

Title:Pre and Post Bronchodilator Spirometry Testing

Number:HFHT-MD#08 [RN]

Activation Date:Feb 2026

Review due by:Feb 2028

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Orders and/or Delegated Procedure:	Appendix Attached: ☒ Yes ☐ No	Title:
Standardization of Spirometry 2019 Update.		
For patients referred to the Lung Health Program by a physician or nurse practitioner (NP) for spirometry testing, and under the authority of this medical directive, the authorized implementer is permitted to perform the following: - Spirometry testing with or without a Beta 2 Agonist Medication. - Bronchodilator responsiveness testing will include the administration of a specified dose of a short-acting beta₂-agonist medication (Salbutamol) via inhalation with a disposable spacer device (dose as per American Thoracic Society/European Respiratory Society (ATS/ERS) Standards for Spirometry). - As part of the referral process the Physician/NP is directed to review this medical directive/delegated procedure and identify any concerns related to performing spirometry or the administration of a short-acting beta₂-agonist medication on the referral form.		

Recipient Patients:	Appendix Attached: ☐ Yes ☐ No	Title:
- Patients under the care of Physicians, affiliated / partnered with the HFHT who have been referred to the Lung Health Program through Ocean E-referral. - At least 6 years of age. - Have a suspected or confirmed diagnosis of Asthma or COPD - Meet the conditions identified in this directive. - Implementer obtains verbal consent form patient or substitute decisionmaker prior to testing.		

Authorized Implementers:	Appendix Attached: ☐ Yes ☐ No	Title:
- Certified Respiratory Educators (CRE(s)) employed by the Hamilton Family Health Team (HFHT) are authorized staff who hold both a regulated health professional designation (i.e., RN) and have obtained Certification through the Canadian Network for Respiratory Care (CNRC). - Successfully completed a recognized Spirometry training course. - The authorized implementor holds the above designation and certification and is in good standing with their professional regulatory body.		

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- Have basic life-support training.

Indications/Contraindications:

Appendix Attached: ☒ Yes ☐ No

Title: Lung Health Foundation's

Primary Care Asthma Program (PCAP) Spirometry Manual (Sept 2021)

The decision to conduct spirometry testing is determined by the ordering Healthcare Professional based on their evaluation of the risks and benefits of spirometry. Potential contraindications should be identified by the HCP on the Lung Health referral form.

Indications for spirometry:

- Measure bronchodilator response.
- Assess response to therapeutic intervention.
- Monitor disease progression.

Absolute Contraindications:

- Patient / POA refusal
- The CRE will conduct a review of relative contraindications and discuss with physicians before initiating medical directive if there are any concerns.

Relative Contraindications for administering salbutamol sulfate beta-2 agonist:

- Significant tachyarrhythmia
- Hypersensitivity to any component of the medication being administered
- History of any adverse effects to the medication being administered.

Relative Contraindications for performing Spirometry

The forced expiratory maneuver used in spirometry will result in increased intrathoracic, intraabdominal, and intracranial pressures, and therefore the following must be considered.

Due to increases in myocardial demand or changes in blood pressure

- Acute myocardial infarction within 1 week
- Systemic hypotension or severe hypertension
- Significant atrial/ventricular arrhythmia
- Non compensated heart failure
- Uncontrolled pulmonary hypertension
- Acute cor pulmonale
- Clinically unstable pulmonary embolism
- History of syncope related to forced expiration/cough

Due to increases in intracranial/intraocular pressure

- Cerebral aneurysm
- Brain surgery within 4 weeks
- Recent concussion with continuing symptoms
- Eye surgery within 1 week

Due to increases in sinus and middle ear pressures

- Sinus surgery or middle ear surgery or infection within 1 week

Due to increases in intrathoracic and intraabdominal pressure

- Presence of pneumothorax
- Thoracic surgery within 4 weeks
- Abdominal surgery within 4 weeks
- Late-term pregnancy

Infection control issues

- Active or suspected transmissible respiratory or systemic infection, including tuberculosis.
- Physical conditions that predispose staff to transmission of infections, such as hemoptysis, significant secretions, oral lesions, or oral bleeding.

