

# Emergency Departments



# EMERGENCY DEPARTMENTS (EDs)

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TB transmission is a recognized risk to patients and HCWs in healthcare settings. The magnitude of this risk varies significantly depending on:

- **Facility type**
- **Patient population**
- **Prevalence and incidence of infectious TB in the community**
- **Occupational group and work area of the HCW**
- **Effectiveness of the facility's TB control program**

The risk of transmission is greater in areas in which care is provided to patients with TB disease before they are identified, properly isolated, and started on appropriate therapy. This care is often provided in hospital EDs.

## **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

Because they don't have health insurance and a private doctor, 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. A random sample of EDs nationally found that EDs with the greatest number of TB patients had the longest waiting times. Many patients with TB disease do not yet have a diagnosis when care is sought in EDs. This results in delay in initiating All precautions and other infection control measures by ED staff. Furthermore, delays in seeking medical care may result in presentation with more advanced TB disease, increasing the risk of transmission to staff in EDs.

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.

In summary, EDs present a unique intersection of risk factors. Given these factors, the cornerstone of effective TB control programs in EDs is early identification of patients with infectious TB. After identifying these patients, implementing appropriate isolation and diagnostic procedures are the most important and effective risk reduction activities. An index of suspicion for TB appropriate to the facility, the community, and the client population is an essential component of these practices.

## Determining the Likelihood of TB Transmission in the ED

The risk for TB transmission in the ED is approximated by looking at several factors:

- TB in the community
- TB in your facility
- *M. tuberculosis* TST or IGRA conversion rate in your facility

With information on these factors, you will be able to assess your ED's risk.

## Obtaining Information about TB in the Community

To assess TB in the community served by your ED, you will need information such as:

- Number of TB cases in the past year in the county or counties from which you draw your ED patients
- Number of TB cases with drug resistance in the past year in the county or counties from which you draw your ED patients
- Demographic information on community TB cases:
  - Race/Ethnicity
  - Age distribution

Other, community-specific information that can be important in evaluating the community TB risk includes general health factors in the community from which your client population is drawn, such as:

- Prevalence of HIV infection
- IV drug use
- Homelessness
- Access to preventive health-care

This information can be found by contacting sources such as:

- Your local TB control program
- Your state TB control program
- Local health information groups such as the American Lung Association and/or AIDS information services

Once you have obtained general information about TB in your community, you need to obtain some facility-specific information.

## Obtaining Information About Confirmed TB in the Facility

You will want to determine the number of confirmed TB cases in the past year that were:

- Admitted to your facility
- Admitted to your facility with drug-resistant TB
- Admitted to your facility and were seen in the ED

This information can be found by looking at records from:

- Admissions/medical records
- Infection control
- Laboratory

The above information is needed to help you assess your ED risk using the “Risk Assessment Worksheet,” which appears in the Appendix on page 149.

## Calculating the TST Conversion Rate for the Staff

A conversion rate provides an estimate of the risk of TB transmission. This rate is a simple way of comparing the number of staff who have converted their TST result since the prior year and the TST-negative staff who did not convert over the same time period. It gives you information needed to determine the significance of the actual number of conversions.

For example, your IC practitioner might say, “We have had five staff conversions in the past year.” If the number of TST-negative staff who were tested that year was five thousand, five conversions may not represent a large percentage of staff (0.1%). But if the number of TST-negative staff who were tested that year was only twenty-five, five conversions represents a much greater percentage of the staff (20%).

It can be misleading to look only at the number of conversions. Conversions must be looked at within the context of the TST-negative staff population.

To facilitate the collection and analysis of this information, it is crucial that TB skin testing data be entered in an aggregate log by department, as well as kept in individual employee records. In order to protect medical record confidentiality requirements, the aggregate log need not give the names of the employees.

Use the “Conversion Rate Calculation Worksheet” in Appendix A on page 141 to calculate and log the aggregate conversion rate. If your facility uses IGRA testing instead of or in addition to TST, these results should be included in the conversion rate calculation as shown in Appendix A.

## Next Steps

Compare the information you developed about your facility with the general ED risk classification in the revised version of Appendix B in the CDC guidelines. Use these classifications in conjunction with community-specific information to determine your ED risk.

