وزارة الصحـــــــة
Ministry of Health

Guideline on Running Spirometry Service in Primary Healthcare

First Edition

March

2025

دائرة الأمراض غير المعدية
Department of Non-Communicable Diseases

Document Title	**Guideline on Running Spirometry Service in Primary Healthcare**
Document Type	Guideline
Directorate/Institution	Department of Non-Communicable Diseases, MOH
Targeted Group	Doctors, Nurses, Spirometry technicians, Respiratory therapists
Document Author	Department of Non-Communicable Diseases, NCD Control Section
Designation	Department of Non-Communicable Diseases, NCD Control Section
Document Reviewers	Spirometry Procedures guideline task force
Designation	Spirometry Procedures guideline task force
Release Date	March 2025
Review Frequency	5 Years

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Date	March 2025	**Date**	March 2025

Acknowledgment

The Directorate General of Health Services and programs (DGHS&P) represented by the Department of Non-Communicable Diseases thanks and appreciates the efforts of all those who participated in writing and reviewing this guideline. The Department would like to thank in particular:

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Acronyms

BP	**Blood Pressure**
COPD	Chronic Obstructive Pulmonary Disease
COVID-19	Coronavirus disease
DGHS&P	Directorate General of Health Services and Programs
FP	Focal point
IPA	Isopropyl Alcohol
IPC	Infection Prevention and Control
MOH	Ministry of Health
MOIC	Medical Officer in Charge
N95	Filtering face piece respirator
NCD	Non-Communicable Disease
PHC	Primary Healthcare
PPE	Personal Protective Equipment
SMS	Short message service
SOP	Standard Operating Procedure
TB	Tuberculosis
URTI	Upper Respiratory Tract Infection

Definitions

- **Spirometry**: A device that measures the air that is expired and inspired. There are three basic related measurements: volume, time, and flow. Spirometry is objective, noninvasive, sensitive to early change, and reproducible. With the availability of portable meters, it can be performed almost anywhere, and, with the right training, it can be performed by anybody. It is performed to detect the presence or absence of lung disease, quantify lung impairment, monitor the effects of occupational/environmental exposures, and determine the effects of medications.
- **Focal Point:** The person responsible for the coordination of activities or tasks amongst a group or a network
- **Disposable mouthpieces:** Small cardboard pieces that are single-use items (i.e., should be disposed of after use) and are connected to the spirometry machine.
- **Height measuring device (stadiometer):** is a medical equipment used for measuring height. It usually consists of a ruler and a sliding horizontal headpiece which is adjusted to rest on the top of the head. Height and age are the most important explanatory variables in spirometry reference equations.
- **Bronchodilator Test*:*** The bronchodilator test is a method for measuring the changes in lung capacity after inhaling a short-acting bronchodilator drug that dilates the airway. When an obstructive ventilator defect is observed, this test helps to diagnose and evaluate asthma and COPD by measuring reversibility induced by the bronchodilator medication.

CHAPTER ONE

1 Introduction

The Directorate General of Health Services and programs (DGHS&P) represented by the Department of Non-Communicable Diseases (NCD) provides this document as a functional guidance to standardize the format and the procedure for the use of spirometers in Primary Healthcare (PHC)

2 Purpose

2.1 To ensure that all primary healthcare institutions and healthcare professionals involved in the provision of spirometry services follow a recognized standardized framework and process.

2.2 To ensure that spirometry services at the level of PHC are provided through clear evidence-based practices for the implementation of infection control measures, aiming to minimize the risk of transmission of infection.

3 Scope

This document is applicable to:

3.1 All primary healthcare institutions with spirometry services.

3.2 All healthcare professionals who are responsible for providing spirometry services in primary healthcare institutions.

4 Structure

The guideline consists of four chapters. Chapter one cover brief introduction to the guideline as well as the purpose, scope and structure. Chapter two explain the procedure of performing spirometry in primary healthcare. Chapter three covers the responsibilities. Chapter four comprises of the document history and version control, reference and Annexes.

