Learning Module
For
Tuberculin Skin Testing (TST)

POST-ENTRY LEVEL COMPETENCY FOR REGISTERED NURSES
(CC 85-xxx)

Developed by: Occupational Health
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Revised by: Clinical Nurse Educator, Veterans Services
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PURPOSE

- Completion of the Learning Module on Tuberculin Skin Testing (TST) provides the Registered Nurse (RN) with the theory and practice necessary to perform this post-entry level competency. After completing the learning objectives, the RN will demonstrate competency according to proficiency standards skills checklist.

- To determine sensitivity/exposure to Tuberculosis.

LEARNING OBJECTIVES

Following the completion of this Learning Module, the RN will be able to:

1. Discuss indications for administering TST.
2. Identify concepts to be taught to patient prior to administration of test.
3. Identify protocol for the administration of the test.

METHOD

- Independent study.
- Discussion with clinical nurse educator or designate.
- Observe the procedure and return demonstration until deemed competent.

PROFICIENCY STANDARD(S)

To be certified as competent to perform the procedure, the RN will successfully:

- complete the learning objectives
- complete the test
- perform all aspects of the Proficiency Standard Skill Check List
- review the policy and procedure for administration of epinephrine: Epinephrine, Subcutaneous administration in the treatment of anaphylaxis post immunization and Learning Module MM 20-005 and Epinephrine, Subcutaneous administration in the treatment of anaphylaxis post immunization and Learning Module MM 20-005LM.

THEORY

The TST is an essential component or diagnostic tool in the investigation of any patient in whom tuberculosis is considered. The intradermal Mantoux (MSTU) is the most accurate and reliable among the methods of tuberculin testing.
Contraindications: - Do not administer to patients with:

Known:
- allergy to any component of Tuberculin Purified Protein Derivative (Mantoux)
- an allergic or anaphylactic reaction to a previous test.
- known tuberculin positive reaction.
- Those that have received a live vaccine within the past 30 days

Previous:
- Severe blistering, vesiculation, ulceration and/or necrosis to the TST in the past.
- Extensive burns or eczema.
- Documented active TB or documented treatment (active or passive) in the past.

The TST is performed by the intradermal injection of 0.1m of PPD (Purified Protein Derivative from tubercle bacilli (Mantoux)). It is recommended for general use in diagnosing tuberculosis infection. PPD must be stored at 2-8ºC. It is available in a multi dose vial and must be discarded 30 days after first use of vial and/or by the expiry date.

To Administer:
- Wipe rubber cap of PPD vial with alcohol swab and allow to dry.
- Draw up 0.1 ml PPD into syringe without injecting air into vial. Fill syringe immediately before injection.
- Choose a test site that is free of blood vessels, lesions, hair or edema on the volar or flexor (palm side) surface of the forearm, 10 cm (4 in) below the elbow crease. The standard site is the non-dominant forearm.
- Support arm on firm surface.
- Wipe injection site with alcohol swab and allow to dry completely.
- Stretch skin at injection site taut before inserting needle.
- Hold syringe almost parallel to the skin with needle bevel up.
- Insert needle into the superficial layers of skin until bevel is fully inserted and tip is visible under the skin.
- Release tautness and stabilize syringe.
- Inject antigen slowly. Resistance will be felt as tuberculin enters between the layers of skin and forms a bleb 5-10 mm in diameter.
- Once administered mark the skin with ink just below the injection site for easy identification when being read.
- Withdraw needle and without recapping dispose of syringe and needle in puncture resistant container.
- Wipe drop of blood that may appear at injection site with cotton ball.
- Record administration data on client record, including date, antigen, lot number, dose, route and site.

If little resistance is felt and there is no bleb or a shallow diffuse bulge appears, the needle has been placed too deeply. This may result in induration which will be difficult to measure and impossible to interpret.
If a substantial portion of the dose leaks out, the needle has not been placed deeply enough and the test result will not be reliable. Repeat test at least 5 cm (2 in) from original site or in other arm.

**To Read the TST:**
- The reading should be made in good light with the forearm slightly flexed.
- The presence or absence of induration (hard, dense, raised area of skin around injection site) is determined.
- The site should be inspected from a side view against the light as well as by direct light and by palpation.
  - Induration only, not erythema, (redness) is the determining factor in measuring the reaction.
  - Blistering, which may occur in 3-4% of cases, should be noted.
  - The reaction should be measured in millimetres rather than noting as being negative, doubtful, or positive.
  - Induration with a transverse diameter (to the long axis of the forearm) of 10mm or more represents a positive reaction which indicates infection with M. tuberculosis, non-tuberculosis mycobacteria, or BCG.
- To accurately interpret the test results, one of two methods may be used: palpation or the ball-point pen technique. Either method is considered reliable (Jordan, 1987), and a mm/cm ruler is used.

**To Interpret:**
In the palpation method, the area across the injection site is lightly palpated, starting from the area of normal skin and moving to the margins of induration. The transverse diameter of induration is measured at its widest width.

In the ball-point pen method:
- A pen can be used to mark sides of induration. The tip of a ballpoint pen pushed at a 45 degree angle toward the site of injection will stop at the edge of induration.
- If induration is present only the transverse diameter is measured, i.e., measure across the arm parallel to the watch band.

The interpretation of the test depends on the reason for testing:

- **0 to 4mm of induration is **SIGNIFICANT** for:**
  - persons with HIV infections AND expected high risk of tuberculous infection.
  - This reaction size is not normally considered significant but in the presence of immune suppression may be important.

- **5 to 9mm of induration is **SIGNIFICANT** for:**
  - persons known to have or suspected of having, HIV infection.
  - Contact of active contagious case.
  - Abnormal chest x-ray with fibronodular disease.

