

# Infection control in a globalised world

## Challenges for general practice

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The consistent use in general practice of standard precautions achieves a basic level of infection prevention and control, protecting staff and patients from the challenges of emerging infectious diseases and the spread of multidrug-resistant organisms. Transmission-based precautions and a good medical handover help prevent dissemination of infection from the community into hospitals.

The history of modern medicine is replete with examples of infectious diseases that have emerged from their zoonotic reservoirs, initially spreading via sporadic community cases and eventually achieving outbreak or pandemic status through dissemination in the hospital system. Recent examples are the West African epidemic of Ebola virus disease (EVD; formerly known as Ebola haemorrhagic fever) and the outbreak of Middle East respiratory syndrome (MERS)



### KEY POINTS

- The consistent use in the general practice setting of standard precautions – work practices that achieve a basic level of infection prevention and control – protects both patients and staff.
- The use of appropriate transmission-based precautions and a good medical handover help prevent dissemination of infection from patients in the community into hospitals.
- It is important that a good history, including travel and previous health care exposure, is taken at every consultation.
- Knowledge and awareness is the key: in order to triage patients presenting to the general practice, it is imperative that GPs stay up to date with information regarding emerging infectious diseases and infections with multiresistant organisms such as carbapenem-resistant Enterobacteriaceae.
- A close working relationship with the hospital sector and the public health department is crucial.
- Environmental cleaning and good practice design help prevent infection transmission.

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## 1. STANDARD PRECAUTIONS APPLIED TO GENERAL PRACTICE<sup>2,5</sup>

Compliance with standard precautions in the general practice setting achieves a basic level of infection prevention and control. These work practices should be followed by all staff involved in patient care or who may have contact with blood, other bodily fluids, secretions or excretions (except sweat), non-intact skin and/or mucous membranes.

Standard precautions consist of:

- Hand hygiene
  - this remains the single most effective control measure and its use should be entrenched in general practice
- Use of personal protective equipment (e.g. gloves, gowns, masks)
  - all staff should be confident in the use of appropriate protective equipment for the risk and understand the organism and its mode of transmission
- Management of sharps and blood and body fluids
  - this acknowledges that the blood and body substances of all persons are considered potential sources of infection
- Aseptic technique
  - this approved technique reduces introduction and transmission of infection during clinical procedures; all staff performing these procedures should be competent in aseptic technique
- Routine environmental cleaning
  - every general practice must have a plan for environmental cleaning, including regular scheduled cleaning and spills management
- Reprocessing reusable medical equipment and instruments
  - instrument processing requires a trained workforce, adequate processing time and the use of maintained compliant sterilisers in a dedicated area
- Respiratory hygiene and cough etiquette
  - these public health measures reduce the spread of respiratory infections; multilingual signage and provision of tissues, waste bins and alcohol-based hand rub are a basic requirement in the waiting room area
- Appropriate handling of linen and management of waste
  - although there is no evidence to support changing linen between clients, discretion should be used around linen use and reuse

in South Korea, both of them spreading rapidly through health-care systems in countries previously not known to have the diseases. In parallel to that, the increasing spread of multidrug-resistant organisms (MROs), such as methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant enterococci (VRE), extended-spectrum  $\beta$ -lactamase (ESBL) Gram-negative bacteria and the near pandrug-resistant carbapenem-resistant Enterobacteriaceae (CRE), has threatened to take medicine back to the pre-antibiotic era. Although antimicrobial resistance has not traditionally been acknowledged as a threat, the WHO

described it in 2015 as one of the key global health issues facing our generation.<sup>1</sup>

Without effective measures, hospitals and outpatient clinics can be a potential hotbed for transmission of various infections between patients. The specialty of infection control aims to prevent or reduce the rates of healthcare-associated infection (HAI). The major areas of infection control involve standard precautions (including hand hygiene and environmental cleaning), isolation procedures and disease surveillance. Many of these procedures have traditionally been more 'hospital-centric', with translation into general practice not necessarily appropriate. Recently, there has been a noticeable shift in the locations where health care is delivered, with increasing numbers of patients being treated in the community rather than in acute hospitals and GPs now being the main providers of medical care.

This article discusses infection control challenges and opportunities in general practice, with a particular focus on the twin threats of emerging infectious diseases and the spread of MROs. GPs play a crucial role in the prevention of further dissemination of these infections within the overall healthcare network.

