Protecting Ourselves from *Respiratory Infections*

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Physicians and other health care workers frequently acquire respiratory infection occupationally (from patients and other health care workers). The recent series of emerging respiratory pathogens such as multidrug resistant tuberculosis, SARS and now pandemic flu, have been compelling reminders of this risk. Preventing occupational acquisition of respiratory infection requires a multifaceted approach (Table 1).[1,2]

Mechanisms of spread

Respiratory infections may be transmitted by:

- contact,
- droplet and
- aerosol/airborne routes (Table 2).

The different routes of transmission are determined by particle size.[3] Droplets are generated by coughing, sneezing, or even talking. Droplets ≥ 5 mm travel relatively short distances (usually less than < 1m) and settle in the environment. Some organisms transmitted by large droplets may survive several hours in an environment if conditions are favorable. Health care workers are at risk for infection when these droplets impact directly on:

- eyes,
- nose,
- mouth, or
- when hands become contaminated from the patient or their environment, and carry organisms to the eyes or mouth.

Meet Claire

Claire, 72, is a patient of yours. She contacts your office because she feels unwell. She tells your booking clerk that she has been coughing and has a fever. These symptoms started as she was returning from a visit to family in Southern China.

How would you manage the patient to prevent transmission of this potential infection to yourself, your staff and other patients in your clinic?

Turn to page 85 to find out.

Table 1
Components of a program to prevent occupational acquisition of respiratory infection by health care workers

- Vaccination
- Hand hygiene
- Respiratory hygiene/cough etiquette
- Administrative interventions to limit exposure
- Isolation/engineering controls
- Personal protective equipment

Airborne-transmission occurs when smaller particles in aerosols, < 5 mm, that do not settle, are breathed in and reach the alveoli.

Aerosol-producing procedures may generate particles of many different sizes and facilitate transmission of respiratory infections (Table 3).[4]

Infection is more likely when the concentration of organisms in respiratory secretions is high, or duration of exposure is prolonged.

Prevention of infection

Vaccination

A yearly influenza vaccine is most important.[5] Vaccination for measles or varicella-zoster should be given for health care workers who are not immune to these diseases through prior infection or vaccination.

Hand hygiene

Patients with respiratory infections may heavily contaminate their environment by droplets expelled when coughing or sneezing. Bacteria tend not to survive long in the environment, but some respiratory viruses may persist in an infectious form for several hours. Consistent and appropriate hand hygiene in caring for patients with respiratory infections will assist in the prevention of transmission. Hand hygiene by patients should also be encouraged. To facilitate appropriate practice, supplies should be readily accessible.

Respiratory hygiene/cough etiquette

Respiratory hygiene and cough etiquette are terms introduced during the SARS epidemic and are practices to be followed by infectious individuals. These practices include:

- covering the mouth and nose when coughing or sneezing,
- turning away from people when coughing and
- prompt disposal of tissues in appropriate receptacles.

In the health care setting, having the infected patient wear a surgical mask to trap potentially infectious droplets when other patients or staff may be exposed is also recommended.

Table 2

Respiratory infections of concern in the health care environment and most important routes of transmission

Agent	Transmission
TB	Airborne
Rubeola (measles)	Airborne
Rubella	Large droplets, contact
Varicella-zoster virus	Airborne
Influenza	Large droplet, contact
Respiratory syncytial virus	Large droplet, contact
SARS	Large droplet, contact
Adenovirus	Large droplet, contact
Parainfluenza virus	Large droplet, direct contact
Mycoplasma pneumoniae	Large droplet, direct contact
Pertussis	Large droplet

Claire's Case cont'd

- When the patient reports, immediately provide her with a surgical mask and ask her to use an alcohol-based hand hygiene product
- If there is not an examining room available, ask her to wait at the side of your waiting room away from other individuals
- As soon as one becomes available, move her to an examining room
- As you enter the room to examine the patient put on gloves and a surgical mask with an eye shield
- Following examination of the patient, remove the surgical mask and eye shield, then the gloves, followed immediately by hand hygiene
- Ask the patient to remove and discard her mask as she leaves your office

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Interventions to limit exposure

Early identification and separation of potentially infectious patients is important to limit transmission. Policies for identification and follow-up of exposed staff members, including when work restrictions are implemented, are also necessary. A health care worker with a fever and cough should not be at work. Staff with mild respiratory symptoms, who do work, should wear a surgical mask if they are within one metre of patients or other staff members.

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Isolation/engineering controls

Potentially infectious patients should, if possible, be placed in waiting areas physically separate from other patients (a distance of at least one meter is recommended). This may not be practical in all settings, given space limitations. Expedited assessment should be provided so there is limited time for exposure.

For patients admitted to hospital, a separate room is recommended to prevent droplet transmission. If this is not possible, accommodation with a distance of at least 1m between patients should be maintained.

The few organisms transmitted by the aerosol/airborne route, TB and varicella zoster virus are the major concerns. A room with appropriate engineering controls is recommended. This includes negative pressure to the hallway, appropriately vented, and with an adequate number of air exchanges. Rooms meeting these standards should also be used when aerosolizing procedures are undertaken.

Table 3

Risk of infection transmission with aerosol generating procedures

High risk	• Bag-valve mask ventilation • Use of nebulizer • High flow oxygen with humidification • Uncontrolled emergency intubation • Chest tube insertion • Bronchoscopy • Sputum induction • Non-intubated ventilation (e.g., Continuous positive airway pressure, Bilevel positive airway pressure)
Moderate risk	• Break in circuit for patient on ventilator • Tracheal suctioning • Cough-inducing procedures
Low risk	• Pulmonary function tests including bedside spirometry • Oral suctioning • Controlled intubation • Controlled extubation

Personal protective equipment

In removing personal protective equipment the health care workers must be careful not to contaminate themselves. Hand hygiene should be performed immediately after removal of any contaminated equipment.

Gloves

Gloves are used to enhance, not replace, hand hygiene. Non-sterile gloves should be used where hand contact with contaminated surfaces or patient secretions is anticipated. Gloves must be removed immediately after use.

Table 4

Practices for the office setting to limit acquisition of respiratory infection

- For potentially infectious patients:
  - Provide an information sheet describing respiratory etiquette procedures
  - Mask patient if they present with a fever and cough
  - Separate from others in waiting area
  - Prompt assessment
  - Hand hygiene for patient
- Wear a surgical mask yourself if:
  - Examining a patient with potential respiratory infection
  - You may have a respiratory infection
- Use eye protection when examining patients with fever and cough
- Hand hygiene after examining patient or contact with contaminated articles

Masks/respirators

Surgical masks will limit droplet transmission. These masks should be worn by a health care worker when within 1m of a patient potentially infected with a respiratory infection transmitted by droplets.

A submicron particulate mask is recommended to prevent transmission by aerosol/airborne spread.

A submicron particulate mask is recommended to prevent transmission by aerosol/airborne spread. The most commonly used are TB masks and N95 respirators. Respirators were initially developed for occupational health to prevent exposure to dusts and chemicals. Their use in health care settings is controversial because of lack of evidence of efficacy, and the complexity and expense of fit testing programs. Some health care workers cannot use N95 respirators due to the shapes of their faces or for those whom have beards. Health care facilities must follow provincial regulations relevant to the use of submicron masks or respirators by employees. The low probability of exposure to airborne diseases means they are not recommended for use in most Canadian physician's offices.

Eye protection

For infections transmitted by droplets, the eyes should be protected by a face shield or goggles. Eye protection also prevents individuals from carrying infectious particles on the hands to the eye. Eye protection is recommended when managing any febrile, coughing patient with a potential viral respiratory infection.

Gowns

Gowns are indicated where contamination of clothes and uncovered skin is likely. They are not generally necessary for preventing transmission of respiratory infection.

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