Resource Booklet

SPIROMETRY PROVISION

Mahitahi Hauora

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Disclaimer:

The information in this document has been compiled by Mahitahi Hauora from a variety of third-party sources, including national and international clinical guidelines, as well as research on best practice. It is intended to serve as a valuable resource for general practice staff in Northland. However, it is important to note that this document does not substitute for clinical judgment.

While efforts will be made to keep this document up to date, there is a possibility that some information may become outdated by the time it is reviewed. Mahitahi Hauora does not accept liability for any third-party content included in this document, nor for the accuracy of information on any external websites linked within it. Links to external sites, training providers, and equipment are provided solely for convenience and do not constitute an endorsement of those sites or their content.

1. Purpose and Background

This document has been created to assist general practice staff, in particular - practice nurses, in delivering spirometry services within primary care. It consolidates international best practice guidelines and national standards to raise awareness of the training requirements for spirometry. Additionally, the document offers practical guidance for practices on planning and implementing spirometry screening and clinic delivery.

Key standards and guidelines referred to within this document include:

- American Thoracic Society and European Respiratory Society Technical Statement on the Standardisation of Spirometry (2019).[1]

[1] Graham, B. L., Steenbruggen, I., Miller, M. R., Barjaktarevic, I. Z., Cooper, B. G., Hall, G. L., Hallstrand, T. S., Kaminsky, D. A., McCarthy, K., McCormack, M. C., Oropez, C. E., Rosenfeld, M., Stanojevic, S., Swanney, M. P., & Thompson, B. R. (2019). Standardization of Spirometry 2019 Update. An Official American Thoracic Society and European Respiratory Society Technical Statement. *American journal of respiratory and critical care medicine*, *200*(8), e70–e88. https://doi.org/10.1164/rccm.201908-1590ST

- Global Initiative for Chronic Obstructive Lung Disease (GOLD) Spirometry for Healthcare Providers Guideline (2010).[2]
- Australian and New Zealand Society of Respiratory Science (ANZRS) Position Statements:
    - Spirometry Training Courses: Content, Delivery and Assessment (2017).[3]
    - Assessing spirometry competence through certification in community-based healthcare settings in Australia and New Zealand.[4]
- International Organization for Standardization (ISO) 6782:2009 (en) Anesthetic and respiratory equipment — Spirometers intended for the measurement of time forced expired volumes in humans.[5]

2. Introduction

Spirometry measures lung capacity and is the recommended test to identify abnormalities in lung volumes and air flow. Spirometry supports the diagnosis and management of Chronic Obstructive Pulmonary Disease (COPD), asthma and other respiratory health conditions.[6][7]

Spirometry is an important service in primary care; and is critical for improving health outcomes through informing the early detection and treatment of respiratory conditions.

[2] Global Initiative for Chronic Obstructive Lung Disease (GOLD). (2010). Spirometry for Healthcare Providers. https://goldcopd.org/wp-content/uploads/2016/04/GOLD_Spirometry_2010.pdf
[3] Swanney, M. P., O'Dea, C. A., Ingram, E. R., Rodwell, L. T., Borg, B. M., & ANZSRS Spirometry Training Course Working Group (2017). Spirometry training courses: Content, delivery and assessment - a position statement from the Australian and New Zealand Society of Respiratory Science. Respirology (Carlton, Vic.), 22(7), 1430–1435. https://doi.org/10.1111/resp.13133
[4] Schneider, I., Rodwell, L., Baum, S., Borg, B. M., Del Colle, E. A., Ingram, E. R., Swanney, M., Taylor, D., & ANZSRS Community-Based Spirometry Competency Working Group (2021). Assessing spirometry competence through certification in community-based healthcare settings in Australia and New Zealand: A position paper of the Australian and New Zealand Society of Respiratory Science. *Respirology (Carlton, Vic.), 26*(2), 147–152. https://doi.org/10.1111/resp.13987
[5] International Organisation for Standardisation. (2009). ISO 26782:2009 - Anesthetic and respiratory equipment — Spirometers intended for the measurement of time forced expired volumes in humans. https://www.iso.org/standard/43761.html
[6] Asthma and Respiratory Foundation NZ. (2023). Spirometry Testing and How it Works. https://www.asthmafoundation.org.nz/stories/understanding-spirometry
[7] Global Initiative for Chronic Obstructive Lung Disease (GOLD). (2010). Spirometry for Healthcare Providers. https://goldcopd.org/wp-content/uploads/2016/04/GOLD_Spirometry_2010.pdf

