

Preventive isolation in the emergency department

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None.

Patients wait at least 1 to 2 hours on the average before being attended in a hospital emergency department. In winter, or during a respiratory infection epidemic, wait times can be 4 to 6 hours. Patients who are elderly or immunocompromised or who have significant comorbidity may spend several hours in an overcrowded emergency waiting area, alongside others who may have respiratory tract viral infections or be carriers of methicillin-resistant *Staphylococcus aureus* or multidrug resistant *Pseudomonas aeruginosa*. We analyze precautionary measures for isolating hospital emergency patients in 3 situations: 1) while they wait to see a doctor, 2) while they are in the emergency room cubicle, and 3) while they wait for a hospital bed. [Emergencias 2009;21:36-41]

Key words: Waiting area. Isolation. Emergency health services.

Introduction

The quality of medical attention provided by hospital emergency departments (ED) in our setting has led to an important increase in the number of visits in recent years¹. This fact, together with the frequent lack of hospital beds², produces overburdened Emergency Services. On average, waiting time from arrival at ED to physician attention is not less than 1-2 hours, and during the winter period or during an epidemic outbreak of respiratory infection, the situation is often worse with delays up to 4 or 6 hours³⁻⁵. In these circumstances, the risk of transmission of infectious diseases in waiting rooms, particularly of the respiratory pathways, is especially relevant. Infections may be transmitted by three mechanisms: by air, by droplets and by physical contact. The transmission of air-borne diseases occurs via droplets or dust particles less than 5 µm in size which contain the infectious agent. These particles may remain suspended in the air for extended periods and be transported long distances. Transmission may occur by drops of larger size deposited on any surface, usually less than a metre away from the source of ori-

gin. These droplets are produced when an infected person speaks, coughs or sneezes. Lastly, transmission may occur by direct contact with the infected person or indirect contact with contaminated objects or surfaces in the surroundings.

In the waiting area of a crowded ED, patients who are elderly, immuno-depressed or with significant comorbidity (liver cirrhosis, chronic renal failure or diabetes, among others) may wait for hours in contact with other patients some of whom may have viral respiratory infection, or they may be nasal carriers of methicillin-resistant *S.aureus* or multidrug-resistant *P. aeruginosa* if they have chronic bronchitis. In the worst of cases, a patient may have lung tuberculosis, and the possibility exists of sharing the waiting area with immigrants, tourists or travellers from other parts of the world that are endemic areas for avian flu or hemorrhagic virus.

In the present work we analyzed isolation precautions to be taken in three particular situations of a patient visit to an ED: 1) during waiting time until being attended; 2) while being attended in an emergency room; and 3) while waiting to be hospitalized when necessary.

1) Isolation precautions in waiting rooms

On arrival at ED, the patient should be evaluated for infection status, especially of potentially transmissible infection of the respiratory pathways, and important immunodepression. If the initial evaluation is performed by nursing staff using a specific questionnaire^{6,7}, the patient should also be questioned about cough, expectoration, rhinorrhea, sneezing, diarrhoea or fever, and disease associated with severe immunodepression should be ruled out.

The waiting room should have an area where patients with possible respiratory infection can be kept at least one metre apart from other patients. In addition, such patients should be provided with a standard face protection mask ("surgical mask") and instructed on correct use, as well as single-use tissues, and the area should be equipped with disposal bins. A useful way to instruct patients about these precautions is to exhibit explanatory pamphlets consisting of simple images indicating the desired precautions without need for text in different languages. The waiting area should have bottled alcohol solution available for hand hygiene, distributed in easily accessible and visible places. Patients with important immunodepression should be attended as soon as possible, but should anyway be separated from others while they wait.

An ED physician should be commissioned to regularly to consult WHO communications on possible epidemic outbreaks in any country; in the event of an ED visit by a patient who has recently come from an endemic area or one with an infectious disease epidemic, the patient should be identified early and subjected to the appropriate isolation measures.

2) Isolation precautions in ED cubicles

While the patient with a possible respiratory infection is being attended in an ED cubicle (often only separated by curtains from the rest in an open space), he/she should keep the mask in place. In addition, the other previously mentioned precautions should be maintained, as well as those described in the following paragraphs.