CHAPTER TWO

5 **Procedures:**

The following aspects should be considered when establishing spirometry services and will be described in detail:

- Establishment of a spirometry clinic
- Assigning Focal Points
- Inviting patients to the Spirometry clinic
- Running the spirometry service

5.1 Establishment of a spirometry clinic

5.1.1 The following departments should be informed when the facility plans to establish spirometry services:

- The MOIC of the relevant healthcare facility
- The NCD Section under the Department of PHC in the governorate.
- The NCD Department, under the Directorate General of Health Services and Programs (DGHS&P).

5.1.2 The management of the PHC facility and the department of PHC in the governorate should ensure that the clinic is equipped with all essential materials and tools. These include:

- Disposable mouthpieces (adults and pediatrics).
- Personal protective equipment (gloves, gowns, surgical face masks/face shields or N95)
- A spirometry machines.
- Nose clips
- Viral/bacterial filters
- Bronchodilation medications
- Height measuring device (stadiometer)
- Vital signs measurement equipment (Thermometer, sphygmomanometer, pulse oximeter)
- Suitable furniture such as, comfortable waiting chairs and an appropriate space for the patient to undergo the examination.

5.1.3 Spirometry room:

5.1.3.1 The assignment of the room to function as the spirometry clinic shall be assigned by the management of the respective PHC facility and the Department of PHC in the governorate.

5.1.3.2 The room assigned as the spirometry clinic should have good ventilation (with an open window) or a room with negative pressure in order to control any possible cross-infection.

5.1.3.3 Allow only one healthcare worker to be in the room.

5.1.3.4 Allow only one patient in the room with one caregiver in case if the patient is elderly, a child, or with a condition or disability requiring a caregiver to be present.

5.1.3.5 The spirometry clinic should commence running when all equipment has been set up for the clinic

5.1.3.6 Good light for clear visibility during the examination.

5.1.3.7 Ensure that a good supply of PPE is available

5.1.3.8 Ensure there are combined detergent and disinfectant wipes (an alcohol wipe) available to clean the spirometry equipment and all room surfaces between patients when scheduling appointment times

5.1.3.9 Ensure the presence of curtains or barriers to provide privacy for the patient during the examination

5.2 Assigning Focal Points

5.2.1 The health facility should assign focal points to ensure the proper operation of the spirometry clinic.

5.2.2 The Spirometry clinic focal points can be nurses, physicians, technicians, or respiratory therapists with appropriate training and experience in conducting spirometry procedures.

5.2.3 The focal points must undergo both theoretical and practical training, which can be conducted either by the central team at the Department of NCD or by a designated team at the governorate level. Upon completion, they should receive a training certificate authorizing them to run the service.

5.2.4 The spirometry clinic focal point will directly communicate with the MOIC of the health facility for any issues.

5.2.5 The spirometry clinic's focal points should follow the procedures set forth in this manual.

5.2.6 It is the responsibility of the spirometry clinic focal points to ensure adequate training for all those running the services either at present or in the future.

5.2.7 The focal points should develop a comprehensive work plan that includes objectives and necessary procedures to ensure the efficient delivery of services.

5.2.8 The focal points are responsible for conducting regular evaluations of performance and outcomes, utilizing the findings to enhance service delivery.

5.2.9 An effective feedback system should be established to enable patients and team members to provide their insights and suggestions.

5.2.10 The focal points should coordinate efforts with other departments within the health facility to improve service integration.

5.2.11 The focal points are encouraged to promote health awareness among patients by organizing workshops or educational sessions on the importance of spirometry testing.

5.3 Inviting patients to the spirometry clinic

5.3.1 The indications and contraindications for spirometry test: (refer to annex 9.1)

5.3.2 Appointment system

5.3.2.1 The Spirometry clinic should run on an appointment system.

5.3.2.2 Appointments to the spirometry clinic should be through an electronic or manual referral system from another clinic within the same health facility or another health facility.

