FEV1/VC) should be calculated using whichever is the higher of the VC measurements, the baseline VC or FVC.
- Both the flow/volume and time/volume graphs must be documented within the patient's healthcare record.
- Spirometry reporting across healthcare communities should be provided in an agreed and uniform manner, ideally involving use of FEV1, FVC and VC and using data highlighting lower limit of normal values.

Step 9: Ensure the patient has follow up appointment arranged for the spirometry and post-bronchodilator tests to be interpreted by a competent health care professional, in order to inform diagnosis, identify the need for onward referral and/or ongoing management.

The reporting and interpretation is outlined below and may be performed separately from the person measuring the values (***foundation spirometry competence***) by a competent "reporter" (***full spirometry competence*** or and competent "interpretor").

Step 10: Selecting the best value for clinical use

The best values are selected using the following standard:[4,6]

- Three technically acceptable results from up to 8 efforts in a quality controlled service are selected.
- Highest FEV1 or FVC from 3 efforts all within 100mL or 5% whichever is smaller (below 1 litre) or higher (above 1 litre) [7]
- The highest FEV1 or FVC can come from any one of the 3 efforts within 100mL (they don't have to come from the same blow).
- Highest VC of 3 efforts all within 100mL or 5% whichever is smaller (below 1 litre) or higher (above 1 litre)

Step 11: Calculating the reference value for clinical use.

The reference values are selected from the recommended lung function values[8];

- The patient's height in metres, age in years and sex is used to calculate the **mean predicted values** for FEV1, FVC and VC.
- The actual best measurement and the mean predicted value is used to calculate the **%predicted value**.
- The **lower limit of normal (LLN)** or **range** is calculated from the mean predicted value and the residual standard deviation.
- Also using the mean predicted value and the residual standard deviation the **standardised residual (SR)** or Z-score is calculated.
- A value below 1.64 SR signifies a 95% chance of the value being outside the normal reference range and is therefore abnormal. **(See Example Box 1)**

Step 12: Reporting the spirometry results

The results are reported with graphs of volume-time and flow-volume superimposing all efforts and a clear table of results showing the following values for FEV1, FVC, and VC (PEF optional). [4]

- The **actual**
- The **mean predicted values**
- The **%predicted value**
- The **lower limit of normal (LLN)** or **range**
- The **standardised residual (SR)** or Z-score
- An indication of the value(s) being outside the normal reference range (e.g. bold, colour, up/down arrows) should indicate which values are abnormal .

Step 13: Interpreting the spirometry results

The interpretation report of the results should never be performed by software from the machine or results service alone. A competent reporter should outline the following details;

- The normality or not of the shape of the curves (Volume-Time; Flow-Volume)
- The normality or not of the values of FEV1, FVC, VC and the calculated values FEV1/FVC & FEV1/VC.
- A comment on whether the pattern fits a normal, restrictive, obstructive pattern or mixed pattern.
- The bronchodilator response is reported as showing significant reversibility or irreversibility according to current disease guidelines (asthma, COPD),
- Any comment on the quality of the measurements (e.g. only 2 efforts, poor efforts, etc.)
- An overall summary statement "answering" the original question in the request.

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1. NICE (2004/10) *Guidelines on the management of Chronic Obstructive Pulmonary Disease*.
2. American Thoracic Society. Guidelines for the measurement of respiratory function. *Respiratory Medicine* 1994 (88)165-194.
3. International Organisation for Standardisation. www.iso.org/iso/store.htm
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5. Miller M R. Hankinson J, Brusasco V et al Standardisation of Spirometry. *European Respiratory Journal*2005:26(2)319-38.
6. British Thoracic Society and Association for Respiratory Technology and Physiology (1994). Guidelines for the measurement of respiratory function. *Respiratory Medicine* **88**; 165-194.
7. Cooper BG. Letter: Spirometry standards and FEV1/FVC repeatability. *Primary Care Respiratory Journal* (2010); 19(X): XXX
8. Quanjer ERJ 1993 ECSC

Calculation Example Box 1

A female patient aged 45 years, who is 1.64 m performs an "actual" FEV1 of 3.00 litres. The RSD for FEV1 is 0.51

1. Predicted value	FEV1 Pred	=	(3.95 x Ht (m)) – (0.025 x Age (years) -2.60
		=	(3.95 x 1.64)) – (0.025 x 45) -2.60
		=	2.75
2. Percent predicted	FEV1 %Pred	=	(Actual FEV1 / FEV1 Pred) x 100
		=	(3.00/2.75) x 100
		=	109%

APPENDIX C

MRC DYSPNOEA SCALE

Grade Degree of breathlessness related to activities

1	Not troubled by breathlessness except on strenuous exercise
2	Short of breath when hurrying or walking up a slight hill
3	Walks slower than contemporaries on level ground because of breathlessness, or has to stop for breath when walking at own pace
4	Stops for breath after walking about 100 metres or after a few minutes on level ground
5	Too breathless to leave the house, or breathless when dressing or undressing
Adapted from Fletcher CM, Elmes PC, Fairbairn MB et al. (1959) The significance of respiratory symptoms and the diagnosis of chronic bronchitis in a working population. British Medical Journal 2: 257–66.	

APPENDIX D – An example of the CAT score