- **10 mm or more of induration is **SIGNIFICANT in all other persons.**
Any person exhibiting a SIGNIFICANT reaction should have a complete tuberculosis assessment which includes:
- history and symptom inquiry
- chest x-ray
- sputum specimen for TB culture.

**Delayed Reactions**
- Can develop up to 14 days after the test was given
- If such a reaction occurs, it should be recorded and reported if significant.

**False Negative Reactions**
Reactivity to the test may be suppressed when given:
- To persons with active TB.
- By improper techniques or when solution is improperly stored.
- Within 30 days of administering live vaccine (e.g., MMR). Live virus vaccines can be given at the same time as the tuberculin test is administered, but if given before, the tuberculin test should be delayed by at least one month.

**False Positive Reactions:**
- Approximately 2% to 3% of recipients will have reactions within the first few hours. These are allergic reactions to the dilutants in the injection and do not indicate tuberculosis infection.
- Cross reactivity from environmental non-tuberculous mycobacteria.
- Bacillus Calmette Guerin (BCG) Vaccine given to prevent TB.
- Populations who are likely to have received the BCG vaccination include:
  - Aboriginal people
  - People born in Quebec and Newfoundland between 1940 - 1980
  - People born outside Canada
  - Some health care workers

**Booster Phenomenon:**

This term is given to an enhanced reaction to a second tuberculin which is given 10 days following the initial, negative tuberculin test when the initial tuberculin reaction is negative. This represents stimulation of immune recall by the first tuberculin test and occurs in people with prior BCG vaccination, sensitivity to atypical mycobacterial antigens, or remote tuberculin infection. It appears that the booster phenomenon is a non-specific manifestation of all prior mycobacterial exposure.
REFERENCES


Canadian Tuberculosis Standards (7th Ed. 2013). Edited and Produced by the Canadian Thoracic Society of the Canadian Lung Association and the Public Health Agency of Canada

Communicable Disease Control Manual, Department of Health 1994

Compendium of Pharmaceutical and Specialties

Guidelines For Preventing The Transmission Of TB In Canadian Health Care Facilities 1996.


SELF- TEST
Please circle all of the answers that apply:

1. The method of testing for prior infection with tubercle bacillus is via:
   a) Intradermal injection of P.P.D. (Mantoux)
   b) Injecting P.P.D. (Mantoux) serum under the skin
   c) Subcutaneous infiltration of P.P.D. (Mantoux)
   d) Intracutaneous injection of P.P.D. (Mantoux)

2. Care of the P.P.D. (Mantoux) sera includes:
   a) Keeping it at room temperature only up to 24 hours
   b) Keeping it refrigerated at 0°C - 8°C
   c) Storing at 2°C - 8°C

3. Reading a P.P.D. (Mantoux) test should be done:
   a) After 24 hrs. but before 48 hrs.
   b) After 48 hrs. but before 72 hrs.
   c) From 24 hrs. to 72 hrs.
   d) From 24 hrs. to 48 hrs.

4. To administer the PPD accurately you must:
   a) Hold syringe at a 45° angle to the forearm
   b) Insert bevel fully into the superficial layers of the (L) forearm
   c) Stretch the skin of the forearm taut
   d) Feel resistance as a shallow diffuse bulge appears
   e) Feel resistance as a 5-10 mm blebs is formed.

5. A Positive Reaction will be demonstrated by a:
   a) Palpable induration of 10 mm or more if red
   b) Palpable induration of 2 mm or more if white
   c) Palpable induration of 10 mm or more
   d) A large red swollen limb where injection given

6. Contraindication to testing with P.P.D. 5TU are:
   a) History of T.B.
   b) Previous severe reaction to P.P.D. M 5TU
   c) Other protein allergies
   d) Presence of any severe or febrile illness
   e) List 3 other
7. **Conversion from a P.P.D. M 5TU 0 mm–10 mm could indicate:**

    a) Patient has contracted T.B.
    b) Patient has built up their immunity to T.B.
    c) Patient has received BCG Vaccine
    d) Need for follow-up investigation
ANSWERS – SELF-TEST

Question 1. (a)

Question 2. (c)

Question 3. (b)

Question 4. (b) (c) (e)

Question 5. (c)

Question 6. (a), (b), (c), (d), (e)
   1. On immunosuppressant drugs
   2. On steroids
   3. Sarcoidosis
   4. Recent immunization with live virus vaccine
   5. Recent viral infection

Question 7. a), (c), (d)
PROFICIENCY STANDARD SKILLS CHECKLIST(S)
ADMINISTRATION OF TUBERCULIN SKIN TEST

Name: ________________________________

Nursing Unit: __________________________

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<thead>
<tr>
<th></th>
<th>YES</th>
<th>NO</th>
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<tr>
<td>1.</td>
<td>Checked the Physician’s Order.</td>
<td></td>
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<tr>
<td>2.</td>
<td>Checked patients armband.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Obtained Health History (noted allergies).</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Explained procedure.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Obtained consent.</td>
<td></td>
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<tr>
<td>6.</td>
<td>Prepared medication and administered same using flexor side of the left forearm about four inches below the bend of the elbow. S/C Epinephrine 1:1000 readily available.</td>
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<td>7.</td>
<td>Administered drug slowly into dermis – a raised white wheal formed. Observed patient for 15 minutes after test administered.</td>
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<td>8.</td>
<td>Instructed patient on when it should be read.</td>
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Performed all criteria as described about without prompting.

Date (YY/MM/DD) ___/___/____

Evaluator: __________________________