However, it is predicted that COPD remains significantly underdiagnosed in primary care linked to the underuse of spirometry testing. [8] [9]

Australasian evidence suggests that barriers to conducting spirometry in primary care include lack of access to maintained equipment, and limited numbers of clinicians qualified to conduct spirometry. The purpose of the *Standards of Practice Spirometry in Primary Care* resource book is to provide guidance to the primary care clinical workforce to enable the safe and effective delivery of spirometry services in Te Tai Tokerau (TTT) / Northland.

3. When to Provide Spirometry

Spirometry is performed to evaluate diagnosed (and undiagnosed) lung conditions, such as asthma, COPD, and other abnormalities. Spirometry results are an important tool for future diagnosis and medication changes. The Asthma Society NZ suggests that people with the following presentations should be considered for spirometry testing.[10]

- Patients with newly diagnosed Asthma / COPD, presenting with breathing problems (respiratory symptoms) such as shortness of breath, wheezing, coughing and chest tightness.
- Patients prescribed Asthma / COPD medicine.
- Additional research notes that spirometry is cost effective for smokers over the age of 35 with respiratory symptoms.[11] It is recommended that spirometry is offered to smokers above the age of 35 presenting with symptoms as noted on health pathways including breathlessness, sputum production, frequent chest infections or exacerbations of bronchitis, or a chronic cough lasting more than 8 weeks.

[8] Johns, D. P., Walters, J. A., & Walters, E. H. (2014). Diagnosis and early detection of COPD using spirometry. Journal of thoracic disease, 6(11), 1557–1569. https://doi.org/10.3978/j.issn.2072-1439.2014.08.18
[9] Härtel, A., Peters, M., & Kostev, K. (2022). Prevalence of Spirometry Testing among Patients with Asthma and COPD in German General Practices. Healthcare (Basel, Switzerland), 10(12), 2570. https://doi.org/10.3390/healthcare10122570
[10] Asthma and Respiratory Foundation NZ. (2023). Spirometry Testing and How it Works. https://www.asthmafoundation.org.nz/stories/understanding-spirometry
[11] Global Initiative for Chronic Obstructive Lung Disease (GOLD). (2010). Spirometry for Healthcare Providers. https://goldcopd.org/wp-content/uploads/2016/04/GOLD_Spirometry_2010.pdf

The Asthma Society New Zealand recommends that people with a diagnosis of asthma, COPD or other relevant respiratory diseases be offered an appointment every 1 – 2 years.[12]

Health Pathways Northland provides further detail on criteria for referral to spirometry including presenting symptoms. Frailty is a key consideration in the referral process. Health pathways notes that spirometric tests require high levels of patient effort and cooperation; while someone may meet criteria for referral – depending on frailty, they may not be clinically appropriate. The frail scale is advised to review frailty, with patients who score 3 or greater should not be considered for spirometry.[13] [14]

4. Training Requirements of Clinical Professionals Performing Spirometry

Persons conducting spirometry screening must be a vocationally registered clinician (like an enrolled nurse, registered nurse or occupational therapist), with a current practicing certificate. The practitioner delivering spirometry must have completed the appropriate training and has either gained or is in the process of gaining up to date spirometry accreditation.

The Australian and New Zealand Society of Respiratory Science [ANZRS]recommends all operators conducting spirometry *[regardless of discipline]* to complete the appropriate

[12] Asthma and Respiratory Foundation NZ. (2024). What is Spirometry. https://www.asthmafoundation.org.nz/assets/documents/What-is-Spirometry-Fact-Sheet.pdf

[13] Northland Community Health Pathways. (2025). Spirometry Request.

