

MODULE 5

Infection Prevention and Control



After reading module 5, you will understand how to prioritise activities on infection control and prevention within healthcare settings. You will know about the chain of infection, and the principles of hygiene. You will understand how hand hygiene and personal protective equipment safeguards both patients and healthcare professionals, and know about the role of aseptic no-touch techniques. You play a critical role in infection control, both through practical roles, and as educators for healthcare professionals, patients and carers.

JIDDU
KRISHNAMURTI

99

**One is never afraid
of the unknown,
but is afraid of the
known coming to
an end**

32 Introduction

Ignaz Semmelweis (1818-1865) began the modern understanding of infection prevention and control. Born in Buda (now Budapest) in Hungary, he gained his medical degree at the University of Vienna in 1844 and started working as an assistant to a professor in maternity in 1846. In the First Department, between 13% and 18% of women who had their babies delivered by physicians and medical students died as a result of childbed fever (today known as puerperal fever), brought in on the hands of the physicians and students who came from the dissection room. In the Second Department, where babies were delivered by midwives and midwife trainees, the mortality rate was around 2%.

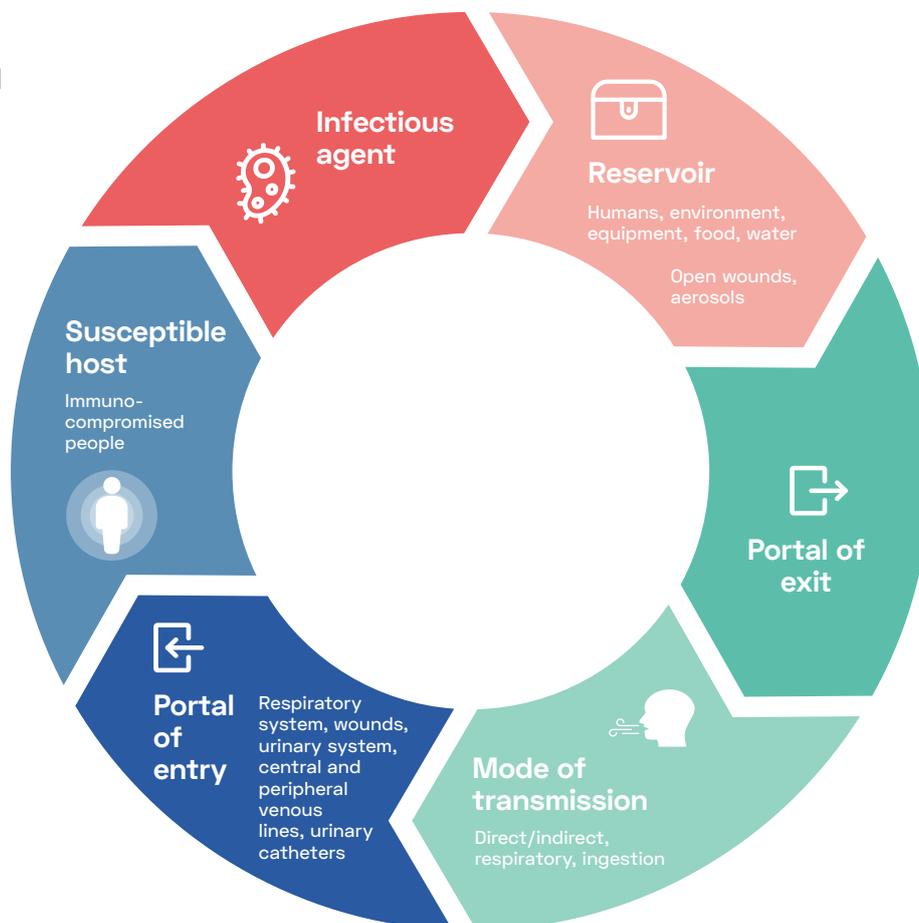
Semmelweis placed large bowls of bleach at the entrance to the maternity clinic, so that everyone who attended a birth would do so with clean hands. During the next seven months the rate of death from puerperal fever fell to decrease to 3%, and then to 1.2% in 1848 the figures for both departments fell to 1.2 percent, when the instruments were washed as well [1].

33 Infection

33.1 The chain of infection

By breaking the chain of infection (Figure 42), nurses can help to stop transmission of infection.

**FIGURE 42:
THE CHAIN
OF INFECTION**



33.2 How to break the chain of infection

Breaking the chain of infection needs answers to a lot of questions:

- **The organism**
 - > What is the organism?
 - > Bacteria, virus, parasite, or fungi?
 - > Is it aerobic or anaerobic?
 - > What are its virulence factors?
 - > What is its target host tissue?

- **The reservoir**
 - > Where is the organism in between infections and outbreaks?
 - > Is the reservoir in the hospital, the environment (e.g. the soil), the food or in a living organism, such as a human, rodent, bird or even a snail?

