

TUBERCULOSIS INFECTION CONTROL

Beverly Collins, RN, MS, CIC
Director of Infection Control – University Hospital

OBJECTIVES

At the end of this presentation, you will be able to:

- List infection control approaches to TB prevention and control
- Describe the type of protective equipment worn by employees
- Describe the type of protective equipment worn by patients
- Describe the steps involved in follow up of TB exposure
- Describe why facial method of protection used to prevent TB transmission hair is a contradiction to N-95 respirator use

Background

- Although the prevalence of tuberculosis continues to decline in most developed countries the risk of healthcare-associated tuberculosis remains for patients or healthcare staff
- Outbreaks of healthcare-associated tuberculosis are usually associated with delays in diagnosis and treatment or the care of patients in sub-optimal facilities
- An aging population, the increasing presence of foreign-born nationals and human immunodeficiency (HIV) disease have meant that this decline has stalled in some countries
- This is reflected in the changing face of TB seen in US hospitals

Infection Control Measures

The control and prevention of tuberculosis in hospitals is best achieved by three approaches/hierarchy:

- Administrative (early investigation diagnosis, isolation, etc.)
- Engineering (physical facilities e.g. ventilated isolation rooms)
- Personal respiratory protection (face sealing masks which are filtered)

Screening for TB Infection in High-Risk Populations - 1

- Most active TB cases arise from patients with latent TB infection
- To reduce the potential risk for new cases arising from the community and from frequently hospitalized patients, groups at high risk for TB should be routinely tuberculin skin tested and offered treatment for latent TB infection if indicated according to established guidelines
- Active TB case identification is better accomplished through the use of appropriate chest X-rays and sputum testing

Screening for TB Infection in High-Risk Populations - 2

- Tuberculin skin testing is an adjunctive measure to identify those who may be latently infected with TB. As such, it cannot distinguish between latent and active TB infection
- In fact, up to 20% of individuals with active TB may have a negative tuberculin skin test result

STEPS TO PREVENT TB TRANSMISSION

- **Rapid identification and isolation**
- **Negative pressure (Airborne Infection Isolation) room:**
 - Patients with confirmed or suspected TB are put on Airborne Disease Isolation in a special air flow room
 - An open door will eliminate the negative pressure gradient by equilibrating the pressure gradient between the patient's room and the hallway. As such the room will not protect patients and staff from TB exposure

Respiratory Protection - 1

N-95 Respirator

- Upon entering the room of an individual on Airborne Precautions for suspected or confirmed pulmonary TB, all staff must wear appropriate respiratory protection.
- Current OSHA Standards as developed by NIOSH (National Institute for Occupational Safety & Health) require that the respirator minimally filter 95% of 0.3 um sized particles.
- Employees must put on the respirator with which they were fit-tested before going into the room of a patient on Airborne Disease Isolation

Respiratory Protection - 2

- Employees with potential exposure to TB are fit tested for an appropriate style and size of respirator
- Federal and Public Employee OSHA laws prohibit the use of N-95 respirators by employees with facial hair if the hair prevents the mask from creating a tight seal around the face
- Employees must ensure that they are clean shaven (no beard/hair) wherever the mask touches the face

TYPES OF N95 RESPIRATORS

Annual respiratory protection training and fit testing are required for employees who wear N-95 respirators



As an alternative, employees may wear a powered air purifying respirator (PAPR) such as pictured at right



Surgical/Procedure mask:

Must be worn by patients on Airborne Disease Isolation when they are being taken out of their rooms

Patient Instructions:

- A patient on Airborne Precautions for suspected or confirmed pulmonary TB is instructed to cover his/her nose and mouth with a tissue when coughing or sneezing
- This applies whether or not other individuals are present in the room since small droplet nuclei from sneezing and coughing can remain suspended in the air for an extended period.

Patient Instructions (cont'd)

- A patient on Airborne Precautions should be instructed to remain in the negative pressure isolation room with the door closed unless he/she requires medical treatment that cannot be provided at bedside
- If the physician or medical team deems it necessary for the patient to leave the confines of the negative pressure isolation room, a tight fitting surgical or procedure mask should be placed on the patient
- A respirator should **not** be used since fit is not guaranteed and patient with pneumonia would already have a compromised immune system

Visitors

Must also don respiratory protection when going into the room of a patient on Airborne Disease Isolation

- When entering the room of an individual on Airborne Precautions, visitors should use an N-95 respirator or procedure mask for respiratory protection
- The requirement for fit-testing before using an N-95 respirator does not apply to the visitors of a patient
- Visitors or family members who have had close contact with a patient who subsequently is found to have TB should be evaluated for active/latent disease and referred to their primary care provider for the appropriate testing

Pediatric TB

- Children with tuberculosis often acquire the disease from an immediate family member
- All adult visitors of children with suspected or proven tuberculosis should wear an N-95 respirator at all times after entering the hospital
- They should refrain from visiting common areas in the facility (i.e., cafeteria, patient lounges, etc.) and referred to their primary care provider for evaluation to rule-out active tuberculosis
- Once written documentation has been provided that active TB has been ruled-out, the adult visitors will longer be required to wear a N-95 mask

