

3 Prevention of Rabies, Chicken pox and Tuberculosis among Health Care Workers.

Introduction

Most Health Care Workers (HCW) are at risk of exposure to infectious diseases due to contact with patients or infectious material from patients. Most of the risks could be minimized by observing safety rules as given in the guideline on Safety of Health Care Workers of the Sri Lanka College of Microbiologists. Apart from this, effective vaccines are available for some infections. However indiscriminate use of these vaccines would place a heavy financial burden on the State. Judicious use of vaccines is very important to reduce this excessive cost. This guideline has been prepared to give recommendations on preventing three diseases Rabies, Chicken pox and Tuberculosis among HCW.

Why do we need Clinical Practice Guidelines?

There are no formal national guidelines available for the prevention of the above mentioned diseases among health care workers.

A healthy work force is an asset to the service provider. There is also a responsibility on the part of the employer to safeguard the workers from undue exposures to work related risks. Workers' attitudes to the service could be improved by providing them a safe working environment. Accidents due to lack of knowledge could be prevented by providing correct

information. These guidelines have been prepared to formulate policies on the use of vaccines and other safety measures to prevent transmission of infections to HCW.

For whom is this guideline intended?

This guideline is intended for policy makers, health managers and health care workers.

Objectives

- To provide evidence based recommendations to clinicians to choose the best course of action in prevention of rabies, chickenpox and TB among health care workers.
- To provide recommendations to the administration to help in the improvement of quality of service delivery by prevention of the three infections mentioned above among health care workers.

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Quick Reference guide

3.1	Prevention of Rabies among Health Care Workers.....	63
3.2	Prevention of Chicken pox among Health Care Workers.....	70
3.3	Prevention of Tuberculosis in Health Care workers	76

Contents

Topic No	Topic	Page No
3.1.1	Health Care Workers (HCW) who are at risk.....	64
3.1.2	Situations where rabies exposure may have occurred	64
3.1.3	Rabies virus may be present	65
3.1.4	When performing procedures where needles or scalpels are used, these instruments.....	65
3.1.5	In situations which are not considered as a risk for rabies transmission post exposure prophylaxis	65
3.1.6	Situations post exposure prophylaxis is not indicated	65
3.1.7	Standard precautions.....	66
3.1.8	Recommendations in handling postmortem specimens in suspected cases of rabies.....	67
3.1.9	Rabies Pre-Exposure Prophylaxis for HCW	67
3.2.1	Criteria for significant exposure to C.pox	71
3.2.2	Health care workers (HCW) who are at risk to C.pox	71
3.2.3	Management	71
3.3.1	Infection control strategies to reduce TB transmission	77
3.3.2	Infection control measures	79
	References	69,75, 93

Prevention of Rabies, Chicken pox and Tuberculosis among Health Care Workers.

These guidelines would include three topics as given below;

1. Prevention of Rabies among Health Care Workers
2. Prevention of Chicken pox among Health Care Workers
3. Prevention of TB among Health Care Workers

3.1 Prevention of Rabies among Health Care Workers

Rabies is usually transmitted through a bite of a rabid animal. Theoretically, rabies may be transmitted to health care personnel from exposure (bite and non bite) to saliva from infected patients, but no cases have thus far been documented. There are six reported iatrogenic cases of rabies resulting from infected corneal graft implants. In another case, aerosol transmission is thought to have occurred in a laboratory worker while grinding rabies infected sheep brains.

3.1.1 Health Care Workers (HCW) who are at risk of being exposed to Rabies would be of four categories.

- A. HCW who attend on patients with suspected rabies.

- B. Medico legal staff performing post mortems.
- C. Laboratory staff handling live rabies virus.
- D. Veterinarians and support staff, personnel of the rabies control programme who are in direct contact with animals.

3.1.2 Situations where rabies exposure may have occurred while handling a patient suspected of rabies and where post-exposure prophylaxis is considered are;

- A. Needle stick injury.
- B. Cut or puncture of skin involving potentially contaminated tissue.
 - eg. Scalpel injury during an invasive procedure.
 - eg. Cut from bone fragment that penetrates glove and skin.
- C. Contamination of mucous membranes, open wounds, or non-intact skin with the patient's saliva.
 - eg. Spray, splash, hand to eye or hand to mouth contamination.