5.3.2.3 Appointments in the spirometry clinic will be scheduled through either the electronic or manual appointment system.

5.3.2.4 The number of appointment slots should not exceed 7 patients per day.

5.3.2.5 The timing between each patient and the other depends on whether viral /bacterial filters are used or not. If viral /bacterial filters are used, then a 5-10-minute gap between the patients will be adequate. If these filters are not used, then the flow sensor piece in the machine will need to be washed and dried and this will take around 30 minutes.

5.3.2.6 A reminder (phone call/SMS) of the appointment date should be done within a week before the appointment day.

5.3.2.7 Patients who are immunosuppressed (e.g. post-transplant or undergoing cancer treatment) are at increased risk of respiratory infections. Thus, consider scheduling their appointments at the start of the day.

5.3.2.8 Ensure the patient has been assessed and triaged as needed for symptoms of a respiratory infection within 24 hours of their appointment and that they are symptom free. Only perform spirometry on asymptomatic patients.

5.3.2.9 If a patient presenting with a respiratory infection requires testing, this should be performed at the end of the day and the equipment should be stripped down and sterilized parts replaced (depending on what is being used) before being used again.

5.3.3 Appointments cancellation

5.3.3.1 Patients who miss an appointment should be contacted by the spirometry clinic focal point and be provided with new follow-up appointments.

5.3.3.2 It is the responsibility of the spirometry clinic focal points to trace patients who did not attend their appointments and provide them with new appointments.

5.4 Running the spirometry service:

5.4.1 Spirometry clinic operating hours/days: The spirometry clinic's operating hours and days will be left to the administration of the health care institute.

5.4.2 Performing the procedure:

5.4.2.1 Pre-test: Assess for spirometry test eligibility. This step needs an assessment and a (screening questionnaire) of every individual before performing a spirometry test. (Refer to Annex 9.2).

5.4.2.2 All patients presenting with symptoms indicative of respiratory infection should have a full clinical assessment performed by a physician. This includes:

- History
- Physical examination
- Chest X-ray (If required).
- Blood test (if required)
- Sputum test (If required)

5.4.2.3 Ensure that patient's data/information (i.e., name, height in cm, weight in kg, age, sex, and smoking status) are checked and documented in the patient's electronic file in the Al-Shifa health system.

5.4.2.4 The height and weight should be measured in each visit before the test.

5.4.2.5 Ensure that patients are counseled about:

- The spirometry procedure and how to perform the test.
- The Bronchodilator tests.
- Ensure to explain the procedure to a child and demonstrate the steps in simple words.
- Spirometry has the potential to transmit pathogens through the equipment used (mouthpieces, valves, and tubing) either through direct contact with bodily fluids or through droplets. Infection risk can be minimized by the routine use of infection control measures. Thus, ensure that the patient and the staff are following the infection control measures:
  a) The staff must adhere to strict hand hygiene regimes focusing on the '5 moments and hand hygiene products must be easily accessible.

b) Using disposable mouthpieces or using the patient's own spacers for reversibility test.
c) Use of a new viral/bacterial filter for each patient.
d) If the filters are not available, then the flow sensor should be cleaned with an antiseptic solution such as Hibiscrub solution (chlorhexidine gluconate 4% solution) and dried for 30 minutes. This should be done after each patient.
e) Following the manufacturer's recommendations for cleaning and disinfection
f) Avoiding spirometry in patients with potentially transmissible disease
g) Avoiding standing directly in front of a coughing patient
h) The staff performing the procedure should wear a surgical mask.
i) Both the patient and the healthcare worker should perform hand hygiene with an alcohol-based hand sanitizer or by washing their hands with soap and water before and after the procedure.
j) Maintaining a distance of at least 1.5 ft. between the patient and the staff performing the procedure. Avoid sitting face-to-face with the patient
k) For reversibility testing, ensure the patients use their own salbutamol inhaler, with or without a spacer, provided it also belongs to them if disposable nebulization Kit is unavailable.
l) Instruct the patient to use respiratory and cough etiquette throughout the testing period.
m) If the patient needs to cough, have a surgical face mask in immediate proximity and make sure the patient knows to place it over their mouth immediately following completion of the maneuver. For example, the face mask may be lowered to the chin during the performance of the maneuver and then pulled up by the patient if they start coughing or when the maneuver is completed.

n) The staff performing the procedure should ensure to change mouthpieces between each patient.

o) Ensure that special filters (viral /bacterial filters) are available in the health institute and that it is being changed for each patient to prevent cross-infection.