Other

- Inability to follow direction (e.g., confusion, dementia, young age, language barrier).

Patients will be asked to avoid the following activities prior to lung function testing.

- Smoking and/or vaping and/or water pipe use within at least 1 h of testing (to avoid acute bronchoconstriction due to smoke inhalation)
- Consuming intoxicants within 8 h of testing (to avoid problems in coordination, comprehension and physical ability)
- Performing vigorous exercise within 1h of testing (to avoid potential exercise-induced bronchoconstriction)
- Wearing clothing that substantially restricts full chest and abdominal expansion (to avoid external restrictions on lung function)
- Eating a large meal within 2 h of testing

Consent Consent is implied through direct Ocean e-referral to the HFHT Lung Health Program the Physician or Nurse Practitioner delegates the order to perform pre and post spirometry testing with the administration of a beta-2 agonist to the patient when all conditions are met. The authorized implementer or program admin personal will call the patient prior to the test and explain which medications/activities to withhold prior to the procedure. The patient will receive a confirmation email reviewing the activities that must be avoided prior to testing. The CRE will conduct a verbal review of relative contraindications (above) and obtain verbal consent from the patient to conduct spirometry testing and share results with referring practitioner.	Appendix Attached: ☐Yes ☐No Title:
Guidelines for Implementing the Order / Procedure: The implementer shall be able to perform spirometry and reversibility testing, through the administration of short-acting bronchodilator, as well as advising patients on which inhaled medication to withhold prior to spirometry testing (medications listed below). The Implementer • Patients will have the test purpose and procedure explained and demonstrated. • Contraindications will be reviewed. • Patients will be informed of the potential side effects of salbutamol. a. Increased heart rate (palpitations) b. Tremors of extremities lasting approximately 30 minutes c. Headaches If the client has a contraindication to salbutamol or refuses to take salbutamol, then the procedure will be discontinued, and the patient will be directed back to their primary care provider. Medication to withhold prior to spirometry testing. The decision to avoid bronchodilators before testing is dependent on the reason for the test. If post bronchodilator testing is to be performed to diagnose an underlying lung condition, the patient may/should withhold the following medication(s) prior to spirometry testing. *Note: It is important to tell the patient that if they need to use their rescue inhaler for symptoms, they may do so and not withhold it for the test. * Inhaled bronchodilators	Appendix Attached: ☒Yes ☐No Title: Lung Health Foundation's Primary Care Asthma Program (PCAP) Spirometry Manual (Sept 2021)

Medication	Withholding time prior to Spirometry testing
Short-Acting Beta 2 Agonist (SABA) e.g., albuterol or salbutamol	4-6 hours
Short-Acting Muscarinic Antagonist (SAMA) e.g., ipratropium bromide	12 hours
Long-Acting Beta2 Agonist (LABA) e.g., formoterol or salmeterol	24 hours
Ultra-long acting Beta2 Agonist (ultra-LABA) e.g., indacaterol, vilanterol or olodaterol	36 hours
Long-Acting Muscarinic Antagonist (LAMA) e.g., tiotropium, umeclidinium, aclidinium or glycopyrronium.	36-48 hours

Other medications to withhold:

Theophylline: 48 hours

LTRA 24 hours (montelukast)

Antihistamines and steroids (oral and inhaled) do not need to be withheld.

Note: if the test is to determine the response to a medication, then the decision to withhold medication prior to testing is not required.

Guidelines for Implementing the Order / Procedure (Continued):

Spirometry will be performed according to the latest ATS/ERS/CTS guidelines.