3.1.3 Rabies virus may be present in the following secretions and tissues:

- D. saliva,
- E. milk,
- F. sexual secretions,
- G. neural tissue and other innervated tissues.

3.1.4 When performing procedures where needles or scalpels are used, these instruments may have penetrated innervated tissue and contaminated with the virus.

- Injury to a HCW by sharps could therefore be considered as a potential risk.

3.1.5 In situations which are not considered as a risk for rabies transmission post exposure prophylaxis is not indicated (X)

3.1.6 Situations where post exposure prophylaxis is not indicated (X)



- Exposure to faeces, urine or blood of a suspected patient
- Touching and general examination of a suspected patient
- Changing a patient's bedlinen
- Serving or cleaning of a patient's meals including the handling of used dishes and other utensils
- Handling a patient's specimens, blood, CSF, urine in the laboratory
- Presence near the operating or autopsy table during routine procedures
- Transport of a patient in an ambulance

Adherence to standard precautions for infection control will minimize the risk of exposure (X)

3.1.7 Standard precautions to be taken by HCW when handling patients or infectious material. (X)



- When coming in contact with the patient's saliva or any other body fluid HCW should wear gloves, masks, gowns and eye protection.
- Patient's clothing, bedlinen and other personal items should be washed with soap and water and boiled before reuse.
- Spillage of secretions or body fluids should be disinfected with freshly prepared 1% hypochlorite solution.
- Any equipment used on the patient (suckers, ventilator tubing etc.) should be disinfected accordingly. (Refer section 6.6 of the Hospital Infection Control Manual – SLCM 2005)

- Personal protective gear would protect mucous membranes from contamination with infectious material.
- All detergents, temperature over 60°C, and 1 % hypochlorite would inactivate the rabies virus.

3.1.8 Recommendations in handling post-mortem specimens in suspected cases of rabies (X)

- Universal precautions to be adopted when performing post-mortems.
- Embalming is not recommended.
- Early disposal of body by cremation or burial is recommended.

- Careless handling of brain or spinal cord, such as using electric saws and drills during brain biopsy or necropsy may be risky.
- Such procedures should be conducted using goggles and respiratory protection. (X)
- Performing necropsies carelessly can lead to mucous membrane and inhalation exposures.
- Wearing protective clothing, goggles, face mask and thick gloves should provide sufficient protection. (X)
- Instruments must be autoclaved or boiled after use. (X)

3.1.9 Rabies Pre-Exposure Prophylaxis for HCW

A. Recommendations are for the following groups only (X)

- Laboratory workers handling live rabies viruses.
- Veterinarians, animal handlers, staff of rabies control programme who are in direct contact with animals.

- All health care workers who come in contact with potential rabies patients do not require pre-exposure prophylaxis.

B. The recommended pre-exposure schedule

- i. One vial of anti rabies tissue culture vaccine (ARV) given intra muscularly (im) on days 0, 7 and 28
- ii. Booster dose after one year.
- iii. HCW who are at continuous risk of exposure need to have one dose of ARV given im, once in every 5 years.



3.1.10 Post-exposure anti rabies therapy for HCW

Refer DGHS circular on Prevention of rabies by anti rabies post exposure therapy (PET).

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3.2 Prevention of Chickenpox among Health Care Workers

Introduction

Chickenpox (varicella) caused by Varicella Zoster Virus (VZV) is highly contagious. More than 90% of susceptible contacts develop the disease after exposure. All susceptible adults in health care settings are at risk of varicella and its complications. Pregnant women and immuno-compromised people are at higher risk of developing complications. Infected health care personnel and patients are sources of nosocomial transmission.

VZV is acquired by inhaling virus released into the air. Hence close contact is necessary. The infected person is infective from about 2 days before onset of rash to about 4- 5 days after or until crusting of the lesions has occurred. The incubation period is usually 14-16 days but may vary from 10-21 days after exposure. The virus replicates more efficiently in immuno-compromised persons who develop disease after a shorter incubation period and also shed the virus over a prolonged period. Scabs are not infectious.

Herpes Zoster

The rash of shingles (Zoster) also contains VZV particles and the vesicle fluid is infective. A non-immune person may contract chickenpox (CP) after contact with vesicular fluid from a patient with zoster. However secretions from the respiratory system of such patients are not infectious.

