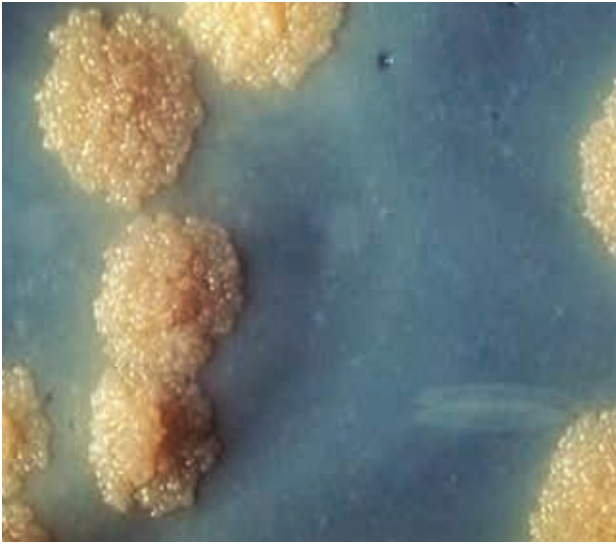


Figure 6.6: Colonies of *Mycobacterium Tuberculosis* Grown in Culture



Respiratory Specimen Collection

Due to the importance of lab testing in the diagnosis of active TB disease, collection and handling of specimens should be done carefully. When specimens are sent to the laboratory they must be collected in a leak proof container (laboratory approved). It must be accompanied with a requisition form and include the following information:

- Patient demographic information (name, date of birth, address, health information number)
- Submitting practitioner name
- Date and time of collection
- Specimen type and site
- Specimen collection method

Sputa are the preferred method of detecting the presence of MTB in the lung(s). Relevant information on the patient's status and initial diagnosis is advisable. Specimens should be collected before the start of anti-TB treatment:

- Sputum collection is best done in the morning upon rising and can be repeated at a minimum of every hour thereafter (particularly in the hospital setting).
- Three samples should be collected (if possible) to increase the sensitivity of testing.
- Ideally, in the community setting, at least three consecutive early morning samples of sputum should be examined before a diagnosis of tuberculosis is excluded. The ideal sample contains 5–10ml of solid or purulent material. (Equivalent: 1–2 teaspoon).
- Patient should NOT use antiseptic mouthwash or drink alcohol immediately prior to obtaining a sputum specimen.

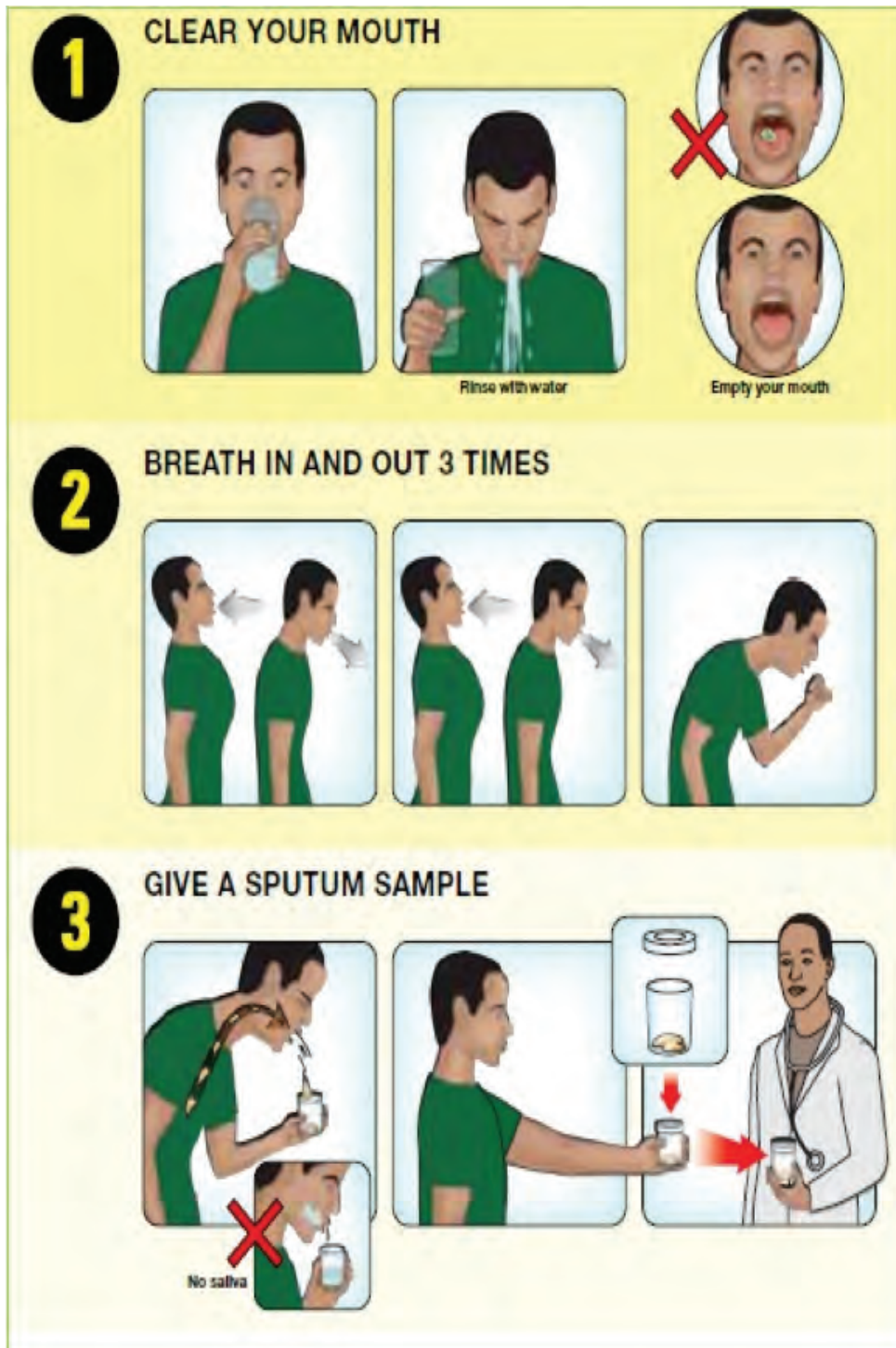
- Maximum yield of sputum is obtained from deep cough, and every effort should be made to obtain this type of specimen. Patients should be properly instructed regarding the importance and the appropriate technique of producing a good sputum sample (see **Figure 6.7**).
- Some patients, particularly the elderly, may have difficulty in producing a good sputum sample; in these cases, chest percussion, taking a warm shower, using a cool mist humidifier, or deep breathing and coughing may help.
- If the specimen cannot be at the lab within one hour of being collected then it must be stored at 4° Celsius and protected from light.
- Twenty-four-hour collection is unacceptable because of lower sensitivity and significantly increased bacterial contamination.

Other techniques used when sputum is difficult to obtain include:

- Induction of cough by warmed aerosol saline
- Gastric wash (depending on presence of qualified personnel, may be done at health centre for adults but children are admitted to hospital under respiratory isolation)
- Auger suction (done in hospital)
- Bronchoscopy specimen (done in hospital)
- Laryngeal swab

With smear-positive specimens, a positive culture will be obtained in well over 90 percent of cases.

Figure 6.7: Sputum Collection Procedure



Go away from people – either outside or beside an open window – before collecting specimen

Provider Safety: Minimizing Aerosolization

Precautionary steps should be incorporated into collection of specimens, particularly for sputum inductions for mycobacteriology testing which includes:

1. Educating staff of the risks of the spread of *M. tuberculosis* through the air
2. Ensuring that the HCP and family members wear a N95 mask when in the same room
3. Making every attempt to have respiratory samples collected in airborne isolation rooms, airborne isolation tents, at home in well-ventilated areas, or outdoors
4. **HCPs should not perform cough-inducing or aerosol-generating medical procedures on clients with suspected or confirmed infectious TB disease in the home or community, because recommended infection prevention and control measures will probably not be in place in the home**

Induced Sputum

Sputum induction should be done using airborne precautions. Some health facilities may have a specially-designed room or ISOPORT that can be used for this purpose, which has high levels of air exchanges per hour, air vented to the outdoors, and a door (as per Canadian Standards Association). Health facilities without such a room may consider administering the nebulized saline in a clinic room, and having the patient produce the sputum sample outdoors. Alternatively, the nebulizer can be taken to the patient's home and samples collected there.