Next, determine whether the community-specific information warrants a shift in the general ED risk classification. For example, if your facility sees few of the TB cases in your community, or has an ED population that is not representative of the community demographics for confirmed TB cases, you may want to revise your classification to a lower-risk category. Conversely, if your patient population closely matches the demographics of the TB cases in your community, or you serve a particularly high-risk population, you should consider revising your classification to a medium-risk category.

TABLE 11.

### General Risk Classifications

The general risk classifications for EDs can be defined as follows:

<p><b>POTENTIAL ONGOING TRANSMISSION</b></p>	<p>Should be temporarily applied to any setting (or group of HCWs) if evidence suggestive of person-to-person transmission of <i>M. tuberculosis</i> has occurred in the setting during the preceding year. Of if any of the following has occurred:</p> <ul style="list-style-type: none"> <li>• clusters of TST or IGRA conversions</li> <li>• HCW with confirmed TB disease</li> <li>• increased rates of TST or IGRA conversions</li> <li>• DNA fingerprinting that shows the presence of identical strain in patients or HCWs with TB disease</li> </ul>
<p><b>MEDIUM RISK</b></p>	<p>Facilities of &gt;200 beds with &gt;6 TB patients Facilities of &lt;200 beds with &gt;3 TB patients</p>
<p><b>LOW RISK:</b></p>	<p>Facilities of &gt;200 beds with &lt;6 TB patients Facilities of &lt;200 beds with &lt;3 TB patients</p>

**Note:** *These are general classifications and may be modified depending on the facility situation. For example, a facility that would fall into the low- or medium-risk categories may upgrade to a classification of potential ongoing transmission if the facility is seeing patients with multidrug-resistant (MDR) TB.*



## Privacy During Triage

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Mr. B, a 57-year-old Chinese man, came to the busy ED of the hospital near his home. It was crowded with people and noisy. When the triage nurse brought him over to the triage area, she sometimes had to speak loudly to be heard over the noise. Mr. B told the nurse that he had not been feeling well and that he had been having some chest discomfort, but denied having a cough or other symptoms. Since he was not currently having any discomfort, he was asked to wait in the waiting area.

After 2 hours, Mr. B was brought into the ED. When the ED doctor came in to examine him, Mr. B admitted that he had been coughing up greenish stuff for the past month, and that he had been losing weight. The doctor ordered a chest x-ray, which was abnormal and indicative of TB disease. Later sputum smears and cultures were positive for TB.

Why did Mr. B deny having a cough or other symptoms during triage? The triage area was not located in a private area where the patient could discuss his symptoms confidentially. Although the triage area was obscured from the view of others in the area, both the nurse's questions and the patient's answers could be overheard. So even though the triage nurse asked all the right questions, the patient did not answer truthfully. This resulted in delayed isolation, which caused exposure for other patients and staff.

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**What are some actions or methods the ED personnel could use to prevent this in the future?**



EMERGENCY

CASE STUDY

## TB Symptom Screening During Triage

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Ms. K, a 39-year old Mexican woman, was brought to the ED after falling from a ladder at her sister's home. She complained of arm and back pain and headache. After staff had ascertained that her injuries were minor, they set her broken arm.

While preparing to discharge her, Ms. K asked if she could also have something for her very productive cough, which she had had for several months. Before discharging Ms. K, the doctor called radiology for a reading on the chest x-rays which had been taken 6 hours earlier. The x-rays were abnormal, and a further work-up revealed that Ms. K had both a positive smear and TB culture.

Although Ms. K was not admitted to the ED for a complaint related to TB symptoms, she did have TB. If TB screening were a routine part of the triage procedure at this urban ED, Ms. K would have been isolated for the entire 6 hours she was there. Instead, she exposed staff members and other patients.

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**What are some of the questions triage personnel should ask patients to determine their TB status?**

*Efforts to identify infectious patients and prevent transmission should begin as soon as the patient enters the door and approaches the admission or registration desk.*

## Implementing and Performing TB Triage

Generally the initial ED triage interaction focuses only on patient acuity. As a result, a stable, but infectious, TB patient may be left sitting in the waiting room for a long time.

Efforts to identify infectious patients and prevent transmission should begin as soon as the patient enters the door and approaches the admission or registration desk.

