RÉGIE RÉGIONALE DE LA SANTÉ ET DES SERVICES SOCIAUX DU NUNAVIK / NUNAVIK REGIONAL BOARD OF HEALTH AND SOCIAL SERVICES

UNGAVA TULATTAVIK HEALTH CENTER / CENTRE DE SANTÉ TULATTAVIK DE L'UNGAVA

Centre de Santé et Services Sociaux Inuulitsivik
Inuulitsivik Health & Social Services Centre
Puvirnituq, Québec J0M 1P0
T 819 988-2957 / F 819 988-2796

Title:	**PROTOCOL**
Subtitle:	**Sputa induction protocol for BK tests**
Responsible for application:	Direction des soins infirmiers
Approved by:	CMDPSF ☒ Records committee ☒
Approved on:	2020-03-03
Revised on:	2019-01-23 Aurélie Heurtebize, Nurse, BSc. N./ Jean-François Laplante, Nurse, BSc. N.
Recipient(s):	All nurses

PREAMBLE

Induction of sputa is the preferred approach for collecting samples. With this technique, the vast majority of patients will be able to generate sputum (except - see Contraindications and approaches to adopt).

PRINCIPAL

This procedure requires an individual (or personal) medical prescription. It entails using a hypertonic solution that essentially irritates the airways, which has the effect of provoking secretions, coughing and as such, the production of sputum.

PURPOSE

Obtain samples of quality bronchial secretions in sufficient quantities to allow for confirming the microbiological presence of *Mycrobacterium tuberculosis* (or BK for Koch's bacillus) in persons suspected of having active TB.

Four samples of sputa are needed (GeneXpert PCR x 1 and BK smears/cultures x 3)[1]. The specimens can be collected on the same day, a minimum of one hour apart. They could also be obtained on three consecutive days. Note that the specimen for GeneXpert and the first BK specimen can be collected at the same time, but must be kept in separate containers (see Procedures).

[1] Dr. Faiz Khan and the laboratories recommend collecting one sample for GeneXpert and three others for the smears and cultures.

PERSONS CONCERNED

This protocol is mostly for the healthcare personnel who will be called upon to perform this procedure for any person who must be tested for the presence of BK by collecting specimens of provoked sputa or aspirating nasopharyngeal secretions (pediatrics).

APPLICATION PROCEDURES

The procedure constitutes a significant risk of transmission, as aerosols infected with *Mycobacterium tuberculosis* could be generated. It must be carried out in environments that meet specific conditions regarding ventilation (negative pressure chamber or BK tent) and by introducing additional airborne precautions (see Application procedures below).

Additional airborne precautions[2]:

- A poster must be placed on the door which indicates the additional airborne precautions in force; a handwritten note or post-it must be stuck to the poster indicating the exact hour when the room or space will no longer be under quarantine (see below for details on the suggested wait times, based on the room or space used for this purpose).

- Healthcare and other workers must wear an N95 mask (fit test must be done every 2 years or whenever a person either gains or loses more than 10 lbs. or 4.5 kg.). N95 mask must pe put on and removed outside of the negative pressure chamber (tent).

- Users must wear surgical masks : a person with a suspected or confirmed case of TB must wear a surgical or procedural mask when moving about in public areas prior to and after undergoing screening/testing. The mask essentially blocks large respiratory droplets generated by coughing, breathing or speaking. It is not efficient for long periods of time, and must be changed whenever it becomes humid.

Negative pressure chamber:

Keep the door and windows closed at all times. According to the CSA Z317.2 2015 standard, a negative pressure chamber must undergo a minimum of 12 air changes per hour. The chamber, moreover, must be empty for at least 35 minutes before a new user accesses it. According to the table prepared by the Francis J. Curry National Tuberculosis Center[3], 90% of the air is renewed 12 minutes after a user exits the chamber, and 99.9% of the air is renewed after 35 minutes (based on the aforementioned 12 air changes per hour). The chamber must be thoroughly cleaned between users, and this after all microorganisms have been deposited on objects and surfaces in the room: clean and disinfect all reusable equipment with disinfecting wipes.

Portable negative pressure tents:

These tents are hooked up to a portable scrubber (local exhaust ventilation device) that pushes air through a HEPA filter, as well as an ultraviolet germicidal lamp. These tents are supplied by the NRBHSS, and can be obtained from your health

[2] Guides généraux de PCI, Notions de base en prévention et contrôle des infections (2018). https://www.inspq.qc.ca/en/expertise/infectious-diseases/nosocomial-infections

[3] Francis J. Curry National Tuberculosis Center, 2004. *How long does it take to clear the air in an isolation or high-risk procedure room*? 3 p.