- **The route out of the reservoir**
 - > How does the organism leave the reservoir? In faeces, respiratory droplets, blood or mucus; in contaminated water; or in the blood meal of an insect?

- **The transmission route**
 - > How is the organism transmitted from the environment or host to the next host?
 - > Does it need a living vector like a mosquito or flea?
 - > Can it be passed from human to human?
 - > When passed from human to human, it is transmitted by respiratory droplets, blood contact, semen or other secretions?
 - > Is it transmitted on the hands of health care workers or the hospital ventilation system?

- **The route into the body**
 - > How does the organism enter the body?
 - > Does it come through inhalation, a break in the skin or mucus membrane, an insect bite, or through contaminated food?

- **Population**
 - > Is the population vulnerable for a specific reason?

Infection spread can be contact (Table 29), droplet (Table 30) or airborne (Table 31).

TABLE 29: CONTACT TRANSMISSION CHAIN OF INFECTION

Chain of infection	
Organism or infection	Methicillin-resistant Staphylococcus aureus (MRSA) Carbapenem-resistant Enterobacteriaceae (CRE) Extended spectrum beta-lactamase (ESBL)-producing Enterobacteriaceae Clostridioides difficile
Reservoir	Skin/gastrointestinal tract
Route out of the reservoir	Wound Nose Urine Faeces
Transmission	Contact, for example nurse or other HCP does not perform hand hygiene after patient contact
Route into the body	Contact, for example nurse HCP empties the urinary bag and contaminates the urinary catheter system, allowing an infection to get into the bladder
Population	Patient
Transmission prevention approach	Gloves, gown or apron, and hand hygiene

In order for someone to get infected through droplet transmission, he/she needs to be <1 meter away from the patient.

TABLE 30: DROPLET TRANSMISSION CHAIN OF INFECTION

Chain of infection	
Organism or infection	Influenza Common cold Pertussis Mumps Meningococcal meningitis
Reservoir	Respiratory tract
Route out of the reservoir	Nose and mouth
Transmission	Surfaces, contaminated hands
Route into the body	Nose and mouth
Population	Patient/staff
Transmission prevention approach	Surgical mask, apron, gloves and hand hygiene

In airborne transmission, the organism remains suspended in the air. To prevent transmission, patients need to be isolated in a negative pressure room whereby the air within the room is changed 12 times per hour and the air is filtered so that infection does not spread outside of the isolation room.

TABLE 31: AIRBORNE TRANSMISSION CHAIN OF INFECTION

Chain of infection	
Organism or infection	Tuberculosis Measles Varicella (chickenpox)
Reservoir	Respiratory tract
Route out of the reservoir	Nose and mouth
Transmission	Air
Route into the body	Nose and mouth
Population	Patient
Transmission prevention approach	FFP2/FFP3 rated mask, gown, gloves and hand hygiene

34 Prevention and control

Having good hand hygiene compliance rates and antibiotic stewardship will help control the spread of infections [2].

34.1 Healthcare-associated infections

Healthcare-associated infections (HAIs) are infections acquired in any healthcare setting such as a hospital, an outpatients department or a nursing home. These infections develop after 48 hours or more following admission, or up to 30 days after care in a healthcare facility [3]. According to the WHO, the incidence of HAIs in developed countries can range from 3.5% to 12% [4]. The ECDC reported that an average of 7.1% of patients in the European Union acquire an HAI during their stay in hospital [4].

Healthcare-associated infections affect illness and death rates, in both developed and developing countries. HAIs are also very costly to treat [3]. According to the WHO, in the EU around €7 billion is spent on HAIs, with 16 million extra days of hospital stay [4].

For the most common HAIs reported by ECDC in 2016/2017, see Figure 43.

FIGURE 43: POINT PREVALENCE SURVEILLANCE OF HOSPITAL-ASSOCIATED INFECTIONS AND ANTIMICROBIAL USE IN EUROPEAN ACUTE CARE HOSPITALS, 2016–2017



Unless we are committed to implement infection prevention as a top priority in our healthcare institutions, patients will continue to acquire infections within the healthcare system, leading to longer hospital stays and more deaths

34.2 Patient safety and HAIs

Patient safety depends on a combination of infection prevention, such as hand hygiene (the most important measure), and infection control, along with better antimicrobial stewardship. Approaches such as care bundles and checklists mean better patient care and improved use of resources [6].

34.3 Sepsis and systemic inflammatory response syndrome (SIRS)

34.3.1 Sepsis

In sepsis the immune system overreacts to an infection, damaging organs and tissues. Sepsis is a very serious condition with high rates of illness and death. In the US, admissions to hospital due to sepsis are greater than those for myocardial infarctions and strokes combined. The death rate is 25-30% [7].

Systemic inflammatory response syndrome (SIRS) and sepsis share common features, however SIRS is a broader term describing a syndrome caused by variety of factors, while sepsis is due to an infection.