3.2.1 Criteria for significant exposure:

- A. A household contact living in the same house as a case of chickenpox or herpes zoster.
- B. Face to face contact with a case of chickenpox for at least 5 min
- C. Contact with secretions of lesions of a patient with herpes zoster for > 1 hr

3.2.2 Health care workers (HCW) who are at risk All HCW who are non immune are at risk. But following categories are more likely to be at risk.

- A. Staff members who are on immuno-suppressive treatments. Eg: underlying connective tissue disorders, those on systemic corticosteroids
- B. Varicella susceptible pregnant staff members
- C. Staff members who are immuno-compromised eg- cancer, and organ transplant recipients
- D. Staff who handle infected secretions like vesicle fluid / respiratory secretions.
- E. Medico-legal staff who perform post-mortem on patients who have died of disseminated CP or varicella pneumonitis

3.2.3 Management

- A. Isolation of the patients
- B. Varicella Zoster Immuno Globulin (VZIG)
- C. Varicella vaccine

D. Antivirals**A. Isolation of the patients**

- Patients with CP or immuno-compromised patients with zoster should ideally be nursed in rooms with negative pressure to prevent nosocomial spread of VZV or in a side room using standard isolation precautions.
- Health workers who are immune to varicella should take care of patients with VZV infections
- Staff members in contact with cases of CP / zoster should contact Infection Control Team & documentation of exposure & staff movements should be made.
- When susceptible personnel are exposed to varicella, exclusion from care of high risk patients is recommended from the 10th day after the first exposure to the 21st day after the last exposure
- If varicella occurs they should be excluded from work until all lesions are dry & crusted.
- Restrict personnel with localized zoster from the care of high risk patients until lesions are crusted; Care for the other patients with lesions covered are allowed.
- Immuno-compromised HCW with zoster should not attend on patients.

B. Indications for VZIG

- Susceptible staff who are pregnant or who are immuno-compromised should be given prophylactic VZIG following exposure.

- The routine post exposure use of VZIG is not recommended among immuno-competent HCW.
- VZIG is costly, does not necessarily prevent varicella & may prolong the incubation period.

Dosage of VZIG

- Please refer manufacturer's product information leaflet.

Even if VZIG is given, exclude from duty from the 10th day after the first exposure through the 28th day after the last exposure.

C. Indications for Varicella vaccine**i. Pre-exposure**

The vaccine should be given to susceptible personnel, especially those who are in contact with patients at a higher risk of complications.

ii. Post-exposure prophylaxis

- Susceptible health care personnel without a reliable history of varicella or laboratory evidence of immunity could be given the vaccine within 3 days of exposure.
- It is not necessary to perform serologic screening of persons with negative / uncertain history of varicella before administering vaccine.
- Routine post vaccination testing of varicella antibodies is not necessary.

D. Antivirals:

- Post exposure use of acyclovir may be effective and less costly than the use of VZIG in some susceptible persons.
- 40 mg / Kg body weight / day in 4 divided doses given for 7 days commencing on the 7th day after the exposure. This is shown to be 70% effective. However, additional data are needed concerning the prophylactic use of acyclovir in healthy and immunocompromised persons in all age groups.

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3.3 Prevention of Tuberculosis in Health Care workers

Introduction

Health care workers face unavoidable hazards by exposure to patients with infectious TB and by exposure to specimens of TB. The risks posed by this hazard cannot be eliminated but they can be reduced.

Nosocomial transmission is of great concern because it affects not only other patients but also the personal health of HCW and may result in either temporary or permanent loss of HCW from the workforce.

Systematic screening for infection of health care workers and assessment of risk are largely undeveloped in Sri Lanka. Published accounts of the epidemiology of TB infection among our health care workers are rare.

There are reports of increased rates of TB disease among health care workers in the UK and the US. Recent studies of the risk of nosocomial transmission of *M. Tuberculosis* done in developing countries have also shown that HCW caring for infectious patients are at risk of *M. tuberculosis* infection.

The emergence of multi-drug-resistant strains has been a problem in many countries. So far there had been few patients in this country with multi-drug-resistant organisms, but protection of health care workers must take into account the probability that these numbers will increase.

Nonexistent or ineffective TB infection control (IC) measures facilitate *M. tuberculosis* transmission in the health care settings. In low-income countries, the risk

of patients and HCW acquiring TB could be significantly reduced if governments, health authorities, and HCW themselves make infection control a high priority.