Discharge Planning - 1

- Notification of Public Health authorities about patients and personnel with known or suspected tuberculosis is a multidisciplinary responsibility.
- Tuberculosis is a Category 1 reportable disease which requires health department to be notified within 24 hours of recognition or strong suspicion of disease.
- Report must also be generated if patient started on 2 or more anti-TB drugs

Discharge Planning - 2

- The patient's degree of infectivity must be assessed for discharge
- In general, a patient should meet the criteria for the discontinuation of Airborne Precautions before discharge unless the local health department deems otherwise
- The Health Department is promptly notified if an infectious or potentially infectious patient signs out against medical advice or elopes from the hospital

TB Prevention in the Emergency Department (ED) - 1

ED Workers at Higher Risk for Exposure to TB

In addition to providing care to persons with unidentified TB disease, EDs increasingly provide care to those populations most impacted by the TB epidemic:

- Urban poor
- Immigrants
- Persons at risk for HIV infection
- Persons recently incarcerated
- Homeless persons
- Persons with inadequate access to health care

TB Prevention in the Emergency Department (ED) - 2

- Many patients with TB disease seek care in the EDs of urban public hospitals. They may wait for long periods under crowded conditions with inadequate room ventilation

- These factors increase the risk of transmission to ED staff.

- Many patients with TB disease do not yet have a diagnosis when care is sought in EDs

- This results in delay in initiating isolation and other infection control measures by ED staff

- Delay in seeking medical care may result in presentation with more advanced TB disease, increasing the risk of transmission to staff in EDs

TB Prevention in the Emergency Department (ED) - 3

- TB transmission to HCWs and patients in EDs has been well documented

- One outbreak occurred following a 4-hour exposure to a patient, known at the time of admission to the ED, to have pulmonary TB
- Another outbreak occurred after only 2 hours' exposure to a patient with unrecognized pulmonary TB

- Most transmission in EDs undoubtedly occurs without known links between an infectious source and susceptible individuals with whom air is shared

Ambulatory Care Facilities - 1

Healthcare employers and employees in outpatient settings should be aware of the risk of tuberculosis among their patient population and should develop, implement, and monitor infection control procedures

- Ambulatory patients who have pulmonary symptoms of uncertain etiology should wear a surgical or procedure mask while in common areas

- Such patients should spend a minimum of time in common waiting areas and should be instructed to cover their mouths and noses when coughing/sneezing

- The patient should be moved to a negative pressure room if possible for isolation. If a negative pressure room is not available, the patient should be placed in a room with the door shut

Ambulatory Care Facilities - 2

- Ventilation in waiting areas should be maintained to reduce the risk of tuberculosis transmission, especially if immunosuppressed patients are treated in the same or nearby area
- Air from clinics serving patients at risk should not be recirculated unless it is first passed through a HEPA filtration system.

Operating Rooms - 1

- Elective operative procedures on patients who have active TB should be delayed until the patient is no longer infectious.
- An operating room with an anteroom should be used for TB patients
- For operating rooms without anterooms, the doors to the operating room should be closed, and traffic into and out of the room should be minimal to reduce the frequency of opening and closing the door

Operating Rooms - 2

- Attempts should be made to perform the procedure at a time when other patients are not present in the operative suite and when a minimum number of persons are present (i.e., at the end of the day)
- When operative procedures (or procedures requiring a sterile field) are performed on patients who may have active TB, the respirator must protect both the sterile field from droplet nuclei from the healthcare worker and from the infectious droplet nuclei generated by the patient

Autopsy Suites

- Personnel performing procedures that may aerosolize infectious particles (e.g. sawing, irrigating) should wear an N-95 respirator or PAPR in cases of known or suspected tuberculosis
- Autopsy rooms should have ventilation that provides at least 12 air exchanges per hour
- These rooms should have good distribution of air flow in the room, negative pressure with respect to adjacent areas, and room air exhausted directly to the outside of the building away from windows, intake vents, and human contact

Surveillance for Tuberculosis Transmission – Exposure Follow Up

- Evaluation through Employee Health Service
- Skin test if previously skin test negative
- Additional follow up at health department/chest clinic if TB skin test (TST) positive
- Treatment with INH if TST positive

Tuberculin Skin Testing Recommendations for Screening Frequency

- Baseline two-step
 - Should be done for all HCWs upon hire
- Low Risk institutions (3 or less TB cases/yr)
 - No serial (annual) skin testing
- Medium Risk institutions (3 or more TB cases/yr)
 - Every 12 months
- Potential on-going transmission
 - As needed in investigation of potential ongoing transmission

CONCLUSION

The best infection control interventions for prevention of TB transmission include effective planning and implementation at all levels:

- Maintain a high index of suspicion for TB disease in patients with respiratory infection (**THINK TB**)
- Prompt isolation and management of patients with suspected or confirmed TB
- Ensure staff fit testing as per recommendations
- Ensure availability of appropriate respirators
- Appropriate staff screening and follow up as per recommendations