

Sputum Induction for the Diagnosis of Pulmonary Tuberculosis (Respiratory Therapy)

Site Applicability

Mount Saint Joseph Hospital, St. Paul's Hospital

Practice Level

Respiratory Therapist

Need to Know

Until ruled out, **ALL** patients suspected of active pulmonary tuberculosis must be isolated in an airborne infection isolation room. Airborne isolation precautions may only be discontinued by a physician in consultation with Infection Prevention and Control (IPAC).

If active pulmonary tuberculosis is suspected, staff will wear a fit-tested N-95 respirator when in the same airspace or room as the patient. Staff will adhere to appropriate infection prevention and control guidelines.

Sputum induction will only be done in an airborne infection isolation room.

Orders for induced sputum are restricted to physicians from **IPAC, ID and Respirology**.

PHC standard is to perform one induced sputum per patient. Only in exceptional circumstances will more than one be required. If an order is received to perform sputum induction more than once, the RT will contact the ordering physician for clarification before proceeding.

Contraindications & Precautions

Inhalation of hypertonic saline and/or use of an ultrasonic nebulizer may trigger bronchospasm. If the medical team determines that the establishment of a diagnosis is deemed crucial, patients with asthma, suspected asthma, or severely impaired lung function (i.e. FEV₁ less than 1L) should be pre-medicated with salbutamol and be under constant medical supervision during the sputum induction procedure. The most responsible physician is to order the medications and assign a monitor.

Severe coughing may result as part of the procedure – therefore it should **not** be performed in patients where severe coughing may be harmful. Examples include:

- Hemoptysis
- Acute respiratory distress
- Unstable cardiovascular status (i.e. dysrhythmias, angina)
- Thoracic, abdominal or cerebral aneurysms

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- Hypoxemia (SpO₂ less than 90% on room air OR patients requiring more than 5 L/min O₂ via nasal prongs to achieve SpO₂ greater than 92%)
- Pneumothorax
- Pulmonary emboli
- Fractured ribs or other chest trauma
- Recent eye surgery

Procedure should not be performed on patients who are unable to follow directions or are non-compliant.

Equipment and Supplies

- Personal protective equipment (PPE), including fit-tested N-95 mask
- Ultrasonic nebulizer: Aeroneb Solo Pro-X controller with AC/DC power cable & control module cable, disposable Aeroneb nebulizer unit, T-adapter
- Disposable mouthpiece
- 3% hypertonic saline solution
- 10 mL syringe
- Sterile sputum collection container with lid
- Disposable emesis bin
- Disposable cup and drinking water
- Pulse oximeter
- Biohazard bag, patient labels and appropriate lab requisition
- 2.5 mg salbutamol and nebulizer/mask setup

Procedure

Steps

1. Check that the test was ordered by IPAC, ID or Respiriology. If in doubt, page the ordering service to confirm.
2. Review patient history to confirm indication for procedure. ***Induced sputum procedure is indicated for the diagnosis of pulmonary tuberculosis only.***
3. Review for any contraindications. If any are present, document rationale for not performing procedure and inform ordering physician. Otherwise proceed to Step 4.
4. Perform hand hygiene and don PPE including N-95 mask.
5. Assess the patient prior to initiating procedure. If patient is actively wheezing or hypoxemic (SpO₂ less than 90% on room air OR requiring more than 5 L/min O₂ via nasal prongs to achieve SpO₂ greater than 92%), do not proceed with the procedure. Document rationale and inform ordering physician. Otherwise proceed to Step 6.