5.4.2.6 Ensure that the test is conducted by trained staff nurses and interpreted by a trained doctor (trained in the use and interpretation of spirometry procedures).

5.4.2.7 Ensure that staff are trained by the pediatric spirometry team on how to perform and interpret spirometry procedures

5.4.2.8 Ensure that the results of the spirometry procedure are documented in the patient's electronic file in the Al-Shifa electronic medical record system.

5.4.3 Equipment management

5.4.3.1 Spirometer calibration

5.4.3.1.1 Before performing spirometry, the equipment used must be calibrated daily.

5.4.3.1.2 Spirometry values should be checked every week using a biological control (a healthy person working in the spirometry clinic).

5.4.3.1.3 Ensure that the staff nurse verifies periodic flow rate performance and conducts leak tests in addition to daily calibration.

5.4.3.2 Spirometer Maintenance

5.4.3.2.1 Maintenance services should be performed once a month if the machine is used daily.

5.4.3.2.2 Maintenance service time must be shortened when operating in smoky or dusty environments and may be extended with less frequent operation.

5.4.3.2.3 The in-charge should be notified immediately of any equipment problem.

5.4.3.2.4 The equipment should be cleaned and disinfected by wiping down all surfaces that the patient comes in

contact with, using an antiviral disinfectant such as 70% isopropyl alcohol (IPA).

5.4.3.2.5 The spirometer must be cleaned between patients. As a minimum, this should involve cleaning the outer casing of the transducer and the outer part of the spirometer itself with an alcohol wipe.

5.4.3.2.6 Follow the manufacturers cleaning instructions to avoid damaging the equipment.

5.4.3.2.7 Store the spirometer and accessories in a clean, dry environment away from direct sunlight and humidity.

5.4.3.2.8 Use dedicated storage cases for portable units to prevent transport damage.

5.4.3.2.9 Maintain backup spirometers or calibration syringes and spare parts to avoid service interruptions.

5.4.3.2.10 Ensure regular check for portable units, charge the batteries and keep backup batteries or power banks on hand for emergencies.

5.4.3.2.11 Maintain a log of maintenance activities and equipment issues for auditing purposes.

CHAPTER THREE

6 **Responsibilities:**

6.1 Primary health care department at the governorate

6.1.1 Provide data on spirometry clinic to the department of NCD in the Ministry of Health

6.1.2 Ensure that the spirometry clinic is well-equipped and that the environment is safe and healthy for both the staff and the patient.

6.1.3 The Governorate's NCD head of section should request spirometry machines through the engineering department at the directorate general of health services in the governorate.

6.1.4 Monitor the running of the spirometry clinics in the governorate.

6.1.5 Solve any issues that may arise at the level of the governorate.

6.1.6 Report any issues with the spirometry machine to biomedical engineering department in the governorate in coordination with the head of the NCD section in the governorate.

6.1.7 Ensure that the staff who are performing the spirometry test are trained and that their knowledge is maintained and updated.

6.1.8 Liaise with the department of NCD to train staff (doctors and nurses) on spirometry procedures.

6.2 Responsibilities of the spirometry clinic focal points (doctor, nurse, technician) at the level of the health center/ polyclinic

6.2.1 As well as overall supervision of the spirometry clinic, the focal point (doctor, nurse, and technician) assists in running the clinic.