The purpose of this guideline is to reduce the spread of tuberculosis to health care workers in health care settings.

The guideline aims at;

- Ward staff/clinic staff
- Laboratory staff
- Medico legal staff

Objectives

General - To reduce TB transmission in HCW

Specific - To introduce infection control strategies to reduce TB Transmission
 - To motivate implementing the infection control strategies in health care settings

3.3.1 Infection control strategies to reduce TB transmission

There are three levels of infection control (IC) measures:

- Administrative (managerial)
- Environmental
- Personal respiratory protection.

All health-care settings need a TB infection-control program designed to ensure prompt detection, airborne precautions, and treatment of persons who have suspected or confirmed TB disease or prompt referral of persons. Such a program is based on a three-level hierarchy of controls, including administrative, environmental, and respiratory protection

Administrative controls are the most important since environmental controls and personal respiratory protection will not work in the absence of solid administrative control measures. Each level operates at a different point in the transmission process:

- Administrative controls reduce HCW and patient exposure
- Environmental controls reduce the concentration of infectious droplet nuclei
- Personal respiratory protection protects HCW in areas where the concentration of droplet nuclei cannot be adequately reduced by administrative and environmental controls.

1st Priority	-	Administrative Controls
2nd Priority	-	Environmental Controls
3rd Priority	-	Personal Respiratory Protection

Environmental factors that enhance transmission include:

- exposure in relatively small enclosed spaces.
- lack of adequate ventilation to “clean” the environment through dilution or removal of infectious droplet nuclei.
- re-circulation of air containing infectious droplet nuclei.

A. High Risk Areas for nosocomial *M. tuberculosis* Transmission

- TB patient isolation areas / rooms
- Areas / rooms where sputum is collected / processed
- Bronchoscopy suites
- Surgical suites
- Intensive care units
- Autopsy suites

3.3.2 Infection control measures

A. Outpatient settings

i. Triage and evaluation of suspected TB patients

This potentially reduces the exposure of HCW and hospitalized patients to infectious TB patients.

- patient waiting areas should be open and well-ventilated. (x)
- patients who may have infectious TB should be triaged to separate clinics or waiting areas. (x)

- persons with cough of > 3 weeks duration should be considered TB suspects.
- placing potentially infectious TB patients in waiting areas with other patients without TB, especially those who are immunocompromised (e.g., AIDS) or pediatric patients, should be avoided. (x)

If a separate waiting area cannot be established for them, consideration should be given to providing expedited **priority service** to decrease the risk of exposure for other patients and HCW. (Y)

B. In-patient settings

i. General measures

- Patients with suspected / confirmed respiratory tuberculosis, whatever the sputum status, should not be admitted to an open ward containing immunocompromised patients, transplant or oncology patients until pronounced non-infectious by the physician in charge preferably in consultation with the microbiologist. (x)
- The infection control team should be informed of the patients. (x)
- The staff and visitors who are non immune should be warned of the risk. Visitors should be limited as far as possible.
- Duration of infection control precautions in pulmonary TB is generally for two weeks after start of effective antimicrobial treatment and sputum is negative for AFB.

- Patients with MDR-TB may remain infectious for prolonged periods and discontinuing isolation after two weeks could contribute to nosocomial MDR-TB outbreaks.

ii. Infection control precautions

- There should be a hospital isolation policy to prevent nosocomial TB (x)

a) Isolation rooms

Suspected / confirmed cases should ideally be isolated in a single room with negative air flow ventilation in relation to the surrounding areas. (As there are no negative pressure rooms currently available in the hospitals, a room with 2 strong exhaust fans could be used instead. The extractor fan should provide 8 to 12 air changes / hour) Regular checks of performance of the system are needed to ensure proper operation of these facilities.

- An ante-room outside the isolation room will further reduce the risk of contaminating air in the rest of the ward. Air is extracted from the ante-room at a lesser rate than from the isolation room.
- In the absence of these facilities at least a single room with good ventilation should be used for isolation. When these rooms are used one should pay attention to the following

Physical isolation of the patient in a well-ventilated room without negative pressure does not reliably prevent airborne transmission. Opening a window might change the direction of airflow and may contaminate areas outside the isolation room. Therefore isolation areas require adequate ventilation with direct engineering controls.