[14] Gleason, L. J., Benton, E. A., Alvarez-Nebreda, M. L., Weaver, M. J., Harris, M. B., & Javedan, H. (2017). FRAIL Questionnaire Screening Tool and Short-Term Outcomes in Geriatric Fracture Patients. Journal of the American Medical Directors Association, 18(12), 1082–1086. https://doi.org/10.1016/j.jamda.2017.07.005

training and certification. Key statements from the ANZRS position on Spirometry training (2017)[15] and Spirometry Competence (2021)[16] include:

- The primary outcome of spirometry training courses should be to enable operators to perform spirometry to international best practice, including testing of subjects, quality assurance and interpretation of results. Where valid results are not achieved or quality assurance programmes identify errors in devices, participants need to be able to adequately manage these issues in accordance with best practice.[17]
    - Spirometry training course content must adhere to the current international American Thoracic Society [ATS] and European Respiratory Society [ERS] standards for Spirometry practice pulmonary function standards for spirometry testing and interpretation.[18]
- Formal spirometry training pathways are important and recommended to support clinical quality and safety standards. Spirometry certification provides evidence to patients, clients, employers and organisations that an individual has participated in an assessment process that qualifies them to perform spirometry to current international spirometry standards set out by the American thoracic Society and the European Respiratory Society in 2019 (ATR / ERS).[19]
    - The regular completion of spirometry certification is likened to other training requirements as part of clinical competency standards.

Professionals conducting spirometry should complete courses in accordance with the recommendations and guidelines set by the ANZRS statements, and the Thoracic Society

[15]Swanney, M. P., O'Dea, C. A., Ingram, E. R., Rodwell, L. T., Borg, B. M., & ANZSRS Spirometry Training Course Working Group (2017). Spirometry training courses: Content, delivery and assessment - a position statement from the Australian and New Zealand Society of Respiratory Science. Respirology (Carlton, Vic.), 22(7), 1430–1435. https://doi.org/10.1111/resp.13133

[16] Schneider, I., Rodwell, L., Baum, S., Borg, B. M., Del Colle, E. A., Ingram, E. R., Swanney, M., Taylor, D., & ANZSRS Community-Based Spirometry Competency Working Group (2021). Assessing spirometry competence through certification in community-based healthcare settings in Australia and New Zealand: A position paper of the Australian and New Zealand Society of Respiratory Science. Respirology (Carlton, Vic.), 26(2), 147–152. https://doi.org/10.1111/resp.13987

[17] See footnote 15.

[18] See footnote 16.

[19] See footnote 15.

Australia New Zealand (TSANZ)[20] guidance on standards for spirometry training courses informed by ANZRS position statements. The TSANZ (2022) recommends:

- Operators new to spirometry must complete a full competency course. This includes a full day course (theory) and practical training / assessment. Operators are also required to complete a portfolio of competency, which includes 10 spirometry assessments reviewed by the course provider before issuing final certification.
- Previously-competency certified clinicians should complete a refresher course every three years at a minimum. Refresher courses should be a minimum of six hours and include the resubmission of a portfolio of 10 spirometry assessments.

For operators that have been trained prior to the up-to-date International 2019 standards as per the current ATS/ ERS standards for Spirometry practice[21]; or have not completed the full competency course such as the portfolio – it is recommended that the operator re-takes the full competency course.

4.1. Training Providers

The following providers deliver spirometry competency accreditation.

NZ Respiratory and Sleep Institute

Adult Respiratory Laboratory

Reception J, Level 1, Building 4

Greenlane Clinical Centre, Auckland, New Zealand

Laboratory Manager - Christina@nzrsi.health.nz

[20] The Thoracic Society of Australia and New Zealand. (2022). Spirometry Training Courses. Companion Document to Standards for the Delivery of Spirometry for Resource Sector Workers.

[21] Graham, B. L., Steenbruggen, I., Miller, M. R., Barjaktarevic, I. Z., Cooper, B. G., Hall, G. L., Hallstrand, T. S., Kaminsky, D. A., McCarthy, K., McCormack, M. C., Oropez, C. E., Rosenfeld, M., Stanojevic, S., Swanney, M. P., & Thompson, B. R. (2019). Standardization of Spirometry 2019 Update. An Official American Thoracic Society and European Respiratory Society Technical Statement. American journal of respiratory and critical care medicine, 200(8), e70–e88. https://doi.org/10.1164/rccm.201908-1590ST

In person training

09 630 9918 ex. 26234

Te Whatu Ora Greenlane

- RespLab@adhb.govt.nz - In person training

SpiroMeTraining

- Refresher and Full Competency Courses
- In person and virtual options
- Contact spirometraining@actrix.co.nz

Written proof of training is required before conducting the refresher course.