6.2.2 Provides data to the asthma clinic focal point/head of the NCD control section whenever required.

6.2.3 It is the responsibility of the spirometry clinic focal points to arrange for a spirometry training program.

6.2.4 Ensure that the staff running the clinic are trained and know how to use the machine that is available in the institute.

6.2.5 Ensures that the spirometry clinic is equipped with all necessary equipment to run the procedure and the clinic.

6.2.6 Ensures regular supply of spirometry machine filters and bronchodilator medications. The clinic focal points should send the requests of filters and bronchodilator medications through the pharmacy.

6.2.7 Requests disposable mouthpieces and PPE regularly.

6.2.8 Ensures that the medications have not passed their expiry dates.

6.2.9 Ensure regular check for portable units, charge the batteries and keep backup batteries or power banks on hand for emergencies.

6.2.10 Reports any insufficiencies to the pharmacist in charge of the health facility.

6.2.11 Ensures that the spirometry machine is checked and that it works properly.

6.2.12 Ensure that the procedure is performed in a room with a window to allow ventilation.

6.2.13 Ensures that only one attendee with the patient is allowed in the clinic.

6.2.14 Ensures that the clinic is run by an appointment system and that the reason for referral is mentioned.

6.2.15 Ensures that at least two trained staff are available to run the clinic.

6.2.16 Ensures that the staff provides counseling to the patients before performing the procedure and that the patients are being screened for test eligibility.

6.2.17 Maintain a list of patients who underwent the procedure.

6.2.18 Maintains a list of clinic defaulters

6.2.19 Ensures the proper interpretation and documentation of the result in the electronic medical file.

6.2.20 Implement periodic audits to assess adherence to the SOP.

6.3 Responsibilities of Department of Engineering affairs at level of the Governorate:

6.3.1 To provide the spirometry machine according to the request from the PHC department in the governorate.

6.3.2 Ensure all spirometry devices comply with national and international standards (e.g., ATS guidelines).

6.3.3 Keep up-to-date certification documents for each spirometer, accessible for audits.

6.3.4 To replace the damaged spirometry machines.

6.3.5 To do regular maintenance of the spirometry machines in the governorate.

CHAPTER FOUR

7 Document history and version control table

Version	Description	Review Date
01	Initial Release	March 2030

8 References

Title of book/ journal/ articles/ Website	Author	Year of Publication	Page
Spirometry: step by step, Breathe,article	V.C. Moore,	2012	232-240, 2
Bracci M, Strafella E, Croce N et al. Risk of bacterial cross infection associated with inspiration through flow-based spirometers	Am.J.Infect Control	2011	
National Asthma Council Australia. Australian asthma handbook.	Melbourne National Asthma Council Australia	2919, version 2.0	
Spirometry indications and Contraindications	Brendan G Cooper	2011	
The spirometry handbook for primary care. Melbourne	National Asthma Council Australia	2020	
Australian asthma Handbook	National Asthma Council Australia. Version 2.2. Melbourne:	2022	
Risk of bacterial cross infection associated with inspiration through flow-based spirometers. Am J Infect Control	Massimo,Bracci,Elisabetta Strafella	2011	

Standardization of spirometry update. An official American thoracic society and European respiratory society technical statement. American journal of respiratory and critical care medicine,	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. and Oropez, C.E	2019	
Considerations for Conducting Spirometry During and After COVID-19	American lung association	2020	
Lung function testing during covid-19 pandemic beyond	Recommendation from European Society group 91, Respiratory function technologists/scientists	May 2020	
https://www.bing.com/ck/a prescreening+spirometry+questionnaire			
National Health Services, Spirometry in Primary Care Tool Kit to Support Spirometry Services		2023	

9 Annexes

9.1 Appendix 1: The indications and contraindications for spirometry test

The indications for spirometry:
▪ Adult patients with acute/chronic respiratory symptoms who need to be evaluated by spirometry. ▪ Children > 6 years old with acute/chronic respiratory symptoms and who need to be by evaluated spirometry. ▪ To assess response to therapy.
The Contraindications for spirometry:
▪ Patients with symptoms of respiratory infections of any sort including COVID-19 infection. ▪ Patients with active TB or if in close contact with an active TB case. ▪ Patients with a history of eye surgery, retinal detachment, open heart surgery, laparotomy, stroke, myocardial infarction, aortic/cerebral aneurysm, or pneumothorax in the last 6 weeks. ▪ Patients with the following conditions: o Hemoptysis of unknown origin. o Acute disorders affecting test performance, such as nausea or vomiting.