6. Explain the procedure to the patient. Ensure patient is aware that coughing during the procedure is to be expected and will help increase sputum production.
7. Have the patient gargle vigorously at least 3 times to remove oral contaminants.
8. Attach the mouthpiece and the nebulizer unit to the T-adapter.
9. Connect the control module cable to the nebulizer unit. Ensure the control module is plugged in to a power source if battery is not charged. The control module will work on battery power for up to 45 min on full charge.
10. Ensure the nebulizer is in the upright position. Open the silicone plug on the nebulizer unit. Draw up 6 mL of the hypertonic saline solution and add via the filler port. Close the plug.
11. Have the patient hold the T-adapter so that the nebulizer unit remains in an upright position through the procedure.
12. To start nebulization, press and release the blue on/off power button on the control module to initiate the 30 minute nebulization cycle. Confirm aerosolization by observing for mist at the T-adapter.
13. Instruct the patient to breathe normally through their mouth and to take occasional deep breaths.
14. Monitor patient throughout procedure. Stop nebulization immediately if any of the following occurs:
 - SpO₂ falls below 90%
 - Excessive, uncontrolled coughing occurs
 - Patient complains of dyspnea, chest tightness or wheezing
 - Patient shows signs of respiratory distress
 - Patient is light-headed or feels nauseated
15. Collect expectorated sputum in the sterile sputum collection container. Once specimen has been collected, replace container lid. Label specimen and place in biohazard bag. Minimum volume of specimen should be at least 5 - 10 mL. If unable to obtain minimum specimen volume, repeat procedure x 1. If still unable to obtain minimum specimen volume, do not repeat a third time. Follow remainder of procedure (omitting Step 21) and inform ordering physician that you were unable to obtain an adequate sample. Document that physician was informed.
16. Assess patient following procedure. If patient is wheezing, initiate bronchodilator therapy with 2.5 mg of salbutamol via nebulizer.
17. Before leaving the room, disassemble setup and discard nebulizer unit, T-adapter and mouthpiece. Wipe down controller, power cable and control module cable with Cavicide. Discard all other supplies.
18. Remove PPE and perform hand hygiene.
19. Document procedure and response in Cerner.

20. Label specimen and requisition as **"Induced Sputum for TB"** and send to Lab. Follow cleaning and disinfection procedure for non-disposable equipment. Return Aeroneb controller to storage area.

References

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6. National Institutes of Health Warren G. Magnuson Clinical Center. (2001). Sputum Induction Procedure.
7. Schoch, O.D., Rieder, P., Tueller, C., Altpeter, E., Zellweger, J.P., Rieder, H.L., Krause, M., Thurnheer, R. Diagnostic yield of sputum, induced sputum, and bronchoscopy after radiologic tuberculosis screening. (2007). *American Journal of Respiratory and Critical Care Medicine*. 175: 80-86.

Appendices

Appendix A:

SPH – AIRBORNE INFECTION ISOLATION ROOMS:

WARD	ROOM	NOTES	WARD	ROOM	NOTES
10A	1001		7A	7001	
	1002			7002	
	1003			7003	
	1004			7004	
	1005			7005	
10B	1014		7B	7014	
	1015			7015	
	1016			7016	
	1017			7017	
	1018			7018	
10C	1033		7C	7033	
	1034			7034	
	1035			7035	
	1036			7036	
	1037			7037	
10D	1045		7D	7045	
	1046			7046	
	1047			7047	
	1048			7048	
	1049			7049	
9D	9043		6B	6014	
	9044			6015	
	9045			6016	
8A	8001			6017	

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	8002			6018	
	8003		5A	5001	
	8004			5002	
	8005			5003	
8C	8033	No dial-set to neg		5004	
	8035	Office		5005	
	8036	Office	5B	5014	
8D	8044			5015	
	8045	Bronchoscopy suite		5016	
	8045A	Methacholine room		5017	
	8046	Pulmonary Function		5018	
	8047	Pulmonary Function	3C	3612	
ICU	3301	Anteroom	CICU	3351	
	3306	Anteroom		3352	
	3307			3353	
CSICU	9	Neg only	EMER	3	Anteroom
PACU	3233	Office		4	Neg only
	3235	Storage Room		5	Neg only
OR	5	Neg only		6	Neg only

Appendix B:

MSJ – AIRBORNE INFECTION ISOLATION ROOMS:

WARD	ROOM	NOTES	WARD	ROOM	NOTES
4 West	418		ICU	Bed 3	
	420			Bed 4	
3 East	373		Surgical Daycare	Endo/Bronchoscopy	
	377				

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