Specimen Collection: Sputum by Suction (Respiratory Therapy)

ALERT

When suctioning, ensure the patient understands the importance of relaxing and breathing at a normal rate during the procedure.

Oxygenate the patient before and after the procedure, and closely monitor his or her oxygenation status and heart rate.

Don appropriate personal protective equipment (PPE) based on the patient's signs and symptoms and indications for isolation precautions.

OVERVIEW

Sputum is produced by cells lining the respiratory tract. Although production is minimal in the healthy state, disease states can increase the amount or change the character of sputum. Examining sputum helps diagnose and treat several conditions ranging from simple bronchitis to lung cancer.

In many cases, suctioning is indicated to collect sputum from patients unable to spontaneously produce a sample for laboratory analysis. Sometimes suctioning provokes violent coughing, causes vomiting and aspiration of stomach contents, and induces constriction of pharyngeal, laryngeal, and bronchial muscles. In addition, suctioning may cause hypoxemia or vagal overload, causing cardiopulmonary compromise and increases in intracranial pressure.[2]

The oropharynx can be suctioned using a rigid tonsil tip suction catheter or Yankauer suction catheter. The lower airway can be suctioned through the nose (nasotracheal suctioning) or through an artificial airway (endotracheal or tracheostomy tube suctioning). The two techniques used for endotracheal suctioning are the open method, which requires that the patient be removed from the ventilator, and the closed method, which uses a sterile, closed inline suction catheter.

Sputum specimens are collected for three major reasons: cytologic examination, culture and sensitivity testing, and acid-fast bacilli (AFB) smear testing. Cytologic or cellular examination of sputum may identify aberrant cells or cancer. Sputum collected for culture and sensitivity testing can be used to identify specific microorganisms and determine the most appropriate antibiotics. An AFB smear is used to support the diagnosis of tuberculosis.

PATIENT AND FAMILY EDUCATION

- Explain to the patient and family that coughing, gagging, or (less common) sneezing can occur as a result of the cough reflex.
- Explain to the patient and family that the use of suctioning is an integral part of patient care.
  - The aim of suctioning is to maintain an airway by preventing the accumulation of secretions and formation of crusts.
  - The frequency of suction varies according to a patient's need.
- Demonstrate the proper splinting technique for postoperative patients.
- If aerosol treatment is indicated, teach the purpose of the procedure. Explain that it will stimulate coughing and sputum expectoration.

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- Encourage the patient to cough during the procedure to assist in expelling mucus from the upper airway.
- Encourage questions and answer them as they arise.

ASSESSMENT AND PREPARATION

Assessment

1. Perform hand hygiene before patient contact and don PPE as indicated for needed isolation precautions.
2. Introduce yourself to the patient.
3. Verify the correct patient using two identifiers.
4. Verify the practitioner's order for the type of sputum analysis and specifications (e.g., amount of sputum, number of specimens, time of collection, method to obtain).
5. Assess when the patient last ate a meal (nasopharyngeal suctioning).
6. Determine the type of patient assistance needed to obtain a specimen.
7. Assess the patient's respiratory status, including respiratory rate, depth, pattern, and color of mucous membranes.
8. Assess the patient's oxygenation status.
9. Instruct the patient to breathe normally during suctioning to prevent hyperventilation.
10. Assess the patient for signs of hypoxemia and hypercapnia.[2]

Preparation

1. Prepare the suction machine or device and determine whether it functions properly.
2. Set the suction regulator to 100 to 150 mm Hg[1] for adults (no greater than what is required to remove secretions adequately).

PROCEDURE

1. Perform hand hygiene and don gown, mask, eye protection or face shield, and gloves.
2. Introduce yourself to the patient.
3. Verify the correct patient using two identifiers.
4. Explain the procedure to the patient and ensure that he or she agrees to treatment.
5. Position the patient in high-Fowler or semi-Fowler position.

   Rationale: High-Fowler or semi-Fowler positioning promotes full lung expansion and facilitates the patient's ability to cough.

   If the patient has a surgical incision or localized area of discomfort, instruct him or her either to place his or her hands firmly over the affected area or to place a pillow over the area.

   Rationale: Splinting the painful area minimizes muscular stretching and discomfort during coughing, which makes coughing more productive.

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6. Connect the suction tubing to the adapter on the sputum trap. If using a sleeved suction catheter, remove the suctioning tubing from the end of the catheter and connect it to the sputum trap.
7. If using a regular sterile suction catheter, remove gloves, perform hand hygiene, don sterile gloves, and avoid contaminating the outside of the container.
8. Connect the regular sterile suction catheter or the end of the sleeved suction catheter to the rubber tubing on the sputum trap.
9. Auscultate the patient's breath sounds.
10. Preoxygenate the patient for 30 to 60 seconds.[1]
11. Gently insert the tip of the suction catheter through the endotracheal tube, nasopharynx, or tracheostomy tube without applying suction.