When suspect TB patients are identified early in the admitting process, these patients can be placed on a “fast-track” for further triaging and possible isolation or masking precautions. EDs that do not have a specific triage tool for this purpose tend to over-look suspect TB patients and triage for acuity only.

### About Triage Levels

This manual introduces three levels of suggested triage procedures for early identification of suspect TB patients:

- **Level A:** Written TB symptom and risk factor screening of all patients presenting to the ED, regardless of the nature of the chief complaint.
- **Level B:** Written TB symptom and risk factor screening of all patients with respiratory complaints or known HIV infection presenting to the ED.
- **Level C:** Develop facility-defined criteria for determining when to suspect TB in your ED patients. No TB symptom and risk factor screening of any patient unless these facility-defined criteria are met.

Each level of triage procedure has advantages and disadvantages. These are discussed in more detail on the following page.

### Determining Which Triage Level to Use

A facility can choose to use any of the three triage levels; there are no requirements that would compel any facility to choose a level above **Level C**. However, there are instances when choosing **Level A** or **Level B** is more protective of the health and safety of ED staff and patients.

We recommend that you use the “Risk Assessment Worksheet” in Appendix B (revised version) of the CDC guidelines and Appendix F on page 149 of this manual to help you decide which triage level to use.

TABLE 12.

### Triage Levels—Advantages and Disadvantages

LEVEL	DEFINITION	ADVANTAGES	DISADVANTAGES
<b>A</b>	TB symptom and risk factor screening of all patients presenting to the ED, regardless of the nature of the chief complaint.	<ul style="list-style-type: none"> <li>This option is likely to “catch” more infectious TB patients. Because screening must be done on all patients, those with atypical presentations of TB are more likely to be found.</li> <li>A high level of suspicion maintained by screening all patients will assure a constant level of readiness to deal with TB effectively.</li> </ul>	<ul style="list-style-type: none"> <li>Screening must be done on all patients, and the triage nurse cannot use clinical judgment to decide whom to screen. This can be difficult for staff to accept.</li> <li>Increased time spent in triage.</li> <li>May result in over-isolation.</li> </ul>
<b>B</b>	Written TB symptom and risk factor screening of all patients with respiratory complaints or known HIV infection presenting to the ED.	<ul style="list-style-type: none"> <li>This level involves minimal behavioral changes for most triage nurses and may be easier to implement.</li> <li>A moderate level of suspicion maintained by screening all patients with respiratory symptoms or known HIV infection will assure some level of readiness to deal with TB effectively.</li> </ul>	<ul style="list-style-type: none"> <li>This level requires the triage nurse to decide when to apply the screening. This can result in missing patients with TB, especially if they present atypically.</li> <li>This level may result in under-isolation.</li> </ul>
<b>C</b>	<p>Develop facility-defined identifying criteria for determining when to suspect TB in your ED patients.</p> <p><b>No TB symptom and risk factor screening of any patient unless these facility-defined criteria are met.</b></p>	<ul style="list-style-type: none"> <li>This level will save time at triage since only patients who meet the facility-defined criteria for suspect TB will be screened.</li> </ul>	<ul style="list-style-type: none"> <li>This level requires the triage nurse to decide when to apply the screening. This can result in missing more patients with TB, especially if they present atypically.</li> <li>This level may result in under-isolation.</li> <li>This level of screening does not require staff to “think TB” and may result in decreased readiness to deal effectively with TB.</li> <li>This level creates vulnerability to occasional outbreak and decreases preparedness to deal effectively with a TB patient and the post-exposure follow-up, which should occur.</li> </ul>

These are our recommendations, based on the risk assessment classifications:

Use **Level A** if your ED’s risk assessment is: **Potential Ongoing Transmission**

Use **Level B** if your ED’s risk assessment is: **Medium Risk**

Use **Level C** if your ED’s risk assessment is: **Low Risk**

**Note:** *Facilities choosing Level C screening should be aware that they may be more vulnerable to occasional outbreaks and less likely to be prepared to deal effectively with a TB patient and the post-exposure follow-up that should occur.*

## Setting up the Triage Area

The triage area should be set up to provide the patient with as much privacy as possible. Patients may be reluctant to answer triage questions truthfully when others can overhear them. This can lead to a delay in identifying suspect TB patients. Even if the triage area must be located in an open area, you can create more privacy by strategically placing portable screens or cubicle walls.