3) Isolation precautions for hospitalized patients

In 1996, the *Center for Disease Control and Prevention* and the *Hospital Infection Control Practices Advisory Committee* published international

guidelines with recommendations on isolation, which have recently been revised^{8,9}; a summary of these is presented below. The application of these measures should start in the ED itself, since patients often have to remain there for hours and sometimes more than a day while waiting for a hospital bed. The management of such patients during this period is particularly complex since the necessary resources are not always available to implement the precautionary measures indicated.

Standard precautions

Standard precautions should be applied in the care of all patients (Table 1). They include:

a) Since the majority of nosocomial infections are transmitted by contact with the hands of health-care workers, hand hygiene with alcohol solutions is the simplest and most effective method to prevent nosocomial pathogen transmission. Micro-organisms present on the skin of the hands may be of two types of flora: resident and transitory. Resident flora micro-organisms (coagulase-negative staphylococcus, *Micrococcus* spp and *Corynebacterium* spp) are of low virulence, not easily eliminated by hand washing but rarely produce infection, except when invasive procedures are performed. Transitory flora are mainly acquired by contact, and constitute a major cause of nosocomial infection. These micro-organisms adhere poorly to the skin and are easily eliminated with hand hygiene. The purpose of hand hygiene in hospitals is to eliminate recently acquired flora due to contact with infected or colonized patients or nearby surfaces. Hand hygiene should preferably be performed using solutions containing isopropyl alcohol, which are more effective than washing with soap and water to eliminate vancomycin-resistant enterococcus and multi-drug resistant gram-negative micro-organisms.

Washing with soap and water should be performed whenever soiling or dirt is visible.

b) Gloves should be used before any contact with blood, body fluids, secretions and/or excretions except sweat, whether or not there is visible blood, broken skin and/or exposed mucosal membranes. In addition, the gloves should be changed between different procedures in the same patient. Despite the use of gloves, the hands may still be contaminated via small perforations or on removal; they are considered complementary barriers but not measures that replace alcohol-solution hand washing.

Table 1. Essential elements of isolation precautions

Standard precautions. Valid for all patients			
Hand washing and hygiene with alcohol solution	– After touching blood, body fluids, secretions, excretions and contaminated objects – Immediately after removing gloves – Before and after direct contact with the patient – If not visibly soiled, the hands may be rubbed with alcohol solution instead of washing with soap and water		
Gloves	– When handling blood, body fluids, secretions, excretions and contaminated objects – Before touching mucosa and broken skin		
Masks, ocular, and facial protection	– During patient care activities and procedures which may involve splashing, drops of blood, body fluids, secretions or excretions		
Medical gown	– Protect the skin and avoid soiling clothing during patient care activities and procedures which may involve splashing, drops of blood, body fluids, secretions or excretions		
Patient Care Equipment	– Equipment for patient care activities and procedures should be used in a manner that avoids exposure to patient skin and mucosal membranes, contamination of clothing and transmission of micro-organisms to other patients and to the surroundings – Re-use of equipment for the care of other patients only after cleaning and disinfection		
Environmental Control	– Establish routine procedures for hygienic patient care and environmental cleaning and disinfection		
Clothing	– Soiled clothing should be handled in a manner that avoids exposure to patient skin and mucosal membranes, contamination of clothing and transmission of micro-organisms to other patients and to the surroundings		
Sharp objects	– Avoid capping used needles – Avoid any kind of handling of used needles or sharp objects – Place used needles and sharp objects in rigid containers for disposal		
Resuscitation of the patient	– Use mouth adaptors, resuscitation bags or other ventilation material instead of the mouth-to-mouth as a resuscitation procedure		
Placement of the patient	– Patients who may contaminate the surroundings or who cannot maintain adequate hygiene must be assigned to single isolation rooms		
Anti-transmission precautions. Measures to be applied in addition to standard precautions			
	Airborne	Droplet	Contact
Room	Single isolation room with negative air pressure, exterior extraction or HEPA filtered, replenished 6-12 times per hour. Door closed	Isolation room. Although not recommended, patients infected by the same micro-organism may occupy the same room if necessary. Door may be left open.	Isolation room. Individual patient-care equipment. Other patients infected/colonized by the same micro-organism may occupy the same room if necessary
Masks	Preferably with filter, to be used by staff on entry to the room. When the patient must leave the room, he/she must wear a surgical mask	To be used by staff on entry to the room, especially when within 1 m of the patient. When the patient must leave the room, he/she must wear mask	Not necessary
Ocular and facial protection	To protect the eyes, nose and mouth during patient care activities and procedures which may involve splashing, drops of blood, body fluids, secretions or excretions		
Medical gown	Necessary to prevent other clothing contact with the patient, surfaces or objects; and especially if the patient has diarrhoea, ileocolostomy or wound with uncontrolled drainage. Also, to protect the skin and clothing during patient care activities and procedures which may involve splashing, drops of blood, body fluids, secretions or excretions		
Gloves	To be put on when entering and removed before leaving room When in contact with blood, body fluids, secretions, excretions and contaminated objects, mucosal membranes and broken skin		
Hand-washing	After touching blood, body fluids, secretions, excretions and contaminated objects; immediately on removing gloves; between patients. Use water and antiseptic soap. Hygiene with alcohol solution if the hands are not visibly soiled.		

c) For procedures that may generate hydrolyzed body fluid aerosols, health-care workers should wear surgical masks with eye protection or a facial screen and a medical gown. Medical gowns should be made of impermeable material preventing the passage of infectious agents and

subsequent contamination of the skin or clothing.

d) Used needles should not be capped; they should be disposed of in specially designed containers for sharp objects and not filled beyond 75-80% of their capacity.

Table 2. Scenarios requiring empiric anti-transmission precautionary measures

Airborne	Droplet	Contact
– Vesicular Rash* – Maculopapular rash with nasal catarrh and fever – Cough, fever and upper lung lobe infiltrate – Cough, fever and lung infiltrate of any localization in a patient at risk or diagnosed with HIV infection	– Meningitis – Petechial or ecchymotic rash with fever – Persistent or paroxysmic cough during periods of croup activity	– Acute diarrhoea of probable infectious (in incontinent patients or with nappies) – Diarrhoea in adults with a history of recent antibiotic use – Vesicular rash* – Respiratory infection, especially bronchiolitis and croup in infants and small children – History of infection or colonization by multi-drug resistant micro-organisms – Infection of the skin, wound or urinary tract in hospitalized or institutional-stay patients where multi-drug resistant micro-organisms are prevalent – Abscesses or draining wounds that cannot be covered

*Condition requiring two types of precautionary measures.

Anti-transmission precautions

These precautions are applied to selected patients with suspected or confirmed specific clinical syndromes or diagnosis of colonization or infection by micro-organisms considered as especially important from the epidemiological point of view. Such precautions should always be implemented together with standard precautions. There are three types of precautions corresponding to the main forms of infectious agent transmission in a hospital setting: by air, by droplets and by contact (Table 1). Some diseases such as la chickenpox require more than one type.

1) Precautions against air-borne transmission

These precautions are designed to prevent transmission of diseases via droplet nuclei. If these particles are inhaled by a susceptible host, they may develop the infection. These precautions are indicated in cases of suspected or confirmed tuberculosis (pulmonary or laryngeal), measles, chickenpox or disseminated varicella zoster. Patients should be hospitalized in single rooms with negative air pressure relative to other neighbouring areas. The room should have air conditioning that allows total replenishment at least 6 times an hour. Although ideal, this type of single room is not generally available in many ED, but a room with an external window may serve to isolate the patient. In any case, the door of the room should be kept closed. Anyone entering should wear a mask that filters out at least 95% of 1 µm particles. The patient should be restricted to the room except in cases of strict necessity. In these cases

the patient must wear a surgical mask. The gown and gloves must be used in accordance with standard recommendations. Health-care workers who are not immune should avoid entering the room of these patients.

2) Precautions against droplet transmission

These measures are aimed at preventing the transmission of micro-organisms in large size particle aerosols produced when the infected patient speaks, coughs or sneezes or during some procedures (e.g. aspiration of secretions). Large droplets do not remain suspended in the air and fall to the floor or other nearby surfaces, usually within a metre or less from the source. Precautions against droplet transmission include isolation in a single room but air conditioning is not necessary. Although not recommended, patients with the same disease may occupy the same room if single rooms are not available. Since drops do not travel far, the door to the room may be left open but this is not recommended. Health-care workers should wear a surgical mask on entering the room. Gown and gloves should be worn according to standard precautions. If the patient is transferred out of the isolation room, he/she should wear a surgical mask.