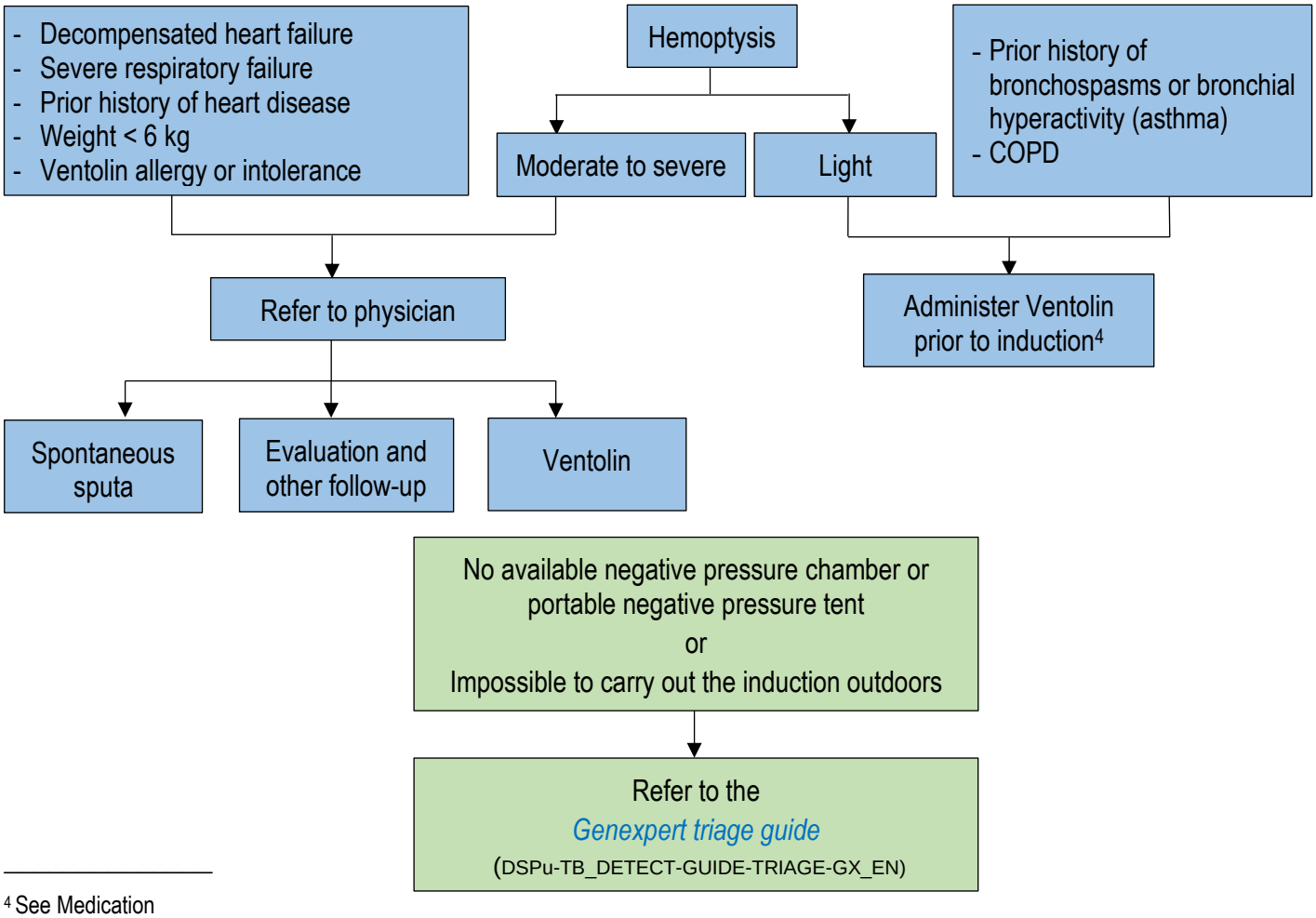
centre's biomedical department. The equipment has lights that indicate when the filters need to be changed. A green light indicates that the UV light is operational. Always make sure the negative pressure device works as it should prior to beginning a test. The objective is to have a ventilation such as that offered in any negative pressure chamber. The speed must be set at maximum. The patient who is generating sputa must be placed so as to face the aspiration, given that bioaerosols must be aspirated as quickly as possible. With these tents, sputum induction can be performed at intervals of only 15 minutes between users (based on > 50 air changes per hour). Once the last patient has completed his test and 15 minutes has gone by, the machine can be shut down. It will need to be powered up 15 minutes prior to being used the next day.