9.2 Appendix 2: Pre-screening questions to Assess for Spirometry test eligibility for both (Test performer and patient):

	Patient's Name: …. **Contact number: ….**	**Patient's Medical Record Number…** **Date: …….**		
No			**YES**	**NO**
1.	Have you used an inhaled short-acting bronchodilator (Ventolin) in the last 4-**6** hours?	If, Yes, if possible, the waiting time before testing depends on the time last used: - if 4 hours wait two hours before testing - If 6 hours proceed with testing, otherwise, document in Al-Shifa system	☐	☐
2.	Do you currently suffer from any of the following symptoms?	If, Yes, do not test at this time, reschedule the spirometer test. ☐ Runny nose ☐ Sore throat ☐ Fever ☐ Headache ☐ Chest pain ☐ Hemoptysis ☐ Nausea or vomiting ☐ Diarrhea ☐ I don't have any of the previous symptoms If, No, document in Al-Shifa system and proceed.	☐	☐
3.	Have you had a respiratory infection (Upper respiratory tract infection, bronchitis, or pneumonia) within 3 weeks?	If, Yes, check which type: • If bacterial infection, reschedule the spirometry test 6-8 weeks after resolution of symptoms. • If viral infection, reschedule the spirometry test 4-6 weeks after resolution of symptoms.	☐	☐
4.	In the last 6 weeks have you had chest injury or surgery involving the eye, ear, chest, or abdomen or have	If, Yes, do not test at this time. Reschedule the spirometry test six weeks after the surgery or the event.	☐	☐

	been hospitalized for a heart attack?			
5.	Are you under a physician's care for high blood pressure?	If, Yes, & If the blood pressure is higher than the normal level and the patient has symptoms (e.g., headache), consult a physician for clearance before proceeding. (BP≥:160/100 requires clinical assessment) - Today's Blood Pressure…….	☐	☐
6.	Within the last **1** hour have you smoked (tobacco including sheesha, electronic cigarettes) or drank coffee?	If, Yes, if possible, wait one hour before testing, otherwise, document in Al-Shifa system and proceed.	☐	☐
7.	Within the last **4** hours have you drank alcohol?	If, Yes, if possible, wait one hour before testing, otherwise, document in Al-Shifa system and proceed.	☐	☐
8.	Within the last **2** hours have you eaten a heavy meal	If, Yes, if possible, wait one hour before testing, otherwise, document in Al-Shifa system and proceed.	☐	☐
9.	Within the last **30** minut**es** have you had vigorous exercise?	If, Yes, if possible, wait one hour before testing, otherwise, document in Al-Shifa system and proceed.	☐	☐
10.	Are you wearing dentures?	If, Yes, depends on the type of dentures: - If the dentures are removable, ask the patient to remove the dentures and proceed with the test. - If the dentures are tight and the patient lost less than half the teeth, postpone testing otherwise, document in Al-Shifa system and proceed.	☐	☐
11.	Are you wearing tight clothes?	If, Yes, if possible, open or change clothes before testing, otherwise, document in Al-Shifa system and proceed	☐	☐
12	Have you used an inhaled long-acting bronchodilator (including combination inhalers) in the last **24** hours?	If, Yes, depends on the type and reason for testing, if possible, wait a few hours before testing, otherwise, document in Al-Shifa system and proceed.	☐	☐
	• Today's Measurements: Height: ___(cm.), Weigh___ (Kg.) • Certified Spirometry Technician's name: ----------			