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[QR code 19]

Early treatment with antibiotics reduces the risk of organ failure and death. The nurse has a very important role in identifying the early signs of sepsis in patients as she/he has the most interactions with patients. A sepsis screen has proven to be a useful tool for nurses when caring for patients in hospital [8].



Case study

In a study carried out in an emergency department and in a community hospital, giving ward nurses a flow chart for sepsis identification, treatment and physician response time improved observation, increased the probability of survival and reduced with a treatment flow chart improved their clinical observations, increased the odds of survival, reduced the risk of organ failure and shortened length of stay [9].

The tool used the following criteria

SIRS TRIAGE – IF TWO OR MORE, THEN →	HAEMODYNAMIC/ORGAN FUNCTION VARIABLES		
		Medical consultation within 20 minutes	Immediate medical consultation
Temperature <36 °c or >38 °c Pulse >90 bpm Respiratory rate >20 breaths per minute or pco ₂ <4.3 kPa Leucocytes <4x10 ⁹ /l or >12x10 ⁹ /l	Blood pressure	Syst >90 mmHg	Syst <90 mmHg Syst BP fall >40 mmHg
	Mental status/Glasgow coma scale (GCS)	GCS 14-15	Acute disorientation or GCS ≤13
	Saturation	>90% with O ₂	<90% with O ₂
	Capillary filling time	<3 sec	>3 sec
	S lactate	<3 mmol/l	>3 mmol/l
	Thrombocytes	>100x10 ⁹ /l	<100x10 ⁹ /l
	Urine output	>0.5 ml/kg/h	<0.5 ml/kg/h

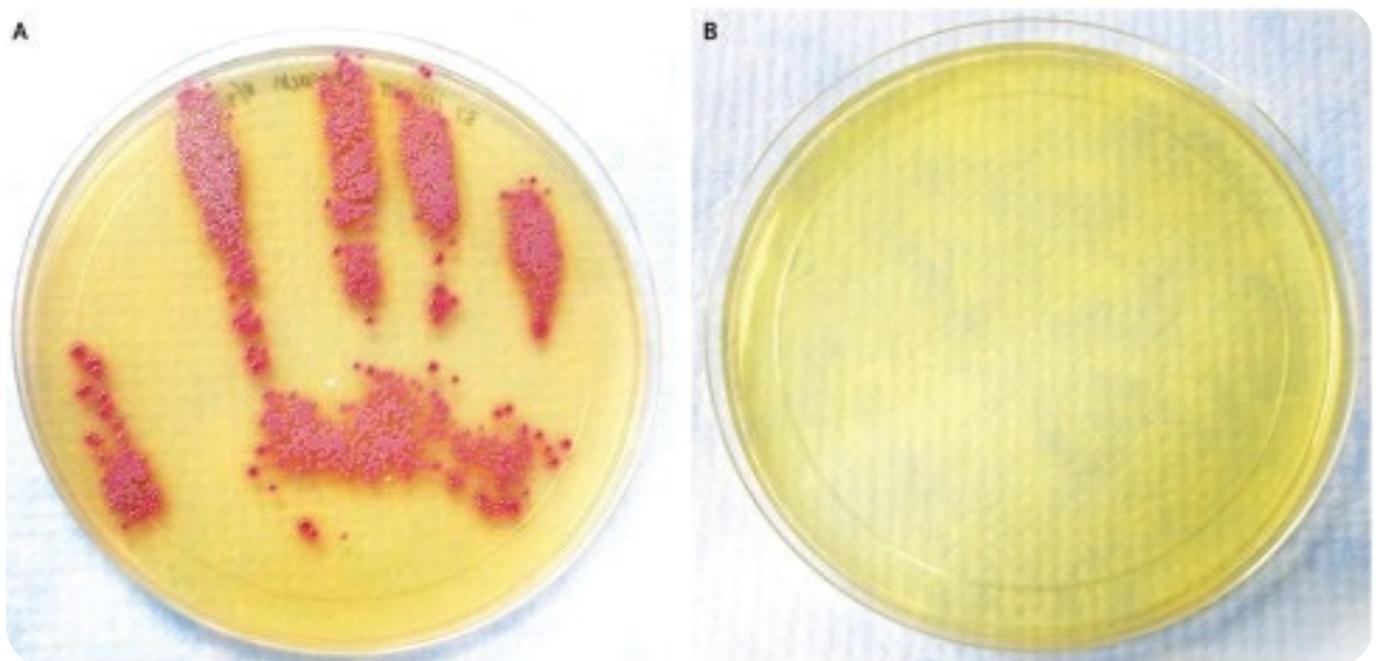
Different hospitals and countries may use different screening tools and criteria.