ISOPORT Sputum Induction Hut available at Stanton Territorial Hospital.

Figure 6.8: Sputum Induction



A nebulizer that can administer 5–6ml per minute over 15 minutes should be used.

It is important that induced sputum be obtained using large volumes of 3% hypertonic saline.

The requisition order should indicate that the sputum was induced, because the resulting specimen often appears watery.

Using this method, virtually all patients will produce sputum.

Sputum induction may also be used for children.

Children at least 2 years of age are able to do this procedure.

For out-patient sputum inductions, Stanton Territorial Hospital is equipped with an ISOPORT™. This is a heavy-duty vinyl enclosure that encapsulates the patient and isolates them in a negative pressure setting. It has been CSA approved for sputum inductions.

<http://www.biologicalcontrols.com/isoport.shtml> (Image adapted from: CDC, Core curriculum on tuberculosis: What clinicians should know, 2011)

Figure 6.9: Sputum Induction Procedure



(Image adapted from: <http://www2.medicine.wisc.edu/homelfiles/Sputinduc.jpg>)

Bronchoscopy

Bronchoscopy is performed in hospital by a specialist. Bronchoscopy is used when spontaneous or induced sputum collection cannot be done, or there is extensive lung disease suspected (e.g. lung cancer). A bronchoscope is passed through the mouth or nose into the lung where it is diseased. Sputum or lung tissue is removed for sampling. Post bronchoscopy sputum should be sent out for AFB testing as this has a yield similar to that of bronchial washings and lavage.

Figure 6.10: Bronchoscopy



Gastric Aspirate/Gastric Lavage (Wash)

Gastric aspiration is a technique used for patients who cannot expectorate adequate amounts of sputum (e.g. children, elderly). A tube is inserted in the patient's mouth or nose to get to the stomach. A sample of gastric secretions is taken presuming that sputum was coughed then swallowed. If nothing is found then a small amount of distilled water is instilled and aspirated afterwards (gastric lavage).

Important points to consider before performing a gastric wash include the following:

- It may be possible to obtain a specimen by inducing cough using warmed aerosol saline (humidified air). Auger suction is an alternative to gastric washing.
- Gastric washings are specimens of sputum swallowed at night. There is no advantage to gastric washings if a patient can produce sputum.

*Gastric wash must be added to buffer solution
IMMEDIATELY to ensure viability of tubercle bacilli.*

Gastric washings are most likely to yield AFB if obtained first thing after awakening, while still fasting. Once awake, normal peristalsis begins and the stomach empties.

Gastric acid is toxic to tubercle bacilli and is neutralized by adding phosphate buffer immediately to the gastric solution. Containers that include phosphate buffer are available through the mycobacteriology laboratory at Stanton Territorial Hospital. As well, ensure laboratory requisition is clearly labeled "gastric washing for AFB".

Laboratory Personnel Handling *M. tuberculosis*

There are risks associated with handling *M. tuberculosis* in the laboratory that are not typically present in health care settings. Compared with the general population, laboratory HCPs have been found to have a greater risk of acquiring LTBI. Although this risk stems mainly from aerosol formation during specimen or isolate manipulation, other mechanisms of transmission have been described in this setting. The Public Health Agency of Canada (PHAC) has drafted a **biosafety guideline** that addresses prevention of laboratory-acquired *M. tuberculosis* complex. Recommendations on safe laboratory procedures, training programs, infection control plans, respiratory protection, TST screening for personnel and safe transportation of samples are also available from other sources.