## Introduction to healthcare-associated infection

Approximately 200,000 cases of HAIs occur each year in Australia.<sup>2</sup>

The US Centers for Disease Control and Prevention defines HAI as a localised or systemic condition resulting from an adverse reaction to the presence of an infectious agent(s) or its toxin(s), with no evidence that the infection was present or incubating at the time of admission to the acute care setting.<sup>3</sup> The terms 'nosocomial infection' and 'community-associated infection' were previously used in infection control surveillance; however, the latter often involved patients who had received recent health care as outpatients and had similar demographics, comorbidities and pathogens to those of patients in the 'nosocomial' category.<sup>4</sup> Since 2008, the broad term 'healthcare-associated infection' has replaced the traditional term 'nosocomial infection', encompassing community-associated HAIs.

The general practice setting is the focus of this article, general practice falling under the umbrella term 'community HAIs'. The unique work environment and logistics of general practice have their own challenges, demanding a different approach to the hospital setting.

## Infection control interventions

The foundation principle of infection control is the consistent following of the work practice of standard precautions by all staff involved in patient care or who may have contact with blood or bodily fluids (except sweat) regardless of the known or perceived infection status of the patient. Hand hygiene is probably

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the most effective part of the standard precautions. When a patient is known or suspected to have an infection or to be colonised with micro-organisms that cannot be contained by standard precautions then transmission-based precautions should be taken. These principles are discussed below.

### **Adhering to standard precautions**

Standard precautions (formerly called universal precautions) are defined as 'work practices that are used consistently to achieve a basic level of infection prevention and control'.<sup>2,5</sup> Despite their seemingly basic principle, they are the bare minimum that is required from all working staff in the practice team, and form the basis for all other infection control safe work practices. Standard precautions as applied to the general practice setting are listed in Box 1.<sup>2,5</sup>

Irrespective of the type of infection, a sound understanding of standard precautions will always ensure a basic level of infection prevention and control. For example, the lack of basic hand hygiene and equipment sterilisation during the emergence of EVD in 1976 resulted in the rapid spread of the disease in patients who visited a rural clinic in northern Zaire (now known as the Democratic Republic of Congo).<sup>6</sup> In retrospect, simple

interventions based on standard precautions would have reduced the devastation of the inaugural outbreak.

An achievable compliant infection prevention and control policy tailored to the particular work practices of the general practice must be developed and implemented in every general practice. All staff, including 'frontline' reception, nursing and environmental staff, should complete regular infection prevention education in standard precautions and should demonstrate ongoing competency in the full bundle of elements that comprise these precautions. Individual general practices must develop and implement an achievable compliant infection prevention and control policy tailored to their work practice.

### **Hand hygiene compliance**

Hand hygiene is a part of standard precautions, and has been covered previously in *Medicine Today* (March 2012 issue).<sup>7</sup> It arguably remains the most effective intervention at preventing HAIs.<sup>8</sup> All clinical staff should be familiar with the '5 Moments of Hand Hygiene', as recommended in the *WHO Guidelines on Hand Hygiene in Health Care: First Global Patient Safety Challenge Clean Care is Safer Care* and further emphasised by the NHMRC *Australian Guidelines for the Prevention and Control of Infection*

in *Healthcare (2010)* and the *Hand Hygiene Australia Manual: 5 Moments for Hand Hygiene*.<sup>2,9,10</sup>

The 'Moments' approach to hand hygiene recommends that healthcare workers clean their hands:

- before touching a patient
- before a procedure
- after a procedure or bodily fluid exposure risk

- after touching a patient
- after touching a patient's surroundings.

Effective hand hygiene involves using soap and water, antiseptic hand wash or alcohol-based hand rubs or wipes. Gloves are never a substitute for hand hygiene but should always be worn if there is a possibility of exposure to blood, bodily fluids or contaminated material.<sup>5</sup>

**TABLE. TRANSMISSION BASED PRECAUTIONS: INFECTION TRANSMISSION MODES AND APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT\***