35 Principles of hygiene

35.1 Hand hygiene and handwashing

The Centers for Disease Control (CDC) and the World Health Organisation (WHO) have published guidelines that define hand hygiene and its role in stopping the transmission of infections, especially MDR organisms including CRE (carbapenem-resistant Enterobacteriaceae), and the other carbapenem-resistant Gram-negative organisms (CRAB, CRPA); MRSA (methicillin-resistant Staphylococcus aureus) and ESBL-producing Enterobacteriaceae.

FIGURE 44: MRSA GROWTH BEFORE AND AFTER HAND HYGIENE



Source: Donskey & Eckstein [10] (permission from the author)

In Figure 44 the left-side image shows an imprint of an ungloved hand following an abdominal examination of an MRSA-positive patient. The right-side image is from the same worker, after using an alcohol-based hand rub. This shows why it is important for nurses to make sure that hands are disinfected properly before and after examining patients.

Figure 45 and Figure 46, from the WHO, show the steps of effective hand hygiene using soap and water or an alcohol hand rub

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October 15 is Global Handwashing Day, a global advocacy day dedicated to increasing awareness and understanding about the importance of handwashing with soap as an effective and affordable way to prevent diseases and save lives.

How to Handwash?

WASH HANDS WHEN VISIBLY SOILED! OTHERWISE, USE HANDRUB



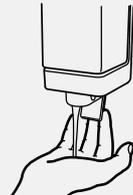
Duration of the entire procedure: 40-60 seconds

0



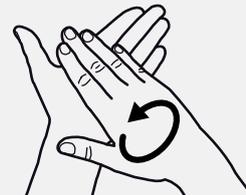
Wet hands with water;

1



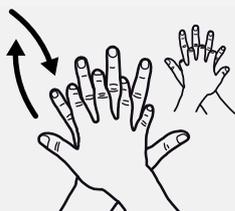
Apply enough soap to cover all hand surfaces;

2



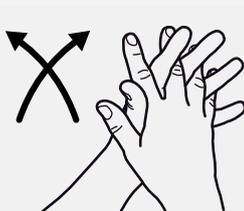
Rub hands palm to palm;

3



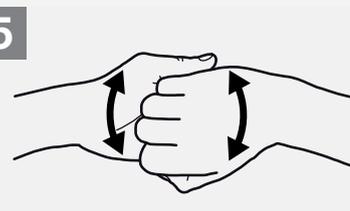
Right palm over left dorsum with interlaced fingers and vice versa;

4



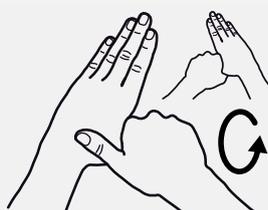
Palm to palm with fingers interlaced;

5



Backs of fingers to opposing palms with fingers interlocked;

6



Rotational rubbing of left thumb clasped in right palm and vice versa;

7



Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;

8



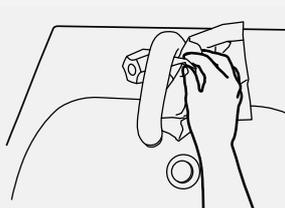
Rinse hands with water;

9



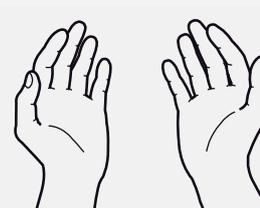
Dry hands thoroughly with a single use towel;

10



Use towel to turn off faucet;

11



Your hands are now safe.



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Patient Safety

A World Alliance for Safer Health Care

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How to Handrub?

RUB HANDS FOR HAND HYGIENE! WASH HANDS WHEN VISIBLY SOILED

 **Duration of the entire procedure: 20-30 seconds**

1a

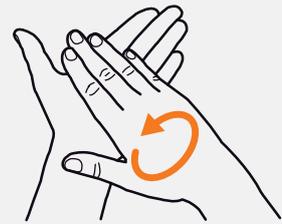


Apply a palmful of the product in a cupped hand, covering all surfaces;

1b

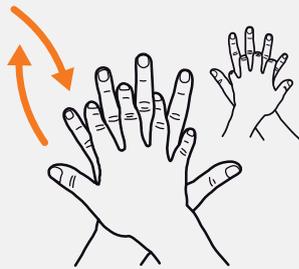


2



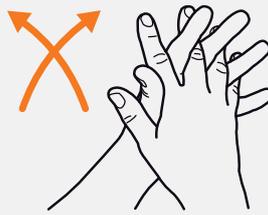
Rub hands palm to palm;

3



Right palm over left dorsum with interlaced fingers and vice versa;

4



Palm to palm with fingers interlaced;

5



Backs of fingers to opposing palms with fingers interlocked;

6



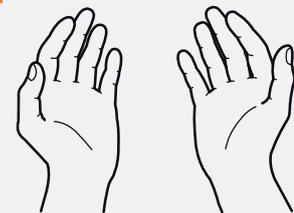
Rotational rubbing of left thumb clasped in right palm and vice versa;