## Implementing the Triage Plan

The only difference between the levels of triage is the population targeted for screening. The recommended actions for patient screening are identical at all levels.

- Develop and implement a written procedure for TB-specific screening.
- Develop specific, written triage questions concerning both risk factors and symptoms of TB disease.

**Note:** *The infection control practitioner should look at the current ED triage forms to determine if such a TB-specific checklist is included. In our experience, many ED staff believe that a general respiratory system checklist meets this need. It does not! If the TB-specific questions are not written down, there will be little consistency between triage nurses, and important questions may not be asked.*

Many organizations have developed TB-specific triage questionnaires. A sample triage questionnaire is included in Appendix B on page 143. Others are referenced in the Resources section on page 170.

The triage criteria for Respiratory Isolation of Pulmonary Tuberculosis (RIPT) Protocol was developed at Harbor-UCLA Medical Center (Appendix J on page 155) to aid in early identification and isolation of patients at high risk for pulmonary TB in the ED.

The triage worksheet consists of a questionnaire of both risk factors and symptoms of pulmonary TB. Point values are assigned to each risk factor and symptom and patient scores are added. Patients who score 5 or more are immediately isolated and evaluated for TB.

This tool is a good example of a short, TB-specific triage checklist.

## A Word About Triage Checklists and Algorithms...

The use of TB checklists and algorithms poses two main problems. First, as people with varying backgrounds, interest, and experience with TB may administer them, the tools may be used differently depending on the user. Second, there will never be complete information at the time the tools are used. Incomplete information will cause errors in the assumptions of the tools.

Nevertheless, these tools are useful to facilitate a standard and consistent collection of information. Triage tools are not foolproof, and, like all other tools, are more effective when used by an experienced practitioner.



## AIIR Signage

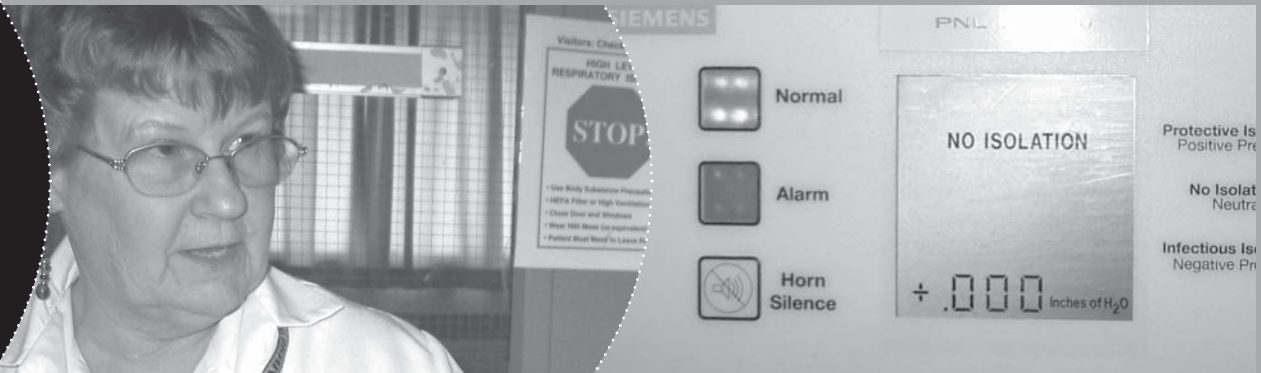
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The housekeeping manager called the ED nurse manager. A housekeeper who was regularly assigned to the ED had complained about going into an exam room in the ED for routine matters, such as emptying the trash containers. After he came out of the room, he found that the nurses and doctors going into the room were wearing respirators. He was worried that he was going to get sick, and angry because he felt important information was being withheld. The ED manager tried to explain that the staff was very busy, and that they communicated informally to one another about the isolation status of the patients. But she realized that this would have to change, in order to better protect the safety of all the workers in the ED. She called the infection control nurse (ICN) and enlisted his help.

At the next staff meeting, the ED manager and the ICN presented a plan they had developed jointly. They made a double-sided sign to hang on the doors of the rooms that were sometimes used as AIIRs for suspect TB patients. The sign was a simple one which on one side read “Exam Room — No Special Precautions Required,” and on the other side read “AIIR—N-95 Respirators Required.” Since the signs would be on the doors, staff would just need to turn them to the isolation side when occupied by a suspect TB patient. The staff agreed to give the signs a try. This was a simple system of notification which benefited all staff who worked in the ED, including housekeeping, lab, and radiology.