- The isolation room should have a wash hand basin and preferably an ensuite toilet.
- The door of the room must be kept closed at all times except for necessary entrances and exits.
- Ensure adequate supply of hand wash antiseptic / detergent preparations and disposable paper towels. (eg: alcohol hand rub)
- Ensure the presence of a sputum mug and a clinical waste bin lined with a yellow bag inside the room.



An isolation room

b) Nursing of patients

- Contact with staff should be kept reasonably to a minimum without compromising patient care (X)
- Protective clothing
- Gloves –usually not necessary but should be worn when likely to be in contact with respiratory secretions or contaminated articles
- Plastic aprons and gowns – should be worn at the time of contact with the patients and their environment to avoid contamination of clothing.
- Masks – if the PFR masks are available they can be used. Ordinary surgical masks do not provide the required level of protection.

Wearing a mask for the staff is recommended when direct exposure to respiratory secretions is unavoidable and for diagnostic procedures with transmission potential

- Eg: during broncoscopy

- TB wound care too requires the wearing of particulate respirators and gloves.



Wearing a tight fitting PFR mask

- Masks should be close fitting and filter particles of 1-5 μ . (N95 particulate respirators). These are intended to be disposable and the manufacturers advise that they be discarded on leaving the isolation facility. Some facilities re-use this because of the high cost. This is not advisable. However if this is done, careful labeling is required for a single staff member's use and should be maintained / stored without getting contaminated.

1. **Use of a mask is not a substitute for good infection control management.**

2. Surgical masks could be given to patients with uncontrolled cough to reduce aerosol spread.

- Hand hygiene
Wash hands thoroughly with an antiseptic / detergent and dry with a disposable paper towel / single use towel. Hands must be washed after touching the patient or potentially contaminated articles and before taking care of another patient.
- Equipment
Single use disposable respiratory equipment and accessories should be used where possible. For reuse they should be thoroughly cleaned / disinfected or sterilized.
- Movements
Inter departmental visits should be limited to a minimum essential.
 - Infectious TB patients should wear masks when they leave the isolation room for investigations in other parts of the hospital.

Contact tracing is an integral part of the routine management of the patients with tuberculosis. The person responsible for local contact tracing should be named by the hospital authorities.

 - All patients with TB should be notified.
 - Staff exposed to an infectious TB case are managed as contacts

C. Intensive Care Units (ICU)

Patients with infectious TB disease might become sick enough to require admission to an ICU.

The ICU patients with suspected or confirmed infectious TB disease should be in isolation room, if possible.

Therefore ICU with a high volume of patients with suspected or confirmed TB disease should have at least one such room. Airborne infection isolation rooms are the ideal to keep these patients.

- To help reduce the risk for contaminating a ventilator or discharging *M. tuberculosis* into the ambient air when mechanically ventilating (i.e., with a ventilator or manual resuscitator) a patient with suspected or confirmed TB disease, ideally one should place a bacterial filter on the patient's endotracheal tube (or at the expiratory side of the breathing circuit of a ventilator).

In selecting a bacterial filter, give preference to models specified by the manufacturer to filter particles 0.3 µm in size in both the unloaded and loaded states with a filter efficiency of >95% (i.e., filter penetration of <5%) at the maximum design flow rates of the ventilator. (for the service life of the filter, as specified by the manufacturer).

D. Reducing exposure in the laboratory

Staff who work in laboratories that handle clinical specimens encounter risks not typically present in other areas of a health-care setting.

Laboratories that handle TB specimens include

- Pass-through facilities that forward specimens to reference laboratories for analysis
- Diagnostic laboratories that process specimens and perform acid-fast staining and primary culture for *M. tuberculosis*
- Facilities that perform extensive identification and susceptibility studies.

Risks for transmission of *M. tuberculosis* in laboratories include aerosol formation during any specimen or isolate manipulation and percutaneous inoculation from accidental exposures. Handling sample containers and making smears pose low risk to HCW.

i. General measures to reduce the risk of transmission in laboratories

- Access to the laboratory should be strictly limited to essential HCW (x)
- Sputum collection should not take place in the laboratory area. (x)
- Sputum containers should ideally be leak proof screw capped. (x)
- A pass-through window should be used to deliver sputum samples. (x)
- Design of the laboratory, (x) (described below)
 - a) Biosafety level (BSL)-2 practices and procedures, containment facilities are required for non-aerosol producing manipulations of clinical specimens (e.g., preparing direct smears for acid-fast staining)

b) BSL-3 practices, containment equipment, and facilities are recommended for the propagation and manipulation of cultures of *M. tuberculosis* complex. Conduct all aerosol-generating activities (e.g., inoculating culture media, setting up biochemical and antimicrobial susceptibility tests, opening centrifuge cups, and performing sonication) in BSC.