Mahitahi also facilitates spirometry trainings for practices where there is enough interest. Please see the Mahitahi Hauora education site about upcoming trainings.

5. Spirometry Equipment

Essential spirometry kit includes:

- Spirometer.
- Calibration syringe.
- Connector (between syringe / spirometer).
- Consumables: filter, spirette, etc.

There are a range of spirometry devices available from different manufacturers including EasyOne, Medriko and Vitalograph. It is recommended for the practice to explore different options and costings and make a judgement to source equipment based on which option works best for the practice.

Please contact the company from which you have purchased your device, for any additional supports such as troubleshooting and device set up. Please also view manufacturer guides for device use.

Mahitahi Hauora offers various supports to increase access to spirometry kit for general practice, including:

- 20% reimbursement for practices that purchase spirometry kit (excluding consumables, excluding GST). Practices must invoice Mahitahi Hauora (accounts@mahitahihauora.co.nz) to be reimbursed for 20% of the device cost before GST. The original tax receipt / invoice must be provided for the reimbursement to be processed.
    - Please note, the above (20% reimbursement) is subject to programme funding availability.

Mahitahi Hauora also offers short term loan spirometry equipment.

- Loans are short term, up to 6 months. A loan is not a long-term solution to delivering spirometry in general practice.
- Loans are for the purpose of supporting practices where clinicians are currently undergoing spirometry accreditation and working towards portfolio completion. Loans are in place to support workforce development in the interim, while the practice prepares to purchase spirometry kit.
- Consumables are the responsibility of the practice.
- The loan will be reviewed on a 3-monthly basis; the loan may not be approved for reasons such as underutilisation or if the practice no longer requires the loan.
    - Please note, loans are subject to availability. Mahitahi Hauora has a limited pool, and there may be instances where all devices are currently on loan out to practice. Please inquire for more information.

6. Spirometry Equipment Requirements

Persons conducting spirometry must have access to and maintain equipment that complies with current standards of best practice. This includes:

- Spirometer that meets the standards of the ISO[22] standard 267823 on Anaesthetic and Respiratory Equipment (Spirometers).[23]
- One way nose pieces and mouth clips.
- Bacterial and Viral filters – which must be changed between each patient.
- Height measure and weight scales, calibrated according to manufacturer's instructions annually.

6.1. Calibration of Spirometry Equipment

Note: *The American Thoracic Society (ATS) / ERS produced an updated set of spirometry guidelines* ***in 2019*** *in which they state: "Calibration verifications must be undertaken daily, or more frequently if specified by the manufacturer".*

Note*: Calibration is important for risk management; and is recommended for quality control in advance of a spirometry assessment being conducted.*[24]

Calibration should be performed by an appropriately trained practicing clinician (section 4), using a 3-litre syringe - following the manufacturer's recommended procedures. The clinician calibrating the spirometry equipment must ensure that there is no more than 0.1L (100ml) variation ideally between each blow.

Calibration should be verified prior to every clinic/session, or after every 10th *patient (whichever comes first).* A calibration log should be maintained, including any problems that arise.

[22] See footnote 5.
[23] See footnote 5.
[24] Shigeoka J. W. (1983). Calibration and quality control of spirometer systems. Respiratory care, 28(6), 747–753.

The clinician is responsible for ensuring and / or conducting quality control checks weekly to ensure reliability and reproducibility of results. Quality control checks should use physical controls (with calibration syringe) or biological controls using one member of staff with stable known normal values. The clinician also must ensure that all repairs and software updates are documented.

The practice must keep a physical log of calibration.

6.2. Cleaning

Cleaning and maintenance of all equipment should be carried out on a regular basis and according to manufacturer's instructions. The spirometer must be cleaned between each patient.