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**Can you think of other ways, ED managers can inform staff about potential TB transmission in their facility?**



## Communication and Monitoring

A busy Northern California hospital has a pro-active infection control committee, which includes the infection control coordinator, the chief engineer, and the nurse manager of the ED. In response to the resurgence of TB, they initiated a construction project to convert the ED waiting room to 100% exhaust air, and convert one of the ED exam rooms to meet the CDC recommendations for a TB AIIR (i.e., 12 ACH with negative pressure and 100% exhaust). The project was successfully completed in 2004.

In 2006, a young engineer was surveying the ED mechanical systems for another planned renovation. During a quiet moment, she asked the triage nurse which was the TB segregation exam room. He told her it was Exam Room #9. However, when the engineer looked at the mechanical drawings for the 2004 remodel, she was surprised to find that the room that had been converted was across the hall from Exam Room #9, and was being used for pediatric exams. Subsequent airflow measurements indicated that Exam Room #9 was under positive pressure and had an air change rate of only 4 ACH.

This example indicates the importance of two things: communication and monitoring. The various disciplines involved in TB control should continually share information. If the engineering department had involved ED staff in the construction project, they would probably have known the correct segregation room. Had engineering been checking airflow annually and sharing this information with others, the mistaken room would have been discovered. Had ED staff been checking for negative pressure at Exam Room #9, they would have discovered that it was under positive pressure.

**What are two ways a healthcare worker can check a room for negative pressure?**

# Handling Suspect TB Patients in the ED

Removing or limiting a suspect TB patient from contact with other patients and staff should be an initial action based on the TB triage results. We refer to such a process as “fast-tracking.” Airborne infection isolation is the ideal for placement of infectious patients. We refer to the use of AIIRs as “isolation.” Many EDs do not have AIIRs, and may instead use treatment/exam rooms with doors closed to separate suspect TB patients from others. This use of treatment/exam rooms is referred to as “segregation.” In the absence of isolation facilities, the ED should be prepared to implement the highest level of containment possible.

The basic concept of fast-tracking can be used in all settings, with isolation or segregation.

## Taking Initial Actions

### Fast-Tracking

Fast-tracking suspect TB patients requires a plan to address:

- Communication among ED staff of the need for masking, isolation, or segregation of the suspect TB patients
- Appropriate isolation or segregation of the patients
- The manner in which necessary services are provided to these patients.

### Communicating the Need for Isolation or Segregation

Patients with suspected or confirmed infectious TB should be masked as soon as they are identified and then moved to isolation or segregation. A sign should be placed on the door of the room, notifying staff that the room is being used for isolation or segregation. The sign should clearly state that no one should enter the room without using an approved respirator. The door should remain closed.

Signage must be kept accessible to staff or it will not be used. A holder on the wall near the room(s) used to isolate/segregate can be a convenient place to store the signage when it is not needed.

It is also important to have approved respirators readily available near the isolation/segregation room. Some facilities have placed wall-mounted boxes of respirators outside these rooms.

The registration and financial clerks are often overlooked in the communication loop. Suspect TB patients should not be sent to the registration or financial area. To minimize contact, alternatives should be explored. Perhaps the clerk could go into the patient’s room, using an approved respirator, or complete the registration over the telephone.

### Isolating or Segregating Suspect TB Patients

The most appropriate room in which to place a suspect TB patient is one that complies with the environmental recommendations as listed in the CDC Guidelines for a newly constructed AIIR. To review, an AIIR is a single patient room that has a minimum air change rate of 12 ACH, negative air pressure relative to adjacent spaces, and direct exhaust to the outdoors or recirculation of air through a HEPA filter.

*Patients with suspected or confirmed infectious TB should be masked as soon as they are identified and then moved to isolation or segregation.*

Many facilities do not have such a dedicated AIIR available in the ED. Such facilities often segregate suspect TB patients in any available closed exam room, regardless of the ventilation characteristics of the room.