Some of the diseases requiring isolation for droplet transmission reasons include the invasive infection due to *Haemophilus influenzae* type B, meningococcal infections, multi-drug resistant pneumococcal infections, pneumonia due to *Mycoplasma*, as well as croup, flu, parotiditis, rubella and the parvovirus B19 infections.

Table 3. Diseases or known/suspected pathogens requiring anti-transmission precautionary measures

Airborne	Droplet	Contact
– Measles – Lung or laryngeal tuberculosis – Varicella zoster* (disseminated or in immunodepressed patient)	– Adenovirus* (infants and children) – Diphtheria, pharyngeal form – Streptococcus group A, pharyngitis, pneumonia, scarlet fever (infants and small children) – <i>H. influenzae</i> (meningitis, epiglottitis or pneumonia in infants and small children) – Flu – Meningococcal infection – Parotiditis – Pneumonia due to mycoplasma – Parvovirus B19 – Croup – Pneumonic plague – Rubella	– Adenovirus* (infants and children) – Enterocolitis <i>Clostridium difficile</i> – Congenital rubella – Cutaneous diphtheria – <i>Escherichia coli</i> 0157:H7, colitis (in incontinent patients or with nappies) – Infections due to enterovirus (infants and children) – Haemorrhagic fevers (Lassa, Marburg, Ebola) – Hepatitis A (in incontinent patients or with nappies) – Severe mucocutaneous, primary, neonatal, simple Herpes – Impétigo – Major abscess (uncovered drainage), cellulitis or bed-sores – Infection/colonization by multi-drug resistant bacteria (MRSA, VRE) – Influenza (infants and children) – Pediculosis and scabies – Rotavirus (in incontinent patients or with nappies) – Respiratory syncytial virus (infants, children, immunocompromised) – <i>Staphylococcus aureus</i> (severe infection of the skin, burns or wounds) – <i>Shigella</i> (in incontinent patients or with nappies) – Chickenpox* – Viral acute conjunctivitis – Herpes zoster (disseminated or in immunocompromised patients)

*Condition requiring two types of precautionary measures.

3) Precautions against contact transmission

The objective is to prevent transmission of micro-organisms by direct contact with an infected or colonized patient or indirect contact after touching contaminated objects or surfaces in the immediate surroundings of the patient. These measures include:

a) Isolation in a single room.

Although not recommended, patients infected or colonized by the same micro-organism may occupy the same room if single rooms are not available. The patient should only leave the room when really necessary.

b) Staff entering the room should wear protective gloves and gown, according to standard precautions. These items should be removed before leaving the room. After removal of the gloves, hand hygiene with alcohol solution is necessary, taking care not to re-contaminate the hands before finally leaving the room.

c) The stethoscope, arterial pressure kit and other objects used in medical attention should be for personal use and not used for other patients.

Lastly, in the three types of anti-transmission precautionary measures, it is important that they

be carefully and strictly applied if the patient requires any kind of surgery, major or minor, since a greater number of health-care workers may be involved.

In addition, staff responsible for the cleaning of the cubicle or isolation room must adhere to the same precautionary measures and take particular care to ensure the cleanliness of all the surfaces potentially contaminated by the patient.

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Precauciones de aislamiento en el área de urgencias

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Por término medio, el tiempo de espera desde que el paciente llega al servicio de urgencias hospitalario (SUH) hasta que es visitado no es inferior a 1 ó 2 horas, y en el periodo invernal o ante cualquier brote epidémico de infección respiratoria, la demora en la visita se puede alargar hasta 4 ó 6 horas. En el área de espera de un SUH saturado, los pacientes ancianos, con inmunodepresión o con co-morbilidad significativa permanecen, durante varias horas, cerca de otros pacientes que quizás sufran infecciones víricas de vías respiratorias, o pueden ser portadores de *S. aureus* resistente a metilicina o de *P. aeruginosa* multirresistente. En el presente trabajo analizamos las precauciones de aislamiento en tres situaciones concretas de la consulta del paciente en un SUH: 1/ durante el tiempo de espera hasta ser atendido; 2/ mientras se le visita en el box de urgencias; y 3/ en el tiempo de espera hasta su hospitalización cuando ésta es necesaria. [*Emergencias* 2009;21:36-41]

Palabras clave: Área de espera. Aislamiento. Servicio de urgencias.