Infection transmission mode	Personal protective equipment					
	Gloves	Impermeable gown, apron	Mask	Goggles/ face shield	Special handling of equipment	Other recommendations
Airborne transmission (e.g. measles, varicella, tuberculosis etc.)	No	No	Yes	Protect face if risk of splashing present	Single use equipment or reprocess after patient use	<ul style="list-style-type: none"> <li>• Respiratory etiquette to be encouraged</li> <li>• The patient should be segregated if possible; if not possible, give the patient a mask to wear</li> <li>• The patient's infectious status should be communicated to other doctors and health professionals involved in their care (i.e. ED staff, ambulance officers)</li> </ul>
Droplet transmission (e.g. influenza etc.)	No	No	Yes	Protect face if risk of splashing present	No	<ul style="list-style-type: none"> <li>• Respiratory etiquette to be encouraged</li> <li>• The patient should be segregated if possible; if not possible, give the patient a mask to wear</li> <li>• The patient's infectious status should be communicated to other doctors and health professionals involved in their care (i.e. ED staff, ambulance officers)</li> </ul>
Contact transmission (e.g. MRSA, <i>Clostridium difficile</i> , ESBL infections, CRE)	For all manual contact with patient, patient devices, equipment and environmental surfaces	Use when in substantial contact with patient (including items in contact with patient or their environment)	Protect face if risk of splashing present	Protect face if risk of splashing present	Single use equipment or reprocess after patient use	<ul style="list-style-type: none"> <li>• Respiratory etiquette to be encouraged</li> <li>• Observe proper hand hygiene technique and wash hands after removing gloves and gowns</li> <li>• The patient's infectious status should be communicated to other doctors and health professionals involved in their care (i.e. ED staff, ambulance officers)</li> </ul>

Abbreviations: CRE = carbapenem-resistant Enterobacteriaceae; ED = emergency department; ESBL = extended-spectrum  $\beta$ -lactamase ; MRSA = methicillin-resistant *Staphylococcus aureus*.

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### Competency in transmission-based precautions

Transmission-based precautions are the use of precautions (personal protective equipment and other means) to prevent transmission of pathogenic organisms by direct contact, droplet or airborne modes, and are implemented when a patient has or is suspected to have an infection or colonisation with an organism that is spread by these means. It is imperative that all general practice staff understand the varying modes of transmission and the appropriate personal protective equipment required for all scenarios (Table; Figure 1).

### Should patients with MROs be isolated in the general practice setting?

In the hospital setting, patients with MROs such as MRSA or VRE are placed in single or cohorted rooms, with transmission-based precautions, including specialised cleaning. The rationale for this practice is to avoid prolonged close proximity with other acutely ill vulnerable patients in a shared room setting.<sup>2</sup> As the scenario of prolonged close proximity is not relevant in general practice, segregation is not routinely recommended in this setting, and standard precautions are considered adequate.

GPs who are reviewing recently discharged patients with a newly diagnosed MRO infection or colonisation should be informed and educated by the hospital staff about their patient's particular MRO, via either a timely discharge letter or a telephone call, and provided with strategies to reduce transmission on their return home and in the community. It is expected healthcare practice to educate and inform such patients about how to reduce transmission, including hand hygiene and covering wounds, so they can resume normal activities.

The most important points to highlight are that these precautions are not dogma, need to be individualised to the clinical setting of the general practice, and need to be initiated with clear communication lines with the patient.

### What to do with a patient with a suspected MRO or communicable disease

As transmission-based precautions prevent early spread and potentially halt the initial phases of an epidemic, early suspicion, recognition and action are important. When a transmissible disease or resistant bacterial infection is suspected, a thorough history that includes information about recent travel and healthcare contact is the cornerstone for assessing the need for further precautions pending results of investigations.

#### Take a travel history

Until recently, the relative geographic isolation of Australia has been a protective factor, preventing the spread of some infections into the local health system. However, in the 2015–2016 period alone, there were a total of 18.2 million arrivals to Australia,



Figure 1. Masks are an effective way of preventing the spread of airborne and droplet-transmitted infections.

comprising 9.6 million Australian residents returning after a short-term absence from the country, 7.8 million visitors arriving for a short-term stay and the remainder people arriving for a long-term stay.<sup>11</sup>

Travel provides many possible entry points for the importation of communicable diseases. The epidemic of MERS in South Korea was a good example of the index case being diagnosed only after multiple presentations to different clinics and hospitals, owing to the lack of an initial travel history and suspicion of a disease never before seen in the country.<sup>12</sup> A good travel history starts with the simple question 'Have you travelled overseas