The two most important environmental characteristics of an AIIR are a high ventilation rate and negative pressure relative to the adjacent space. The direct exhaust requirement is not as crucial because ED supply air filters should remove most TB particles from recirculated air. We recommend that a specific exam room with these two ventilation characteristics be identified to segregate such patients. You can assess the ventilation of a number of rooms and use the one that is most satisfactory. Alternately, you can select the room based on other concerns, and then improve the ventilation as required. A removable sign should be placed on the room door to warn staff that a segregated patient is inside.

The room should have a high ventilation rate (minimum 12 ACH). The airflow rate in the room should be measured. The hospital engineering department may have the equipment to measure room airflow. Otherwise, your engineering department can contract with a certified air balancing firm to perform these measurements. Once you know the amount of air moving through the room, you can calculate the air change rate. If the room airflow is inadequate, it should either be increased, or supplemented with a portable High Efficiency Particulate Air (HEPA) filter unit.

The room should also be under negative pressure. Check the room's pressurization relative to the corridor using a telltale such as smoke tubes or incense sticks. (Your engineering department may have smoke tubes that you can use. Otherwise you may be able to buy them from a local safety supply company.) Hold the smoke-generating device at ground level just outside the door and observe the smoke trail. Repeat this or a similar test daily to verify negative pressure of any room used for segregation or isolation.

Negative air pressure may be achieved in a room by increasing the amount of air exhausted by the existing ventilation system so that more air is exhausted than supplied. If this cannot be accomplished, you may have to add a dedicated exhaust fan, or a stand-alone HEPA filter unit with a portion of the discharge diverted outside.

For information about AIIR criteria, see "AIIRs" on page 88. For more information about HEPA filters see page 42.

## **Providing Services to Suspect TB Patients**

Services should be brought to the patient as much as possible, rather than bringing the patient to the service. When this is not possible, a system must be in place to assure that the patient is masked when not in isolation or segregation. It is also imperative that the staff in the department providing the service are notified that the patient is an isolation/segregation patient and should be masked. Ideally, an ED staff member should accompany the patient at all times when out of the isolation/segregation room. This is not always possible, so it is important to develop a facility-specific process for communicating the isolation status of the patient between departments. Some facilities have a computerized notification that accompanies the order for services. Other facilities place a special color wristband on patients who should be masked when out of isolation or segregation.

# The ED Waiting Room—A Port of Entry

EDs can be described as places where high-risk, undiagnosed patients may come for treatment when in crisis. ED staff members are often aware of TB and the high-risk populations that frequent the ED, but their attention is usually focused on identifying and treating acute, life-threatening injuries and illnesses. Frequently the initial triage interaction is delayed and/or focuses only on patient acuity. Too often this leaves a person with infectious TB sitting in the waiting room.

## Protecting Patients from Exposure

Special efforts should be made to protect patients who are at high risk for developing TB disease after infection, such as infants or persons with HIV/AIDS, from coughing patients who may have TB. When possible, coughing patients should be placed in a separate waiting area. Patients who are noted to be coughing at registration or triage could be directed to this alternate site. Surgical face masks and tissues should be provided to patients who are directed to this area.

The direction of the airflow should be checked to help determine the area you select for this alternate waiting site. The preferred location is in a separate room that is well ventilated and under negative pressure. If a separate room is unavailable, use an area in the general waiting room that is as close as possible to where air is being removed from the room. This will help to prevent the spread of infectious particles to other areas of the waiting room.

You can visualize air movement in the waiting room using smoke-generating devices. Release smoke at various locations in the room. Note the directions in which the smoke is blown by the air currents in the room. If you hold the smoke-generating device close to the ventilation system outlets, you should also be able to observe which outlets are supplying air and which are removing air.

## Educating Patients

Placing signs that show a coughing individual using tissue or a surgical-type mask are non-judgmental and lend support to ED staff TB control efforts.

Signs in appropriate languages for your facility's clientele should be easily visible in your ED registration and waiting areas to encourage coughing patients to cover their coughs. The sign should have a picture of a person covering their cough and be easily understandable. Sample signs for you to copy and use are included in Appendix L, starting on page 157.

A variety of patient literature on TB should also be available in the waiting area. Pamphlets can be obtained from a number of sources including the CDC, your state TB Control Program, and the American Lung Association.