7. Infection Prevention and Control

Spirometry itself is not deemed to be an aerosol-inducing procedure, however, the cough associated with it (generated by some patients) can be.[25] Risk of cross-contamination also occurs when surfaces are touched without proper Infection Prevention and Control (IPC) precautions.

It is expected that practices providing spirometry services comply with the IPC standards outlined by the Te Whatu Ora IPC Guidance. [26] This includes adequate hand hygiene and respiratory hygiene for staff. Moreover, it is recognised that the processes regarding the environment in which services are delivered and monitoring potential risks of illness transmission between patients requires planning.

It is recommended that the practice has an established space for spirometry services that can be arranged to comply with the below IPC requirements.

[25] Association for Respiratory Technology & Physiology. (2022). ARTP Aerosols and Lung Function Testing Update: December 2022 (V1.1). https://www.artp.org.uk/write/MediaUploads/ARTP_Aerosols_Updated_Version_15-12-22_V1.1.pdf

[26] Te Whatu Ora. (2025). Infection Prevention and Control. https://www.tewhatuora.govt.nz/health-services-and-programmes/infection-prevention-and-control

7.1. Patient Screening

Patients must be screened for COVID-19 and other transmissible viruses prior to receiving a spirometry test. Prior to arriving to the clinic, patients must be advised that if they have any COVID-19 symptoms they must test and stay home. If they have been exposed to COVID; they must test prior to attending the clinic. This can be completed by an administrator or clinician when reminding the patient of an upcoming appointment.

Pre-screening must be completed by the clinician delivering spirometry once the patient arrives for the procedure. This includes asking about any flu or COVID-19 symptoms.

7.2. Room Ventilation Requirements

The Primary Care Respiratory Society has provided updated evidence and guidance on spirometry, including how to reduce risk.[27] It is recommended that there are six room air changes per hour, with mechanical air circulation or ventilation. With appropriate ventilation measures in place, it is anticipated that a practice can provide a maximum of 1 spirometry appointments per hour per room *(i.e., 2 appointments per hour if two rooms are up to standard).* Ventilation standards are as follows:

- Appointments must occur in a room with a fixed mechanical or air circulation device. The circulation device must bring in air from the outside and not pull air from other offices / rooms in the facility.
- The door of the room used for spirometry service must always remain closed, excluding when patients / practitioners are exiting or entering the room.
- It is highly recommended that the spirometry room has a window, and that the window is open throughout the spirometry service. Should there be no window room options, it is vital that all other IPC and room ventilation requirements are followed.

[27] See footnote 25

7.3. Room Environment and Cleaning

All surfaces carry risk of transmission, where adequate cleaning is required. Fabric and soft furnishings are often harder to clean and can absorb fluids. The spirometry space should only have hard furnishings (plastic, wood, etc) that can be cleaned with antibacterial wipes after each patient / spirometry test.

7.4. Reducing Risk of Patient Cough

The following actions can mitigate the risk of patients coughing in the room space. The clinician should advise of the following before the spirometry test.

- Encourage the patient, if they feel like they are about to cough, to cough into the spirometry mouthpiece (with the filter).
- If they are unable to do this (do not have the spirometry mouthpiece on), the patient should pull their facemask over their nose / mouth, and cough into their elbow.

The clinician performing spirometry should alter spirometry manoeuvres to reduce risk of cough: advising the patient to relax, while slowing vital capacity and 1-2 second expiratory manoeuvre to obtain FEV.

7.5. Immune-compromised and Vulnerable Patients

It is advised that patients who are immunocompromised or considered high risk are the first in the schedule to receive spirometry services – granted they are not too frail for an assessment to take place as per health pathways. The clinician providing spirometry is responsible for advising administration staff on high-risk patients to book in first.

8. Guide for Spirometry Clinic Planning and Delivery

8.1. Referral and Triage

Patients can be referred within the practice (internally) or to practices providing spirometry where a practice does not have a spirometry trained clinician. As per Health Pathways, a

patient with a FRAIL score <3 and at least one of the following features present can be referred for spirometry.