ii. Work practices

- Only those with 'permit to work' should work in the laboratory. (x)
- Personnel who work with mycobacteriology specimens should be thoroughly trained in methods that minimize the production of aerosols. (x)
- Based on the risk assessment for the laboratory, employees should use personal protective equipment (x)
 - For activities that have a low risk for generating aerosols, standard personal protective equipment consists of protective laboratory coats, disposable gloves should be worn.
 - Use respiratory protection when performing procedures that can result in aerosolization outside a BSC. The ideal to use is an N95 filtering face piece respirator

In laboratories affiliated with a health-care setting (e.g., a hospital) and in free-standing laboratories,

the laboratory consultant, in collaboration with the infection-control staff for the setting, and in consultation with the state TB laboratory, should develop a risk-based infection-control plan for the laboratory that minimizes the risk for exposure to *M. tuberculosis*. (x)

E. Bronchoscopy Suites

Because bronchoscopy is a cough-inducing procedure bronchoscopy suites require special attention

Bronchoscopy can result in the transmission of *M. tuberculosis* either through the airborne route or a contaminated bronchoscope.

- If possible, avoid bronchoscopy on patients with suspected or confirmed TB disease or postpone the procedure until the patient is determined to be non-infectious, by confirmation of the three negative AFB sputum smear results. (x)
- At least N95 respirators should be worn by HCW while present during a bronchoscopy procedure on a patient with suspected or confirmed infectious TB disease. (x)
- Whenever feasible, perform bronchoscopy in a room that meets the ventilation requirements for an airborne infection isolation room. (z)
- In the absence of such facility mechanical ventilation and air-cleaning technologies can be used to increase ventilation and facilitate air changing. (y)

Directional air flow should be maintained from a "clean" area, across the HCW, across the patient, and to the outside. The area where air is entering should be

located away from the exhaust area to avoid re-entry of contaminated air (“shortcircuiting”). (x)

F. Autopsy Suites

Autopsies performed on bodies with suspected or confirmed TB disease can pose a high risk for transmission of *M. tuberculosis*, particularly during the performance of aerosol-generating procedures (e.g., median sternotomy).

- When performing autopsies on bodies with suspected or confirmed TB disease, co-ordination between attending physicians and pathologists is needed to ensure proper infection control and specimen collection. (x)
- The use of local exhaust ventilation should be considered to reduce exposures to infectious aerosols (e.g., when using a saw). (x)
- For HCW performing an autopsy on a body with suspected or confirmed TB disease, should wear at least N95 disposable respirators.
- After an autopsy is performed on a body with suspected or confirmed TB disease, allow adequate time to elapse to ensure removal of *M. tuberculosis*-contaminated room air before performing another procedure in the same room.

If time delay is not feasible, the autopsy staff should continue to wear respirators while they are in the room.

G. HCW education, screening and Surveillance

- Regular education programmes for HCW regarding prevention of TB and infection control practices in health care settings should be conducted by the infection control team of the health Institution. (x)
- Pre employment screening - Staff screening for TB at recruitment is recommended. (x)
- Surveillance during employment- Staff working in lower-risk areas requires no routine surveillance during employment. Staff working in TB or general respiratory wards, bronchoscopy or induced sputum rooms, TB laboratories, and post-mortem examination rooms are at high risk of TB exposure. It is desirable for such staff to have an annual assessment. (y)
- Health care workers, irrespective of age, who are previously unvaccinated and if Mantoux negative, should receive BCG vaccination.

(BCG does not confer complete protection and therefore tuberculosis can still occur in vaccinated health care workers.)

H. TB Concerns for clinical Waste

The infection control team in the Health care setting should address this issue. (x)

The waste handlers should be educated and trained in proper handling of waste. (x)

An appropriate and efficient prevention method is to require facilities, such as laboratories and clinics to decontaminate materials potentially contaminated with viable TB bacteria prior to sending them offsite for disposal / dispose them by incineration onsite.

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