Respiratory Specimens

1. **General considerations**
   a. Twenty-four-hour sputum collections are not recommended for culture.
   b. If *Corynebacterium diphtheriae, Arcanobacterium haemolyticum, Bordetella pertussis, N. gonorrhoeae,* Legionella sp. are suspected, the physician should contact the clinical microbiology laboratory prior to specimen collection because special techniques and/or media are required for the isolation of these agents.
   c. Generally, one respiratory specimen for bacterial culture will be accepted per 24 hour period.

2. **Lower respiratory tract**
   a. Expectorated sputum
   (1) If possible, have the patient rinse mouth and gargle with water prior to sputum collection.
   (2) Instruct the patient not to expectorate saliva or postnasal discharge into the container.
   (3) Collect specimen resulting from deep cough in sterile screw-cap cup or other suitable sterile collection assembly.

   b. Induced sputum
   (1) Using a wet toothbrush, brush the buccal mucosa, tongue, and gums prior to the procedure.
   (2) Rinse the patient's mouth thoroughly with water.
   (3) Using an ultrasonic nebulizer, have the patient inhale approximately 20 to 30 ml of 3 to 10% 0.85% NaCl.
   (4) Collect the induced sputum in a sterile screw-cap cup or other suitable sterile collection assembly.

   c. Tracheostomy and endotracheal aspirations
   Tracheostomy is followed by colonization within 24 h of insertion of the tube. Results must be correlated with clinical findings such as fever or infiltrate on chest X ray.
   (1) Aspirate the specimen into a sterile sputum trap.

   d. Bronchoscopy specimens
   Bronchoscopy specimens include bronchoalveolar lavage, bronchial washing, bronchial brushing, and trans-bronchial biopsy specimens.
   (1) Pass the bronchoscope trans-nasally or trans-orally in non-intubated patients or via the endotracheal tube in intubated patients.
   (2) Wedge the tip of the bronchoscope in a segmental (for bronchial wash) or sub-segmental (for bronchoalveolar lavage) bronchus.
   (3) To obtain specimens
   (a) **Bronchial wash or bronchoalveolar lavage**
   Bronchial wash and bronchoalveolar lavage specimens are generally obtained before brushing or biopsy specimens to avoid excess blood in the recovered fluid, because blood may alter the concentration of cellular and non-cellular components.
   i. Inject sterile non-bacteriostatic 0.85% NaCl (generally 5- to 20-ml aliquots) from a syringe through a biopsy channel of the bronchoscope.
   ii. Gently suction the 0.85% NaCl into a sterile container before administering the next aliquot. (In general, 50 to 75% of the 0.85% NaCl instilled is recovered in the lavage effluent.) Keep aliquots separate during collection. Combine aliquots from the same site for microbiology cultures and smears, but aliquots from separate sites

(for example right upper lobe and right lower lobe) should be combined only after consultation with the attending physician.

(b) **Mini-BAL or quantitative BAL**

Mini-BAL specimens are collected at the patient's bedside by respiratory therapy. Sterile saline is instilled using a metras catheter and recollected to obtain a specimen of approximately 20 ML in volume.

(c) **Bronchial brush specimens**

Insert a telescoping double catheter plugged with polyethylene glycol at the distal end (to prevent contamination of the bronchial brush) through the biopsy channel of the bronchoscope.

(d) **Trans-bronchial biopsies**

Obtain the biopsy sample through the biopsy channel of the bronchoscope, and transport it in a sterile container with a small amount of non-bacteriostatic sterile 0.85% NaCl.

e. Lung aspirations

Use a computed tomography scan to obtain lung aspirates by inserting a needle through the chest wall into a pulmonary infiltrate. Aspirate material from the lesion. If the lesion is large or if there are multiple lesions, collect multiple specimens from representative sites.

f. Lung biopsies

Obtain a 1 - 3 cm square piece of tissue if possible. If the lesion is large or if there are multiple lesions, collect multiple specimens from representative sites. Submit in a sterile container(s) without formalin.

3. Upper respiratory tract infections

a. Throat (pharyngeal specimens)

Submitted primarily for the detection of group A streptococci (can also be used to detect *N. gonorrhoeae*, *Haemophilus influenzae* [for epiglottitis])

(1) Do not obtain throat samples if epiglottis is inflamed, as sampling may cause serious respiratory obstruction.
(2) Depress tongue gently with tongue depressor.
(3) Extend sterile swab between the tonsillar pillars and behind the uvula. (Avoid touching the cheeks, tongue, uvula, or lips.)
(4) Sweep the swab back and forth across the posterior pharynx, tonsillar areas, and any inflamed or ulcerated areas to obtain sample.

b. Nasal swabs

Submitted primarily for the detection of staphylococcal carriers

(1) Insert a sterile swab into the nose until resistance is met at the level of the turbinates (approximately 1 inch into the nose).
(2) Rotate the swab against the nasal mucosa.
(3) Repeat the process on the other side.

c. Nasopharyngeal suction/aspirate:

Specimens are submitted for the detection of *Bordetella pertussis* and respiratory viruses.

1) Suction the material from the posterior nasopharynx with a Delis aspirator, a flexible feeding tube, a large bore IV catheter, or a butterfly IV set with the needle cut off, and collect into a sterile container.
2) If adequate volume of secretions is not obtained by suction, perform a nasal washing using 1 ml of sterile saline. Place in sterile cup (not viral transport media), and secure cap tightly.

d. Nasopharyngeal swabs

Specimens are submitted primarily for the detection of carriers of *N. meningitidis*.

(1) Carefully insert a flocked swab through the nose into the posterior nasopharynx, and rotate the swab. (Keep the swab near the septum and floor of the nose.)

(2) Place swab into viral transport media provided.

e. Nasal washings

Submitted primarily for viral cultures

(1) Instruct the patient not to swallow during the procedure.

(2) With the patient's head hyperextended (approximately 70˚C angle), instill approximately 5 ml of sterile 0.85% NaCl into each nostril.

(3) To collect material, tilt the head forward and allow the fluid to run out of the nares into a sterile container, or aspirate the fluid by inserting a rubber bulb syringe into each nostril.

(4) Place the saline wash in a sterile container**.**

f. Sinus aspirates

(1) Using a syringe aspiration technique, obtain material from maxillary, frontal, or other sinuses.

(2) Place the contents of the syringe into an E-swab transport system.

g. Tympanocentesis fluid

Specimens submitted primarily to diagnose middle ear infections if previous therapy has failed.

(1) Clean the external canal with mild detergent.

(2) Using a syringe aspiration technique, obtain the fluid from the ear drum. Send the specimen in a sterile tube.

(3) If the ear drum has ruptured, collect exudate by inserting a sterile, flocked swab through an auditory speculum.

Collection considerations for respiratory specimens

Culture	Vol (ML)*	Comments
Bacteria	NA	Inform laboratory if *Legionella sp., Corynebacterium diphtheriae, Arcanobacterium haemolyticum, Bordetella pertussis, N. gonorrhoeae* are suspected.
Fungi	3-5	Collect three early-morning specimens resulting from deep cough or sputum induction. Lung biopsy specimens or lung aspirates are also appropriate.
Anaerobes	1	Sinus aspirate, tympanocentesis fluid, lung aspirates or biopsy specimens are appropriate for anaerobic culture.
Mycobacteria	5-10	Collect three early-morning specimens resulting from deep cough or sputum induction. Lung biopsy specimens or lung aspirates are also appropriate.
***Pneumocystis* spp.**	2	Use bronchoaveolar lavage fluid, lung biopsy specimen. Induced sputum accepted if other specimens not possible.
Parasites	3-5	Examine for amoebae, helminth eggs (*Paragonimus westermani)*, hooklets of *Echinococcus* spp., larvae of hookworm, and *Ascaris* and *Strongyloides* spp.

*Amounts are guidelines. NA = not applicable.