Requirements for Referral

- Breathlessness
- Sputum production
- Frequent chest infections or exacerbations of bronchitis
- Chronic cough lasting more than 8 weeks, may be continuous or intermittent, productive or non-productive
- For monitoring of progression of respiratory conditions (i.e., COPD, Asthma), to inform ongoing management, if the patient has not undergone spirometry in the last 3 years.

Health pathways provide the FRAIL scale, it is also included as Appendix 1 in this resource booklet. It is recommended that before a referral is made, the FRAIL scale is completed to limit inappropriate referrals.

Health pathways note the following exclusions.

- FRAIL Scale score > 3 – contact the clinical hub doctor to discuss on 027-231-5886.
- Absolute contraindications:
    - Active TB
    - Known or suspected active COVID-19
    - Within 14 days of onset COVID-19 symptoms or positive COVID test, or
    - Ongoing symptoms from COVID-19, or
    - Household contact of known or suspected case within last 14 days
    - Any respiratory infection within last 4-6 weeks

- Any conditions that may be aggravated by forced expiration
- Dissecting/unstable aortic or cerebral aneurysm
- Current pneumothorax or embolism
- Within 6 weeks of ophthalmic, thoracic, intra-abdominal, or neurosurgery
- Within 4 weeks of myocardial infarction
- Within 1 week of sinus surgery or ear infection
- Glaucoma (untreated or where recent high pressure have been documented)
- Late pregnancy
- Significant atrial or ventricular arrhythmia
- Severe uncontrolled hypertension
- Recent concussion with ongoing symptoms
- Non-compensated heart failure
- Uncontrolled pulmonary hypertension or cor pulmonale
- Known lung cancer

- Relative contraindications:
    - Increased risk or history of pneumothorax
    - Haemoptysis
    - Systemic hypotension
    - Hernia
    - History of syncope with forced expiration

- Confusion or cognitive impairment, or other condition that makes following instructions difficult
- Patient's general condition prevents them from performing forced expiration

8.2. Preparing the Patient – Leading up to the Appointment

As outlined in Health Pathways, various factors such as type of medication (inhaler) will influence how a patient prepares for their spirometry appointment. Prior to the appointment (at least 1 week), it is recommended that someone from the practice contacts the patient to provide them with information about their upcoming appointment and how to prepare. Typically, this involves providing both verbal and written information in the form of a pamphlet to better prepare the patient. Please refer to appendix 2 for a copy of the inhaler information, and a patient preparation leaflet example.

8.3. Performing Spirometry

Appendix 2 provides a process overview of a spirometry appointment. It is also noted that the spirometry operator will use clinical judgement as necessary. Refer to Appendix 3, for a general overview of a spirometry appointment structure.

8.4. Documentation and Results Interpretation

Spirometry assessment to be documented in the provider patient management system as a screening term.

9. Eligibility for Funded Spirometry

Mahitahi Hauora funds general practice to provide spirometry to priority patients who are enrolled with a Mahitahi Hauora practice and meet both the clinical (health pathways) AND equity criteria. Please refer to the claiming guidance in partner portal for further information *(Guidelines > Claiming Guidance for Practices – Long Term Conditions)*

Appendix 1 – FRAIL Scale

FRAIL SCALE RISK ASSESSMENT

	QUESTION	SCORING	RESULT
F	**FATIGUE** How much of the time during the past 4 weeks did you feel tired? A = All or most of the time B = Some, a little or none of the time	A = 1 B = 0	
R	**RESISTANCE** In the last 4 weeks by yourself and not using aids, do you have any difficulty walking up 10 steps without resting?	Yes = 1 No = 0	
A	**AMBULATION** In the last 4 weeks by yourself and not using aids, do you have any difficulty walking 300 metres OR one block?	Yes = 1 No = 0	
I	**ILLNESS** Did your Doctor ever tell you that you have? ☐ Hypertension ☐ Diabetes ☐ Cancer (not a minor skin cancer) ☐ Chronic lung disease ☐ Heart attack ☐ Congestive heart failure ☐ Angina ☐ Asthma ☐ Arthritis ☐ Kidney disease	0 – 4 answers ✔ = 0 5 – 11 answers ✔ = 1	
L	**LOSS OF WEIGHT** Have you lost more than 5kg or 5% of your body weight in the past year?	Yes = 1 No = 0	
		TOTAL SCORE	