## Providing Short-term Protection (Masking Tissues)

The purpose of masking a suspect or known infectious TB patient is to block aerosols produced by coughing, sneezing, talking, etc. A surgical mask placed on a cooperative patient provides adequate short-term protection for staff and other patients in the ED. Covering a cough with a tissue is also an effective TB control measure. All staff, including staff at the front reception desk, should be trained to look for patients with symptoms of TB, especially coughs. Surgical masks and/or tissues should be readily available to coughing patients at the registration desk, in the waiting room, the triage area, and the treatment room. Staff should be trained and empowered to offer coughing patients masks/tissues with a gentle reminder to cover their mouth and nose when coughing. This can be a difficult task for employees, and role-playing may be helpful during training.

Some facilities are concerned that having tissue boxes in waiting areas can be very messy, since children may pull tissue after tissue out of the box. One solution to this is to mount dispensers on the wall, above the reach of children, to assure that tissues are always available, but out of the reach of children.

### Masking Considerations

Patients who are suspected or known to have infectious TB must be masked until placement in appropriate airborne infection isolation. A regular surgical mask is sufficient to block droplets from escaping into the room air. Masks must be changed if they become damp or difficult to breathe through.

**Respirators should not be used on patients.** Respirators increase the work of breathing which can prompt the patient to remove the respirator.

## About ED Waiting Room Environmental Controls

ED waiting rooms are areas in hospitals where there is a particularly high risk of TB transmission. These areas tend to be crowded spaces where people can spend a large amount of time before they are medically screened. The ventilation system for ED waiting rooms should be designed and maintained to reduce the risk of TB transmission.

Environmental controls for ED waiting rooms include:

### Ventilation

Ventilation is the most effective environmental control. Ventilation can dilute and remove infectious TB particles, as well as other airborne contaminants. The current California Building Code mandates a minimum air change rate of 10 ACH for new or renovated hospital ED waiting rooms. Many EDs were constructed before 1991 when this requirement was added to the building code. Such EDs may have ventilation rates less than 10 ACH. Facilities are not required to bring existing ED ventilation rates into compliance with the current code unless they are renovating the ED.

The first step you should take is to have the hospital engineer calculate the air change rate in the waiting room. You will need to have the actual airflow in your waiting room measured, probably using an airflow hood.

If the air change rate is less than 10 ACH, it should be increased. It may be possible to achieve this by adjusting the amount of air supplied and exhausted by the building ventilation system. Otherwise, self-contained HEPA filter units can be used to increase the effective air change rate. For more information, see page 42.

### **Negative Pressure**

The ventilation system for an ED waiting room should be balanced to achieve negative pressure in the room with respect to adjacent spaces. The amount of air exhausted from an ED waiting room should exceed the amount supplied.

General air movement will, consequently, be towards the waiting room from adjacent areas in the hospital. This will help contain any infectious particles generated in the waiting room.

For effective negative pressurization of a room, all doors should be kept closed. However, this is usually not practical for an ED waiting room. Nevertheless, the design of the mechanical systems for EDs should endeavor to keep air moving towards the waiting room. Smoke-generating devices can be used to confirm this airflow.

If the exhaust airflow rate in your waiting room does not exceed supply, then exhaust should be increased. It may be possible to increase the exhaust airflow by adjusting (also called rebalancing) the existing mechanical exhaust air system. Alternately, a new exhaust system could be installed. This option will obviously be more expensive. You should discuss these options with your facility's engineering staff. For more information, see page 26.

### **Routine Assessment and Maintenance**

Ventilation systems drift out of balance over time. Monitoring is required to verify the actual conditions, and maintenance is required to reset airflows to the intended values.

The airflow in waiting rooms should be measured and rebalanced at least annually. Records should be kept documenting airflow readings. These readings should be shared with the infection control committee and ED management.

### **Upper-air Ultraviolet Germicidal Irradiation (UVGI)**

Upper-air UVGI is recommended for crowded congregate settings, such as waiting rooms, to increase the effective air change rate. Consider upper-air UVGI to supplement the ventilation system in high-risk public areas, such as ED waiting rooms.

Expertise is required for the safe and effective installation and use of upper-air UVGI lamps. Issues to address include:

- Initial and routine monitoring of radiation levels (both in the occupied area of the room and in the upper room)
- Routine maintenance
- Staff education
- Labeling and posting of warning signs

For more information, see "Upper-air UVGI" on page 38.