### 2. SUGGESTED GENERAL PRACTICE TRIAGE QUESTIONS FOR A TRAVEL HISTORY

- Have you travelled overseas recently?
  - the travel destination needs to be compared against areas with recent outbreaks – a good resource is the International Society for Infectious Disease's ProMED-mail website <http://www.promedmail.org>
- What was your travel itinerary?
  - the travel itinerary gives clues into potential disease exposures or exposure to areas with high colonisation of MROs
- Were you sick or ill overseas?
- Were you hospitalised or did you seek medical attention overseas?
  - many hospitals and clinics in areas such as South Asia and Southern Europe have high colonisation rates of MROs

Abbreviation: MRO = multidrug-resistant organism.

recently?', and has traditionally centred on questions such as geographic region, dates and purpose of travel, activities undertaken, specific risk exposures, vaccination or prophylactic medications received or any reported illness overseas (Box 2).

Regarding exposure to resistant bacterial infections, traditional infection control practice has focused on repatriated travellers or those who have been hospitalised abroad.<sup>13</sup> However, just the mere fact of travelling overseas – without being hospitalised or seeking medical attention – has been associated with increasing asymptomatic carriage of ESBL-producing organisms.<sup>14,15</sup> This becomes clinically relevant when these travellers fall sick and present to their GP upon returning to their country of origin, as a previously simple-to-treat infection such as a urinary tract infection may require broader spectrum intravenous antibiotics rather than oral antimicrobial therapy. The importance of good clinical handover when sending unwell patients with recent international hospitalisation to the emergency department ensures prompt activation of infection control measures.

Overseas traveller groups of particular concern are Australian residents returning to their country of origin to visit friends and relatives (the so-called VFR [visiting friends and relatives]

travellers) and expatriates/long-term travellers.<sup>16</sup> Being born in a country with endemic MROs, and travel to these countries, has been demonstrated to be a risk factor for ESBL-producing *Escherichia coli* infection.<sup>17</sup> The VFR group tends to interact more with the local population, increasing the risk of exposure to endemic MROs. A good example of potential risk exposure to these travellers is the alarming isolation of NDM-1-positive bacteria from sewage and water samples in New Delhi (NDM-1 – New Delhi metallo- $\beta$ -lactamase-1 – is a newly recognised carbapenemase).<sup>18</sup>

### **Determine previous healthcare exposure independent of travel history**

Because of the increasing dissemination of MROs in the local Australian healthcare system, it is pertinent that a travel history should always involve a history of a patient's recent healthcare exposure. The recent outbreak in a hospital in Victoria of the CRE *Klebsiella pneumoniae* carbapenemase (KPC)-producing *K. pneumoniae* highlighted the sobering point that many of these 'superbug' infections are not linked with obvious international travel, with the initial cases in the epidemic all reporting no history of overseas travel prior to admission.<sup>19</sup>



**Figure 2.** Hand-hygiene stations promote good hand hygiene, a very effective intervention for preventing transmission of infections.

### Establish an efficient triage system

A suggestion to help GPs flag patients at high risk of a transmissible disease or resistant bacterial infection acquired through overseas travel could be requiring travel history questions to be answered in the initial patient registration forms/questionnaire. A similar intervention exists at hospital triage, with the focus on recent overseas health care contact, with the aim of improving infection control of imported Gram-negative drug-resistant organisms such as CRE.

Practice reception staff should be firm yet polite when asking travel history questions, with transparency about the reason for the questions often yielding the best results. The questions are similar to those asked in a pre-travel clinical review; examples of questions are given in Box 2. The answers should be conveyed promptly to the GP, prior to review of the patient.

As well as identifying patients possibly colonised or infected with antibiotic-resistant organisms, this approach often aids in the initial detection of other potential imported infectious diseases such as Avian influenza and MERS. Precautions to be taken when dealing with a potentially infectious patient or a patient suspected or proven to have an MRO are further explored in the next section.

### Ensure handover when transferring patients with MROs or communicable diseases

If a sick patient with a suspected or proven communicable disease or MRO infection/colonisation needs to be referred to hospital for further management, a good handover to the emergency department staff or admitting officers is crucial.

Many emergency departments now have specific processes for presentations of patients with MROs and other infectious diseases to avoid exposure of other patients and staff in the

waiting room and during triage. Information regarding infectious illness, such as measles- or influenza-like illnesses, should be discussed with receiving services, and any special arrangements for patient presentation noted.