There must be a thorough cleaning between users, and this after all microorganisms have been deposited on objects and surfaces in the room: clean and disinfect all reusable equipment with disinfecting wipes.

Outdoors:

If sputum induction cannot be carried out in a negative pressure chamber or portable negative pressure tent, it could, if temperatures permit, be performed outdoors. In such cases, make sure the privacy and confidentiality of all persons undergoing the procedure are preserved.

CONTRAINDICATIONS AND APPROACHES TO ADOPT



[4] See Medication

NECESSARY EQUIPMENT AND SUPPLIES

- Nebulizer
- Mask for the nebulization
- Hypertonic saline solution (7%)
- Container for secretions (Falcon conical tube or Mucus trap in the case of nasopharyngeal aspiration)
- Kleenex
- Individual protective equipment (for nurses): N95 mask, disposable or sterile gloves, depending on the procedure (see Procedures).

→ **Pediatric clientele > 6 kg and < 18 yrs of age or any other person with a medical condition requiring use of a bronchodilator prior to the procedure (see Contraindications and approaches to adopt):**

- Ventolin (salbutamol inhalation).
  Administer with a nebulizer whenever possible (double-masked) rather than an aero-chamber (which is more expensive).

→ **Pediatrics clientele unable to generate sputa:**

- Suction device.
- Suction catheter (usually 8fr calibre).
- Individual protective equipment (for person accompanying the user): N95 mask.

MEDICATION

- Hypertonic saline solution (7%): one 4 ml single dose ampule (nebulization).

- Ventolin (salbutamol inhalation) prior to induction (see Contraindications and approaches to adopt):

→ **Pediatric clientele > 6 kg and < 18 yrs of age:**

1. Ventolin 0.15 mg/kg/dose (max. 0.5 ml) or 0.03 ml/kg/dose of a 5 mg/ml solution (maximum 0.5ml) in 2 ml of NaCl 0.9% (nebulization)
   OR
2. Ventolin 100 mcg 2 inhalations (to administer with an aero-chamber)

→ **Adult clientele with a contraindication requiring use of a bronchodilator prior to the procedure:**

1) 2.5 mg (nebulization): always dilute with 2 ml of NaCL 0.9%
   OR
2) Ventolin 100 mcg 2 inhalations (to administer with an aero-chamber)

Note: If bronchospasm during the intervention, refer to the physician on call as quickly as possible.

PROCEDURE

Information for patients:

1. NPO (*nil per os*, nothing by mouth) for one hour prior to the test.
2. Must rinse their mouth both before and after the procedure.
3. Reason for the procedure.
4. Use of the nebulizer.
5. Salty taste of the hypertonic solution.
6. Need to breathe regularly but deeply, through the mouth.
7. Strong cough to expel deep sputum (and not saliva) into the container.
8. Need to stay in the room until they are no longer coughing.
9. Waiting period to get results.

Pediatrics clientele unable to generate sputa:

1. Assess the user's respiration (frequency, amplitude, rhythm and any audible breathing noises). Repeat after the treatment with Ventolin and the treatment with the hypertonic solution.
2. Preliminary treatment with Salbutamol to prevent bronchospasms (see Medication).
3. Administer the hypertonic solution (See Necessary equipment and supplies).
   Do not mix the Salbutamol and the hypertonic solution, as this will reduce the irritation and prevent the desired effect.
4. Set the aspiration pressure between 60 and 100 mm Hg.
5. Wear sterile gloves.
6. Use the saline solution 0.9% to humidify and lubricate the suction catheter and facilitate its insertion into the nose.
7. Insert the suction catheter into the nostril up to the nasopharyngeal area, to provoke coughing.
8. Aspirate the secretions into the appropriate container (Mucus trap). Obtain a sample of between 5 and 10 ml (minimum of 1 ml for GeneXpert and 3 ml for the BK).
9. Close the container and affix a label to identify it.
10. Follow the laboratory protocol to ensure the container is sealed. Place the samples in individual plastic biomedical waste bags and send them to the laboratory **(keep in the fridge, at a temperature of 4°C and away from the light). Important: clearly note that the specimen was collected by induction, and label as BK#1, BK#2, BK#3 (as the case may be).**
11. The samples can all be collected the same day; an interval of at least 1 hour between samples is required, and steps 1 to 10 must be followed for each specimen. A total of 4 samples[1] are needed, 1 for GeneXpert and 3 for the sputa BK.