SCORING: ROBUST = 0 PRE-FRAIL = 1-2 FRAIL = >3

SYDNEY NORTH
Primary Health Network

Figure 1: Available on Health Pathways

Appendix 2 – Patient Preparation – Medication and Leaflet

Mahitahi Hauora

Stopping your medicines before your spirometry appointment

It's important to stop taking your inhalers before your spirometry appointment. There are also some other kinds of medicines you'll need to stop taking.

This table tells you when you need to stop taking your inhalers and other medicines.

Stop these inhalers 6 hours before your appointment	Stop these inhalers 12 hours before your appointment	Stop these inhalers/medicines 24 hours before your appointment
Ventolin/Respigen (blue)	**Oxis** (white/blue base)	**Spiriva handihaler** (grey)
Bricanyl/Terbutaline (white/blue base)	**Serevent** (green)	**Spiriva Respimat** (grey/blue lid)
Duolin (light grey/blue cap)	**Meterol** (white/pink cap) **Seretide** (purple)	**Nuelin** (liquid or tablet)
Atrovent (white/green lid)	**Vannair** (red/grey cap)	**Seebri** (white/orange sides)
SalAir (light grey/white cap)	**Symbicort** (white/red base)	**Breo Ellipta, Relvar Ellipta** (white/blue lid)
	Duoresp Spiromax (white/red cap)	**Onbrez** (white/blue sides)
	RexAir (white/grey cap)	**Incruse Ellipta** (white/green lid)
	Foradil (blue)	**Ultibro** (white/green sides)
		Anoro Ellipta (white/red lid)
		Spiolto Respimat (white/green lid)
		Singulair (tablet)

If you are unable to stop using your inhalers or medicines due to breathlessness please tell us when you come to your appointment.

Figure 2: Available on HealthPathways

Spirometry Appointment - Information Sheet

Your GP has requested a breathing test (spirometry) to diagnose or monitor any respiratory symptoms you may have.

Your Appointment

Date:

Time:

Location:

Please arrive 10-15 minutes early. You will be asked to sign a consent form. We will keep a copy of your spirometry report. A copy will be emailed to your GP. You can ask for a copy of it, and you can get another copy anytime in the future.

If you have any queries, or want to change your appointment, please call *(practice name)* on *(number).*

Please read this letter carefully as it gives instructions on what to do before your appointment.

Please follow all the instructions given to you at the time of booking.

- Please bring all of your inhalers and your spacer device to your appointment.
- No smoking or vaping at least 1 hour before appointment.
- No vigorous exercise at least 1 hour before appointment. No alcohol/intoxicants at least 8 hours before appointment. No heavy meals at least 2 hours before appointment.
- Wear loose clothing.
- Tell us if you have had any chest infection, antibiotics, or prednisone (steroids) in the last 6 weeks.

Handy Hints

- Go to the toilet before the test - a full bladder can make you hesitate and interfere with the results of the test.
- If you are unwell, please let us know as soon as possible so that we can change the date of your appointment. Being unwell can affect how well you are able to perform the test.
- Please let us know if you are in pain – this can affect how well you can perform the test.

Spirometry and your inhaler

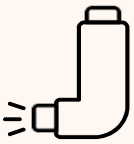
You need to stop taking your inhaler before your appointment. Some inhalers need to be stopped before others. If you use more than one inhaler, you may need to stop them at different times. We'll contact you again before your appointment to remind you when to stop using your inhaler.

Your inhaler is:

You need to stop taking it at:

Your inhaler is:

You need to stop taking it at:



Your inhaler is:

You need to stop taking it at:

Appendix 3 – Spirometry Appointment Process

Summary:

The following process summary has been compiled by Mahitahi, from the information provided in the Global Initiative for Chronic Obstructive Lung Disease (GOLD) Spirometry for Health Care Providers Guideline. [28]

Stage 1: Pre-Appointment

Step	Description
1	Please refer to relevant material within the Mahitahi Spirometry resource booklet, particularly, section 8.1-8.2.
2	Assess the patient for any contraindications *(see contraindication list on health pathways, also noted in 8.1).* It is at the clinician's discretion to postpone the test if it is deemed inappropriate to continue.
3	Check patients have discontinued their inhalers at appropriate time interval
4	Perform baseline oxygen saturations
5	Measure the patient's height and weight. Enter values into spirometer along with ethnicity and age.