7



Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;

8

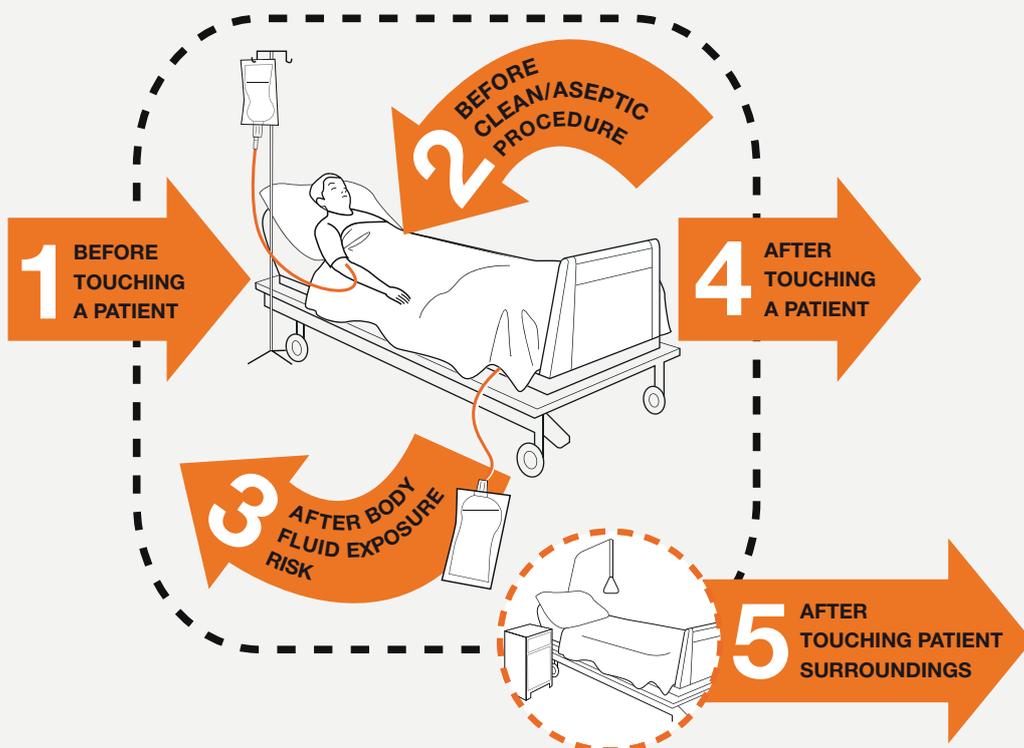


Once dry, your hands are safe.



FIGURE 47: MOMENTS FOR HAND HYGIENE ON A WARD

When? YOUR 5 MOMENTS FOR HAND HYGIENE



<p>1 BEFORE TOUCHING A PATIENT</p>	<p>WHEN? Clean your hands before touching a patient when approaching him/her.</p> <p>WHY? To protect the patient against harmful germs carried on your hands.</p>
<p>2 BEFORE CLEAN/ASEPTIC PROCEDURE</p>	<p>WHEN? Clean your hands immediately before performing a clean/aseptic procedure.</p> <p>WHY? To protect the patient against harmful germs, including the patient's own, from entering his/her body.</p>
<p>3 AFTER BODY FLUID EXPOSURE RISK</p>	<p>WHEN? Clean your hands immediately after an exposure risk to body fluids (and after glove removal).</p> <p>WHY? To protect yourself and the health-care environment from harmful patient germs.</p>
<p>4 AFTER TOUCHING A PATIENT</p>	<p>WHEN? Clean your hands after touching a patient and her/his immediate surroundings, when leaving the patient's side.</p> <p>WHY? To protect yourself and the health-care environment from harmful patient germs.</p>
<p>5 AFTER TOUCHING PATIENT SURROUNDINGS</p>	<p>WHEN? Clean your hands after touching any object or furniture in the patient's immediate surroundings, when leaving – even if the patient has not been touched.</p> <p>WHY? To protect yourself and the health-care environment from harmful patient germs.</p>

Source: WHO

Reducing infection transmission by handwashing

Frequent and thorough handwashing is an excellent way to reduce the transmission of bacteria, viruses and other pathogens between people, both in a hospital or clinic setting and in everyday life. Different products can work better in different situations. Key recommendations are to follow international, national, regional and or even local guidelines.

1. Plain non-antimicrobial soap

Lathering with soap and detergent-based handwashes and rinsing removes things sticking to the hands, including dirt, grease, organic substances and bacteria, viruses and other pathogens. The detergent properties also break down the lipids in the membranes around many bacteria and viruses. Wash all surfaces of the hands, including between the fingers, rubbing for around 20 seconds.