    ***** Note:**

    GeneXpert and the first BK specimen can be collected at the same time, but must be stored in two separate containers.

    If you use two containers for the GeneXpert and the first BK specimens, you must prepare two suction catheters + Mucus trap and open them. Use the first suction catheter + Mucus trap kit to collect the GeneXpert specimen in one nostril, then the second such kit to collect the BK #1 specimen in the other nostril.

Pediatric and adult clientele able to generate sputa:

1. Assess the user's respiration (frequency, amplitude, rhythm and any audible breathing noises). Repeat after the treatment with Ventolin (according to the medical prescription or protocol) and the treatment with the hypertonic solution.
2. Preliminary treatment with Ventolin to prevent bronchospasms (according to the medical prescription or protocol).
3. Administer the hypertonic solution (See Necessary equipment and supplies).
4. Wear disposable gloves.
5. Have the user spit so as to obtain a sample of between 5 and 10 ml (minimum of 1 ml for GeneXpert and 3 ml for the BK) sputa from the lungs (not saliva), directly into the appropriate container (Falcon conical tube). Maximum duration 20 minutes.
6. Follow the laboratory protocol to ensure the container is sealed. Place the samples in a plastic biomedical waste bag and send them to the laboratory **(keep in the fridge, at a temperature of 4°C and away from the light). Important: clearly note that the specimen was collected by induction, and label as BK#1, BK#2, BK#3 (as the case may be).**
7. The samples can all be collected the same day; an interval of at least 1 hour between samples is required, and steps 1 to 6 must be followed for each specimen. **A total of 4 samples[1] are needed, 1 for GeneXpert and 3 for the sputa BK.**

Stop the procedure if:

→ The user has generated at least 1 to 2 ml of sputa from the lungs and is unable to produce any more.
→ The nebulization is complete and the user cannot produce any acceptable sputum.
→ The user complains of dyspnea, chest tightness, wheezing, dizziness or nausea.

***** Note:**

GeneXpert and the first BK specimen can be collected at the same time, but must be stored in two separate containers.

RESPONSIBILITIES AS REGARDS THE PROTOCOL'S APPLICATION

The Direction des soins infirmiers is charged with the application of this protocol.

COMING INTO FORCE

March 2020

REFERENCES

Update of the contraindications regarding use of this protocol, by Mme Claire Crépeau, based on the recommendations of Dr. Faiz Khan, Pneumologist, McGill University Health Centre and TB expert, MUHC (July 2017).

Méthodes de Soins Informatisées, *Protocole de Prélèvement des expectorations* (2015-09-11).

Méthodes de Soins Informatisées, *Aspiration des sécrétions de la cavité buccale* (2018-05-08).

Abatements Technologies Ltd. 2/18/2011:PREDATOR® 1200 Portable Air Scrubber, Model PRED1200UV-INSTRUCTION MANUAL, https://www.abatement.com.

Public Health Agency of Canada. (2014). *Canadian Tuberculosis Standards,* 2014. 7th edition.

Canadian Standard Association (CSA) (2015). *Special requirements for heating, ventilation, and air-conditioning (HVAC) systems in health care facilities.* 117 p.

NSW Government Health. Tuberculosis, Epidemiology, Policies and guidelines Fact sheets: *Sputum induction guidelines (*May, 2018*).* https://www.health.nsw.gov.au/Infectious/tuberculosis/Pages/tb-sputum-induction-guidelines.aspx**.**

INSPQ, Guides généraux de PCI, Notions de base en prévention et contrôle des infections. (2018). https://www.inspq.qc.ca/en/expertise/infectious-diseases/nosocomial-infections**.**

Viger, A., Lachance, L., Samson, L. & Ouellet, S. Expectorations induites pour recherche de BK. Centre intégré de santé et de services sociaux de la Montérégie-Centre (June, 2015).

Review by Marie-Soleil Fortier, Advisor, DSI, *Sputa induction protocol for BK tests*, CSI (2017).

Deborah Fertuck, *Protocol for the procurement of induced sputum for pediatric patients,* MCH (2019-09-05).