Stage 2: Informing the Patient

Step	Description
6	Explain and demonstrate the procedure. Explain that they will need to perform two different blows for the procedure, one for Vital Capacity (VC), and one for Forced Vital Capacity (FVC) and that they will need to perform each type of blow on several occasions (minimum of 3 acceptable, and maximum of 8 test results

[28] https://goldcopd.org/wp-content/uploads/2016/04/GOLD_Spirometry_2010.pdf

	required). Explain to the patient that it is important to perform each manoeuvre as best they can.
7	The Provider shall explain to the patient: ▪ the nature of the test. ▪ the type of blow required. ▪ that a minimum of three acceptable and a maximum of 8 test results are needed. ▪ Post-bronchodilator testing - As recommended in the Guide on Quality-Assured Diagnostic Spirometry (see box above) the Provider shall perform post-bronchodilator testing. The usual bronchodilator dose is 400mcg salbutamol via spacer as per standing order
8	The Provider shall record: ▪ The post-bronchodilator 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 as detailed in the Guide.
9	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 to proceed with the test. If they decide not to proceed, they will rebook the test.

Stage 3: Preparing the Equipment and Administering the Test

Step	Description
1 - Baseline Vital Capacity (VC)	
10	A minimum of three acceptable Vital Capacity (VC) manoeuvres must be obtained. The repeatability criteria are met when there is no more than 100mls ideally (and certainly no more than 150mls in the occasional highly variable

	patient) between each blow. Some spirometers will inform the user when this has been achieved. Apply nose clip and check that the patient is sitting comfortably.
11	Verbally encourage patient to continue to exhale as long as possible. Observe both patient and the time volume curve as each VC is performed to ensure they breathe into maximal inspiration and do not obstruct the mouthpiece with their teeth or tongue. Ensure there are no leaks from the mouthpiece and ask the patient to remove false teeth if loose.
12	Usually, these actions will be achieved within no more than four VC manoeuvres; however, if the patient is unable to achieve the quality criteria, record why this has not been possible. Follow-up as required (arrange for another appointment or refer to specialist).
2 - Forced vital capacity (FVC)	
13	Prepare the patient and the equipment to perform the baseline FVC. A nose clip is not essential. A minimum of three acceptable FVC manoeuvres must be obtained. Repeatability criteria are met when there is no more than 100mls ideally (and certainly no more than 150mls in the occasional highly variable patient) between each blow. Some spirometers will inform the user when this has been achieved.
14	Encourage maximum effort at the start of each blow, verbally encouraging patient to continue to exhale to achieve maximal effort. Observe the patient as each FVC is performed to ensure they: Breathe until maximal inspiration and do not obstruct the mouthpiece with their teeth or tongue. Ensure there are no leaks from the mouthpiece: Remove false teeth if loose. Observe the flow/volume curve as each FVC manoeuvre is being performed.

	Ensure the patient exhales fully and that this is demonstrated on the graph showing a time/volume plateau.
15	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
3 - Documentation	
16	Record baseline spirometry results in electronic or paper template, using the largest FEV1 and VC or FVC (performed to standard) to determine the FEV1/VC ratio. 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 ratio6 Ensure there is also a copy of the trace attached to the patient's 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.
4 – Post-bronchodilator Testing	
17	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: l Administer bronchodilator (usually 4 x 100mcg salbutamol as single puffs via spacer or 2.5mg via nebuliser) l Perform spirometry after 15 minutes Step 8: Arrange interpretation of the spirometric results by a competent interpreter (see below). Step 9: Ensure the patient has a follow up appointment arranged for the results to be explained and to arrange on-going management.

18	The standard 4:6: 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. l Both the flow/volume and time/volume graphs must be documented within the patient's healthcare record.