2. Alcohol

Alcohol and alcohol gels are effective against bacteria, viruses and other pathogens, but the alcohol content should be 60% or above. In lab studies, alcohols work against Gram-positive and Gram-negative bacteria (including multidrug-resistant pathogens such as MRSA and VRE), *M. tuberculosis*, and a variety of fungi.

3. Chlorhexidine

Chlorhexidine works by disrupting bacterial cell membranes, releasing the cell contents. Chlorhexidine works more slowly than alcohol.

4. Chloroxylenol

Chloroxylenol inactivates enzymes in bacteria and affects their cell walls. In lab studies, chloroxylenol works well against Gram-positive bacteria, and moderately well against Gram-negative bacteria, mycobacteria and some viruses.

5. Hexachlorophene

Hexachlorophene inactivate essential enzyme systems in microorganisms. Hexachlorophene is bacteriostatic, with good activity against *S. aureus* and relatively weak activity against Gram-negative bacteria, fungi, and mycobacteria.

6. Iodine and iodophors (PVP-I)

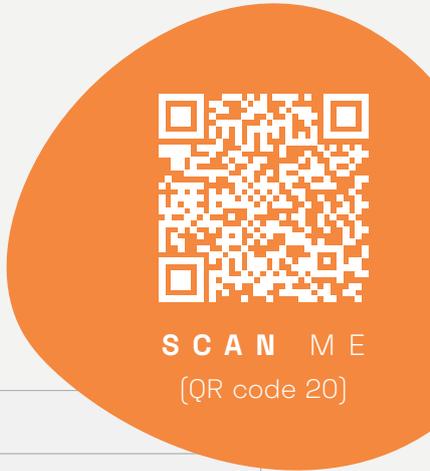
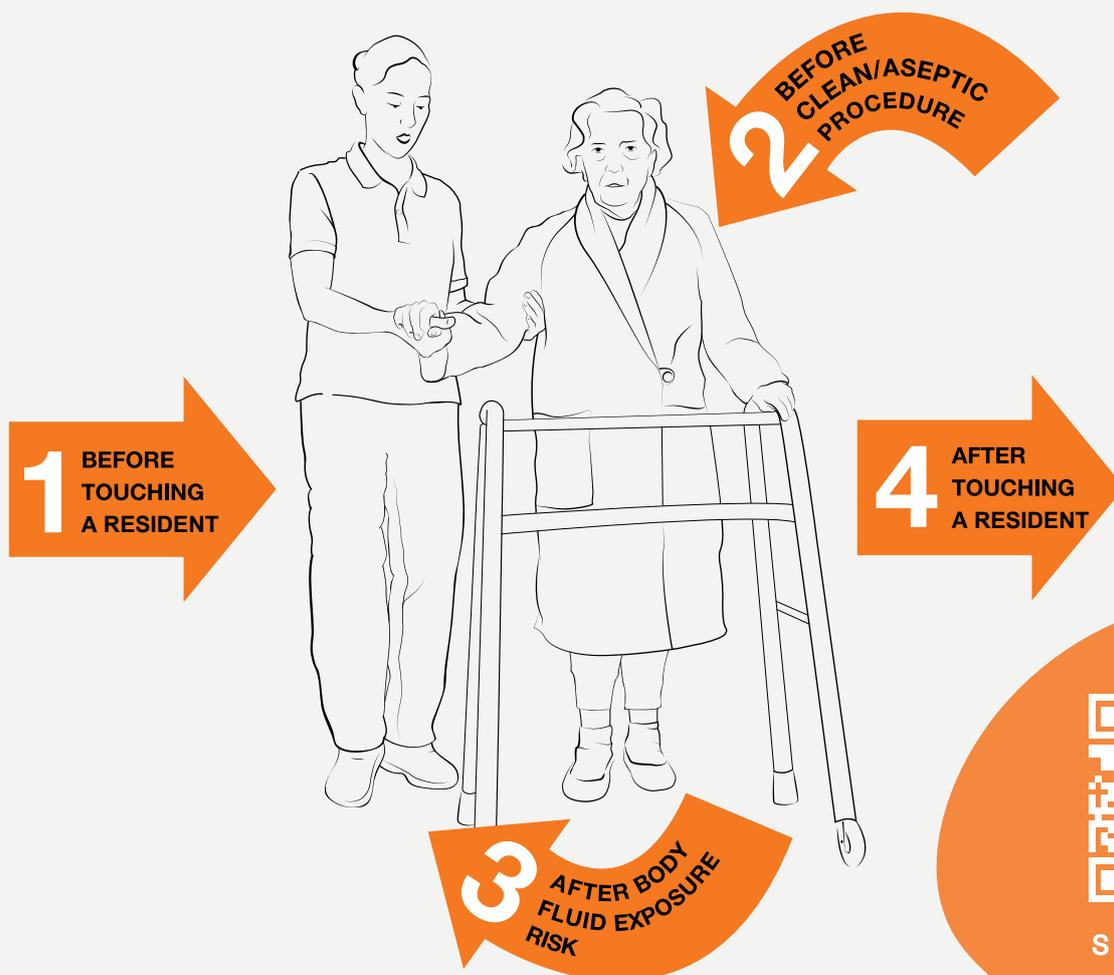
Iodine molecules enter the cell wall of microorganisms, affecting protein synthesis and cell membranes. PVP-I is effective against bacteria, viruses, fungi, spores, protozoa, and amoebic cysts. PVP-I has shown efficacy against coronaviruses like MERS-CoV and SARS-CoV and other viruses such as Ebola virus there has been no reported resistance or cross-resistance in over 150 years of use.