- A minimum of 3 pre and post bronchodilator tests (total of 6 minimum) will be performed to the satisfaction of the CRE for meeting criteria for reproducibility. Usually no more than a total of 8 maneuvers will need to be performed.
- After the pre-bronchodilator test patients will be administered 4 separate doses (2 doses for patients under 12 years of age) of salbutamol for the purpose of assessment of airway reactivity. (Note: ATS does not currently specify any recommendations for the pediatric population.)
- The post-bronchodilator test will be conducted 15 minutes after Salbutamol has been administered.
- If any of the above side effects are noted, further administration of Salbutamol will be discontinued. The side effects will be documented in the chart and the client's primary care provider will be notified.
- Infection control will include hand washing/administration of antibacterial solution, single use mouth pieces and nose clips, wearing appropriate PPE as required, use of and cleansing of handheld equipment and high traffic areas between patients.

Hygiene and Infection Control

The goal of infection control is to prevent the transmission of infection to patients and staff during spirometry testing. Indirect transmission of aerosol droplets generated by the patient blowing into the pneumotach can be blown into the atmosphere. It is recommended that the operator follow local public health and infectious disease recommendations for testing (e.g., appropriate PPE, hand hygiene, ventilation, etc.). Please note that these recommendations can change to respond to local/regional policies and should be reviewed regularly.

Documentation and Communication:

The HCP's completed referral to the HFHT Lung Health Program received through the Ocean E-referral process is entered into the patient's medical record.

Documentation in the patient's medical record will include the Medical Directive number and whether Salbutamol was administered along with the implementers name and credentials.

Information regarding implementation of the procedure and the patient's response should be documented in the patients' medical record in accordance with standard documentation practice.

The Spirometry report will be attached to the progress note in the medical record with will be sent via fax or within EMR to the Physician for their review and sign off.

The CRE will notify the referring professional or their on-call replacement if there are any urgent concerns about test results that may indicate the need for immediate medical assessment. If the CRE is unable to contact the patient's physician, the patient will be sent to the Emergency Dept.

Appendix
Attached: ☐Yes
☐No
Title:

Review and Quality Monitoring Guidelines:

- This Medical Directive/ delegated procedure will be reviewed and renewed every two years on the anniversary of the activation date. Renewal will involve collaboration with the Lung Health Program Lead and a minimum of one implementing CRE.
- At any such time that issues related to the use of this directive are identified the team must act upon the concerns and immediately undertake a review of the directive.
- If new information becomes available between routine renewals and particularly if this new information has implications for unexpected outcomes the directive will be reviewed by the Lung Health Program Lead and a minimum of one implementing CRE.

Quality control checks are to be regularly performed

- Spirometry equipment is calibrated each day prior to testing. A 3L syringe is used to recalibrate and verify volume by cycling flows at low, medium, and high levels. Calibration syringes must have a monthly leak test. This will be recorded on the program and documented on the maintenance log. If the calibration verification fails, check for and remediate problems and repeat calibration verification.
- Monthly biological control testing with one staff member with normal lung function. The results should be essentially the same each time and documented in the maintenance log.

Note: Any deviation in the accuracy checks should be followed up with a calibration of the spirometer and then performed again. Further deviation indicates a fault in the equipment.

Supporting Documents and Related Links

Lung Health Foundation's Primary Care Asthma Program (PCAP) Spirometry Manual (Sept 2021)
<http://hcp1stg.wpengine.com/wp-content/uploads/2022/01/PCAP-Spirometry-Manual-2020-Dec-21-SH-GA.pdf>

American Journal of Respiratory and Critical Care Medicine - Standardization of Spirometry update.
https://www.atsjournals.org/doi/full/10.1164/rccm.201908-1590ST#_i11

Canadian Thoracic Society: Spirometry in Primary Care.
https://cts-sct.ca/wp-content/uploads/2018/01/Spirometry-in-Primary-Care_CRJ-Jan-Feb-2013.pdf

Canadian Network for Respiratory Care (CNRC)
<http://www.cnrchome.net/certification.html>

Appendix Attached: ☐Yes ☐No
Title: