The Sydney children's Hospitals Network
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SPUTUM INDUCTION IN CHILDREN SUSPECTED OF HAVING PULMONARY TUBERCULOSIS

PROCEDURE ©

DOCUMENT SUMMARY/KEY POINTS

- In consultation with Respiratory Medicine or Infectious Diseases, medical teams may request induced sputum samples in patients where the diagnosis of ***Pulmonary Tuberculosis*** (TB) is suspected.
- The therapist must wear appropriate PPE for airborne precautions consistent with the documents referred to in this policy. This includes gloves, a long sleeve impermeable gown, a high filtration mask (P2 or N95) and eye protection whilst in the room with the patient.
- Sputum induction should be performed in an isolation room and where possible in a negative pressure isolation room.

Approved by:	SCHN Policy, Procedure and Guideline Committee	
Date Effective:	1st September 2021	**Review Period**: 3 years
Team Leader:	Physiotherapist	**Area/Dept**: Physiotherapy

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CHANGE SUMMARY

- Document due for mandatory review.
- The time required to wait between collection of multiple samples has been modified
- The equipment cleaning procedure has been modified

READ ACKNOWLEDGEMENT

- **Read Acknowledge Only** – Ward, Respiratory and After Hours Physiotherapists, Infectious Diseases Team, Respiratory Team

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This document reflects what is currently regarded as safe practice. However, as in any clinical situation, there may be factors which cannot be covered by a single set of guidelines. This document does not replace the need for the application of clinical judgement to each individual presentation.

Policy:

Physiotherapists are able to collect induced sputum samples in patients suspected of having pulmonary tuberculosis (TB) at the request of the admitting team after consultation with the infectious diseases or respiratory medicine teams.

This policy describes the process when induced sputum is requested to specifically assess for the presence of TB.

Procedure:

General Information:

- The referral must be made by the medical staff.
- This policy is consistent with NSW Health Guideline for Sputum Induction with modifications made for the paediatric patient and site specific equipment considerations.
- Medical staff must complete appropriate pathology request forms and chart hypertonic saline 6% (sodium chloride 6%) for inhalation prior to the procedure. Hypertonic saline 3% (sodium chloride 3%) may need to be used in patients who do not tolerate hypertonic saline 6%, ie. excessive coughing, bronchospasm, O2 desaturation).
- At the time of policy writing, hypertonic saline 6% is available from both SCH and CHW pharmacies in pre-prepared 10 mL sterile sachets, product name *Hypersal. Hypertonic saline 3% is also available at CHW pharmacy in a 4 mL ampoule, product name MucoClear.*
- Use of an ultrasonic nebuliser requires 20 mL of hypertonic saline to be charted. Use of a breath enhanced jet nebuliser requires 4-6 mL hypertonic saline to be charted. The physiotherapist accepting the referral will advise on quantity needed depending on the equipment available.
- Salbutamol may be charted if clinically indicated e.g. child has history of asthma or reactive airways.
- The service is generally available between 0800 and 1700 Monday to Friday. The treating team will discuss requests outside of these hours with the physiotherapy team when clinically indicated or to assist with discharge home.
- One sample is to be collected on three separate occasions.

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- Samples are to be collected each morning for 3 consecutive mornings or, alternatively, 3 consecutive samples may be collected on the same day, 4 hours apart, on request of the Infectious Diseases Team when enough notice is given, i.e. 0800, 1200 and 1600.

Westmead

- Samples are to be collected on three separate occasions with no specific time interval between samples.

Safety Issues - Patients:

- If the patient requires pre-medication with bronchodilator, this is to be delivered by nursing staff 10 minutes prior to the procedure as per the medication chart.
- SpO_2 must be monitored throughout the procedure and O_2 therapy must be available and utilised as necessary to maintain an acceptable SpO_2 for that patient. The physiotherapist must also auscultate, observe work of breathing and signs of paroxysmal coughing prior to, during and following the procedure to assess patient tolerance of the procedure.

Safety Issues - Therapists:

- The sputum induction must be performed in an isolation room and where possible in a negative pressure isolation room within the hospital.
- The therapist must wear appropriate PPE for airborne precautions including gloves, a long sleeve impermeable gown, a high filtration mask (P2 or N95) and eye protection whilst in the room with the patient[13-15].

Equipment:

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- A low output ultrasonic nebulizer is to be used. This is kept on the sputum induction trolley in the Physiotherapy Department on level 0.
- A sterile circuit must be used. Hypertonic saline should be drawn up by the nursing staff after prescription in the medication chart.
- **Note:** If the ultrasonic nebulizer is not available a breath enhanced jet nebulizer e.g. Pari LC Sprint may need to be used after consultation with the referring team

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- A breath enhanced jet nebuliser (e.g. Pari LC Sprint) is used for administration of hypertonic saline.
    - Pari LC sprints can be sourced from the ward, Inhalation Therapy Department or the Physiotherapy Department.
- A specimen jar or sputum trap with appropriate sized suction catheter and vial of normal saline should be taken into the room at the time of sputum induction.
- Additional airway clearance equipment as required on an individual patient basis.

Method of Sputum Induction:

Randwick – Utilising an ultrasonic nebuliser

- Nursing staff to pre-medicate patient with bronchodilator 10 minutes prior to procedure if this has been prescribed.
- O2 therapy must be available and utilised to maintain SpO2 in the normal range.

- The physiotherapist is to half fill the ultrasonic nebuliser chamber with tap water. **Note**: the tap water is not nebulised – the hypertonic saline sitting within the medication cup is the nebulised solution.
- The medication cup is to be attached to the underside of the lid of the nebuliser chamber. The medication cup should be partially submerged in the water within the nebuliser chamber.
- 20 mL of hypertonic saline 6% or hypertonic saline 3% is to be prepared by nursing staff. If Hypertonic Saline 3% is required, add 10 mL of Hypertonic Saline 6% and 10 mL of sterile 'water for injection'. Nursing staff are responsible for drawing up the correct volume and concentration of hypertonic saline and providing the correct volume and concentration to the physiotherapist for use in the ultrasonic nebuliser.
- Attach the sterile circuit to the ultrasonic nebuliser.
- Turn on the ultrasonic nebuliser and set the output to approximately 50% of maximum.
- Patient is to breathe in and out through the mouthpiece using slightly greater than normal tidal volumes.
- After no more than 15 minutes of inhalation, patient is to remove the mouthpiece, take some deep breaths then perform huffing and coughing and airway clearance techniques if deemed appropriate by the physiotherapist to produce a sample.
- Where possible sputum samples will be obtained with huffing and coughing, however when samples are unable to be collected this way, Physiotherapists will perform oropharyngeal suction.
- The sample needs to be transported to the lab promptly after collection.

If sputum induction is not successful in obtaining a sputum sample, the treating team must be immediately notified.

If the ultrasonic nebuliser is not available, then a jet nebuliser is to be used following the procedure outlined in the 'Westmead' section directly below.

Westmead

- Nursing staff to pre-medicate patient with bronchodilator 10 minutes prior to procedure if this has been prescribed.
- O2 therapy must be available and utilised to maintain SpO2 in the normal range.
- Nursing staff will load hypertonic saline into the LC Sprint.
- The LC Sprint is attached to the air outlet with a flow of 4-5L/min.
- A mask or mouthpiece interface will be selected at the Physiotherapist's discretion.
- In age-appropriate patients the Physiotherapist will direct Active Cycle of Breathing Technique during inhalation of the hypertonic saline and incorporate high sitting and side-lying positioning as appropriate. Other airway clearance techniques may be considered if the patient is unable to perform ACBT effectively.
- The hypertonic saline nebuliser will be continued until the nebuliser is completed or until an appropriate sample has been obtained.

- Where possible sputum samples will be obtained with huffing and coughing, however when samples are unable to be collected this way, Physiotherapists will perform oropharyngeal suction.
- The sample will be transported promptly to the laboratory.

If sputum induction is not successful in obtaining a sputum sample, the treating medical team must be immediately notified.

Note for children too young to expectorate samples:

- A jet nebuliser with face mask should be used to deliver the nebulised hypertonic saline to children unable to use a mouthpiece (approximately < 4 years).
- Following no more than 15 minutes of inhalation in these young children, oropharyngeal suction is to be performed with the aim of cough stimulation to bring sputum above the larynx from where it can be suctioned.
- 3 samples need to be collected in this manner.

Cleaning:

Randwick

- Following the procedure, all equipment is returned to the physiotherapy department.
- The circuit is to be disassembled.
- All components of the 3-way mouthpiece are to be washed in warm soapy water, rinsed clean then air dried.
- The dry 3-way mouthpiece and tubing that goes from the chamber to the 3-way mouthpiece are to be placed in the 'used respiratory equipment' container in the physiotherapy department.
- The physiotherapy assistant is responsible for taking used circuits to CSSD and collecting them after sterilisation.
- The water chamber, medication cup and chamber lid are to be rinsed out thoroughly with tap water and allowed to air dry. These parts do not go to CSSD.
- The machine and trolley are to be wiped down with alcohol impregnated or disinfectant wipe e.g. 'Isowipe/Clinell'.

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- If nebuliser equipment is going to be used for ongoing treatments, the equipment is separated into its individual pieces, washed in warm soapy water and left to air dry at the patient's bedside.
- If the nebuliser equipment is no longer required, it should be separated into its individual pieces, bagged and returned to the Physiotherapy Department where it is taken to Inhalation Therapy for cleaning by the Physiotherapy Assistant.

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