    Rationale: Inserting the catheter without applying suction minimizes hypoxemia and trauma to the airway as the catheter is inserted.

12. Advance the catheter into the trachea gently and quickly.

    Rationale: Entrance of the catheter into the larynx and trachea triggers the cough reflex.

13. As the patient coughs, apply suction and gently withdraw the catheter. Limit the aspiration time to 15 seconds or less.[1] Apply suction by placing the thumb of the nondominant hand over the suction port of the regular suction catheter or by depressing the suction button of the sleeved suction catheter.

    Suctioning longer than 15 seconds can cause hypoxia and mucosal damage.[1]

    If the patient shows signs of becoming hypoxemic during the procedure, discontinue the procedure immediately and provide oxygen as ordered.

14. Release suction and remove the catheter.

    Rationale: Suction can damage mucosa if applied during withdrawal.

15. Continue the procedure until enough of a specimen has been collected.
16. Detach the catheter from the specimen trap.

a. If using a regular suction catheter, dispose of it in the appropriate receptacle.
b. If using a sleeved suction catheter, reconnect the suction tubing to the end of the catheter.

17. Secure the top of the specimen container tightly. For the sputum trap, detach the suction tubing and connect the rubber tubing on the sputum trap to the plastic adapter.
18. In the presence of the patient, label the specimen per the organization's practice.[3]
19. Prepare the specimen for transport.

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a. Place the labeled specimen in a biohazard bag.
b. If the specimen requires ice for transport, place the specimen in a biohazard bag then place the bag with the specimen into a second biohazard bag filled with ice slurry.

Rationale: Placing the specimen in a separate bag protects the label from being damaged.

20. Immediately transport the specimen to the laboratory.
21. Oxygenate the patient as needed.
22. Discard supplies, remove PPE, and perform hand hygiene.
23. Document the procedure in the patient's record.

MONITORING AND CARE

1. Observe the patient's respiratory status throughout the procedure, especially during suctioning.

Rationale: Excessive coughing or prolonged suctioning can alter the patient's respiratory pattern and cause hypoxia.

2. Auscultate the patient's breath sounds.
3. Observe the patient for anxiety or discomfort.

Rationale: The procedure can be uncomfortable. If the patient becomes short of breath, anxiety may develop.

4. Observe the patient for signs or symptoms of pain. If pain is suspected, report it to the authorized practitioner.

EXPECTED OUTCOMES

- Respirations return to baseline
- Hemodynamic stability
- Oxygenation status is not compromised
- Adequate amount of sputum collected
- Sputum is not contaminated by saliva or oropharyngeal flora

UNEXPECTED OUTCOMES

- Hypoxemia
- Increased respiratory rate and effort
- Shortness of breath
- Anxiety or discomfort from suction catheter
- Inadequate amount of sputum collected
- Sputum is contaminated by saliva or oropharyngeal flora
- Pain when coughing to produce sputum

DOCUMENTATION

- Method used to obtain specimen

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- Date and time of collection
- Type of test ordered
- Characteristics of sputum specimen
- Patient's tolerance of procedure
- Patient and family education
- Unexpected outcomes and related interventions

REFERENCES

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2. American Association for Respiratory Care (AARC). (2010). AARC clinical practice guidelines: Endotracheal suctioning of mechanically ventilated patients with artificial airways 2010. *Respiratory Care*, *55*(6), 758-764. (classic reference)* (Level VII)
3. Joint Commission, The (TJC). (2020). National patient safety goals effective January 2019. Hospital accreditation program. Retrieved March 10, 2020, from https://www.jointcommission.org/-/media/tjc/documents/standards/national-patient-safety-goals/npsg_chapter_hap_jan2020.pdf (Level VII)

*In these skills, a "classic" reference is a widely cited, standard work of established excellence that significantly affects current practice and may also represent the foundational research for practice.

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- Level I - Systematic review of all relevant randomized controlled trials
- Level II - At least one well-designed randomized controlled trial
- Level III - Well-designed controlled trials without randomization
- Level IV - Well-designed case-controlled or cohort studies
- Level V - Descriptive or qualitative studies
- Level VI - Single descriptive or qualitative study
- Level VII - Authority opinion or expert committee reports

Supplies

- PPE (gloves, gown, mask, eye protection or face shield, plus sterile gloves, if needed)
- Vacuum source
- Calibrated, adjustable regulator
- Collection bottle and connection tubing
- Sterile water and cup (open suction)
- Suction device (wall or portable)
- Oxygen source with an oxygen flow meter (open suction) or ventilator (closed suction)
- Manual resuscitation bag
- Stethoscope
- Sterile suction catheter or existing sleeved suction catheter
- Inline specimen container or sputum trap
- Small plastic bag or container for specimen delivery to laboratory

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- Oxygen therapy equipment, if indicated
- Pulse oximetry device, if indicated

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