Source WHO

FIGURE 48: MOMENTS FOR HAND HYGIENE IN A RESIDENTIAL HOME

Your Moments for Hand Hygiene

Health care in a residential home



1	BEFORE TOUCHING A RESIDENT	WHEN? Clean your hands before touching a resident. WHY? To protect the patient against harmful germs carried on your hands.
2	BEFORE CLEAN/ASEPTIC PROCEDURE	WHEN? Clean your hands immediately before performing a clean/aseptic procedure. WHY? To protect the patient against harmful germs, including the resident's own, from entering his/her body.
3	AFTER BODY FLUID EXPOSURE RISK	WHEN? Clean your hands immediately after a procedure involving exposure risk to body fluids (and after glove removal). WHY? To protect yourself and the environment from harmful patient germs.
4	AFTER TOUCHING A RESIDENT	WHEN? Clean your hands after touching the resident at the end of the encounter or when the encounter is interrupted. WHY? To protect yourself and the environment from harmful patient germs.



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WHO acknowledges the Ministry of Health of Spain and the Hôpitaux Universitaires de Genève (Infection Control programme) for their active participation in developing this material.

Source: WHO

March 2012

You can test your knowledge on hand hygiene and contact precautions by scanning QR code 20. After completing both modules, you will receive certificates.

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SCAN ME
(QR code 21)

BOX: Speak out – Doctor, have you washed your hands?

In a study at a Sydney hospital, doctors and nurses failed to wash their hands properly when no one was watching. Hand-washing rate fell from 94% with human auditors watching to 30% when this switched to automated surveillance (QR code 21). This puts patient’s lives at risk [11].

The compliance with hand washing is an issue for any HCP, but particularly for doctors (QR code 22). While they have fewer total patient contacts than nurses, they see more individual patients and perform most invasive procedures, so have more potential for opportunities for transmission of pathogens. Doctors also play a role in influencing the attitudes and behaviour of other members of staff [12].



SCAN ME
(QR code 22)

35.2 Personal protective equipment

Personal protective equipment (PPE) is designed to protect nurses and other HCPs from infectious diseases. PPEs include gloves, masks, aprons, gowns and visors. The choice of PPE depends on how the infection is transmitted. PPE should be used whenever there is a risk of exposure to blood or other potentially infectious material such as sputum, vomit or faeces). The following is a guidance, please follow your hospital protocols. (see Figure 49).

FIGURES 49: PUTTING ON AND REMOVING PPE IN EIGHT STEPS

Make sure you have all the necessary Personal Protective Equipment:

- Disposable isolation gown that is water resistant
- FFP2/FFP3 mask
- Face visor with anti-fog properties
- Non-sterile nitrile gloves

STEP 1
GOWN

Putting on PPE:

Staff should wear the following PPE, put on in the following order:

**Tying at the neck
than at the back**



STEP 2
FFP3 RESPIRATOR
AND FIT CHECK



1. Check the FFP 2/3 mask

2. Hold the mask in your hand



3. Wear the FFP2/3 mask by applying the mask tightly around the face and pulling the straps above your head

4. Secure the mask around your face



5. Check for leakages. If FFP2/3 has a valve, ensure that it forms a tight seal.



STEP 3
EYE
PROTECTION



Wear a visor

STEP 4
DISPOSABLE
GLOVES

Wear 1 pair of gloves ensuring the gloves overlap the edge of the gown



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Removal of PPE:

STEP 1



Remove the glove of the non-dominant hand from the base of the palm, without touching the inside of the glove, and flip it over the fingers



STEP 2



Using the non-dominant hand (which is partially gloved) to remove the glove from the dominant hand from the base of the palm without touching the inside of the glove

STEP 3

Dispose of the gloves in the appropriate bin

STEP 4

Perform hand hygiene using alcohol-based hand rub



STEP 5

Remove gown by using a peeling motion, fold gown in on itself and place in clinical waste bin