As discussed previously, early identification and documentation of the unwell returned traveller is extremely important in contemporary health care. Also important is the understanding that although a patient may not have an infection, there is a possibility of colonisation with an MRO that requires screening and the following of transmission-based precautions when presenting to healthcare facilities.

### Compliance with environmental cleaning

All shared surfaces, equipment and touch points within a general practice site are potential sources for indirect contact transmission of infections. This is inclusive of organisms spread via contact and droplets, including common illnesses such as gastroenteritis and influenza.

Routine cleaning of surfaces and touch points (including seating, bathrooms and reception areas) and of shared patient equipment is an important element of a comprehensive infection prevention program.

Every general practice must have a plan for environmental cleaning. Regular cleaning schedules should reflect risk; for example, frequent touch points such as door handles, hand rails and chair arms should be cleaned regularly and this cleaning documented. Cleaning product selection is important, and appropriate personal protective equipment and safety data sheets should be provided for all products.

Asking families to bring their own toys when visiting the practice can reduce infection transmission risk between children while in the practice. There should be a regular documented cleaning program in place for toys kept in the practice, and all toys should comply with occupational health and safety and KidSafe requirements.

### Good general practice design

It is important to plan the general practice facilities so there is sufficient space. There should also be plenty of highly visible display points for signage and alerts for patients and visitors. Information notices about new outbreaks of communicable diseases in the community should be clear and presented in plain language. Accessible and simple patient 'hand and respiratory hygiene stations' can be easily created with alcohol-based hand rubs and masks (Figure 2). Similarly, waiting rooms must be designed so that patients requiring droplet or airborne precautions can be quickly segregated; the classic examples are presentations of a measles/influenza-type illness and in recognised 'outbreak seasons' such as for H1N1 influenza. Another intervention is the so-called 'social distancing' where seats are spaced at least 1 metre apart.

Although not always easy logistically, the best practice during an outbreak of an infectious disease is to dedicate a specific consulting room with an alternative patient access point for consultations regarding the outbreak for its duration. This reduces waiting room exposures and helps reduce the required contact tracing.

### Patient education

Patient education and information is a powerful tool for infection prevention and control in general practice. Patients should be educated about their 'patient responsibilities', outlining ways they can protect themselves and others when visiting the practice, including information about hand hygiene, respiratory etiquette and ringing ahead if communicable diseases such as viral gastroenteritis or influenza are suspected, to reduce shared waiting room time and exposures.

If the practice has a website, it can provide links to relevant evidence-based patient resources, such as the Victorian Department of Health and Human Services disease information and advice website (<https://www2.health.vic.gov.au/public-health/infectious-diseases/disease-information-advice>). This particular website provides accurate plain language explanations of communicable diseases, including information about childcare and school exclusion periods.

### Responsibilities beyond the practice

Standard precautions apply to settings beyond general practice such as aged care facilities, where medical care is usually provided by GPs. Transmission-based precautions should be routinely implemented in aged care facilities when necessary, such as during gastrointestinal or respiratory disease outbreaks.

Responsible prescribing of antibiotics (antimicrobial stewardship) is relevant in the context of preventing further emergence of resistant organisms and preserving the current arsenal of antimicrobial therapy. Antimicrobial stewardship describes the combination of processes implemented in health-care settings to ensure appropriate antimicrobial prescribing, with the intention of reducing antimicrobial resistance, costs and patient-specific adverse effects associated with overprescribing of antimicrobial therapy. The principles are clear: prescribe antimicrobial agents only when indicated, only use broad-spectrum agents until microbial sensitivities or the results of investigations are known, use microbiological results to guide therapy whenever possible and ensure an appropriate duration of treatment.<sup>20</sup>

### Conclusion

In an increasingly globalised world, hospitals, cities and health are becoming more interconnected, and GPs need to have an increased awareness of the global status of emerging infectious diseases, especially when reviewing travellers from overseas.

MROs such as ESBL-producing organisms and CREs that were in the domain of the hospital system are now affecting community health care. Infections such as MERS that used to be geographically confined to one region are now being spread worldwide.

GPs and their staff should be familiar with the sets of infection control practices known as the standard precautions and transmission-based precautions, and be able to apply these measures to their local settings. The success of infection control policies depends on a well-educated and adequately resourced workforce, and is facilitated by good facility design, forward thinking and strategic and physical preparation for potential infectious events.

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A list of references is included in the website version of this article ([www.medicinetoday.com.au](http://www.medicinetoday.com.au)).

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