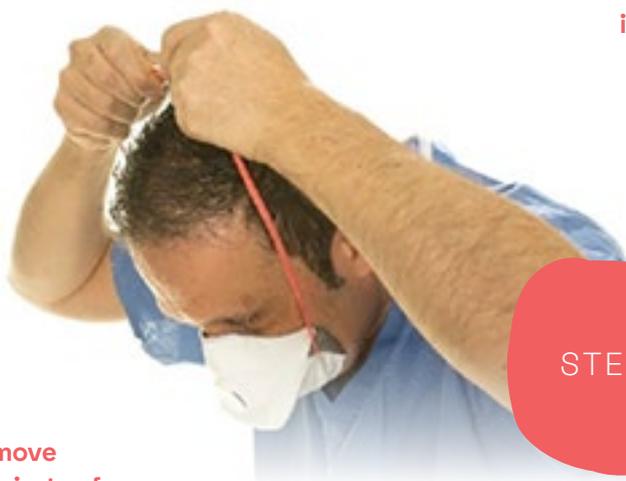
STEP 6

Remove visor only by the headband or sides and dispose in clinical waste bin



STEP 7

Remove respirator from behind using the rubber bands away from your face and dispose in clinical waste



STEP 8

Perform hand hygiene using alcohol-based hand rub



This sequence of putting and removal of PPE's is recommended by the ECDC and WHO

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Use of respiratory face protection when caring for a suspected or confirmed case of the new COVID-19

The following guideline is based on the recommendation of the WHO and CDC published in view of the new COVID-19 virus. Every nurse should be trained well so that when using PPE, she/he will not be exposed to the virus especially during the removal of such PPE. In this section we will explain about the types of masks that are available and recommended for use when caring for patients with a high consequence infectious diseases. Since it is a new virus we do not know exactly the mode of transmission. From what is known till when this has been published that the COVID-19 is transmitted from person to person via respiratory droplets. Transmission will occur if the nurse is within approximately 6 feet (2 meters) of a patient with 2019-n-CoV for a prolonged period of time. Therefore, proper wearing and removal of PPE will protect the nurse from becoming infected while caring for such patients.

Types of face masks available on the market

Both the WHO and CDC have recommended the use of N95 or FFP2 masks which offer protection against airborne infections including the current COVID-19. It is important that the mask says either N95 or FFP2 mask has a 95% efficiency filter. The N99(FFP3) that mask has a 99% efficiency filter. However both masks are safe to use when caring for such patients.

It is highly important that every time the nurse puts the respiratory mask she/he needs to perform a fit check (refer to poster showing the steps on how to put on and remove the PPE). It is also important that a fit test is performed on all nurses to ensure that the face mask fits well. The fit test should be carried out by a trained technician.

35.2.1 Glove use – To glove or not to glove?

Gloves do not replace the need for hand hygiene when caring for patients. Gloves are not 100% safe as there can be tiny holes that are not visible to the naked eye but can allow microorganisms through to colonise nurses' hands. This can happen in almost a third of cases [13].

Gloves should be worn in the following circumstances:

- When dealing with body fluids such as blood, urine, sputum and discharging wounds
- In contact with mucous membranes or broken skin
- Taking blood samples or working with catheters
- When dealing with patients who are colonised/infected with virulent organisms, MDROs such as CRE, CRAB, MRSA and VRE, or in epidemic or emergency situations
- As part of transmission-based precautions.

Gloves should be changed:

- Between patients to prevent cross-transmission of microorganisms especially MDROs
- Between different body sites, for example when a patient has two different wounds, to prevent cross-contamination.

Put on and remove gloves using the techniques shown in Figure 50.

FIGURE 50: PUTTING ON AND REMOVING NON-STERILE GLOVES

HOW TO DON GLOVES

<p>1</p>  <p>Take out a glove from its original box.</p>	<p>1b</p>  <p>Touch only a restricted surface of the glove corresponding to the wrist (at the top edge of the cuff).</p>	<p>3</p>  <p>Don the first glove.</p>
<p>4</p>  <p>Take the second glove with the bare hand and touch only a restricted surface of the glove corresponding to the wrist.</p>	<p>5</p>  <p>To avoid touching the skin of the forearm with the gloved hand, turn the external surface of the glove to be donned on the folded fingers of the gloved hand, thus permitting to glove the second hand.</p>	<p>6</p>  <p>Once gloved, hands should not touch anything else that is not defined by indications and conditions for glove use.</p>

HOW TO REMOVE GLOVES

<p>1</p>  <p>Pinch one glove at the wrist level to remove it, without touching the skin of the forearm, and peel away from the hand, thus allowing the glove to turn inside out.</p>	<p>2</p>  <p>Hold the removed glove in the gloved hand and slide the fingers of the ungloved hand inside between the glove and the wrist. Remove the second glove by rolling it down the hand and fold into the first glove.</p>	<p>3</p>  <p>Discard the removed gloves</p>
<p>4 Then, perform hand hygiene by rubbing with an alcohol-based handrub or by washing with soap and water.</p>		



SCAN ME
(QR code 23)

Source: British Columbia Institute of Technology (BCIT)
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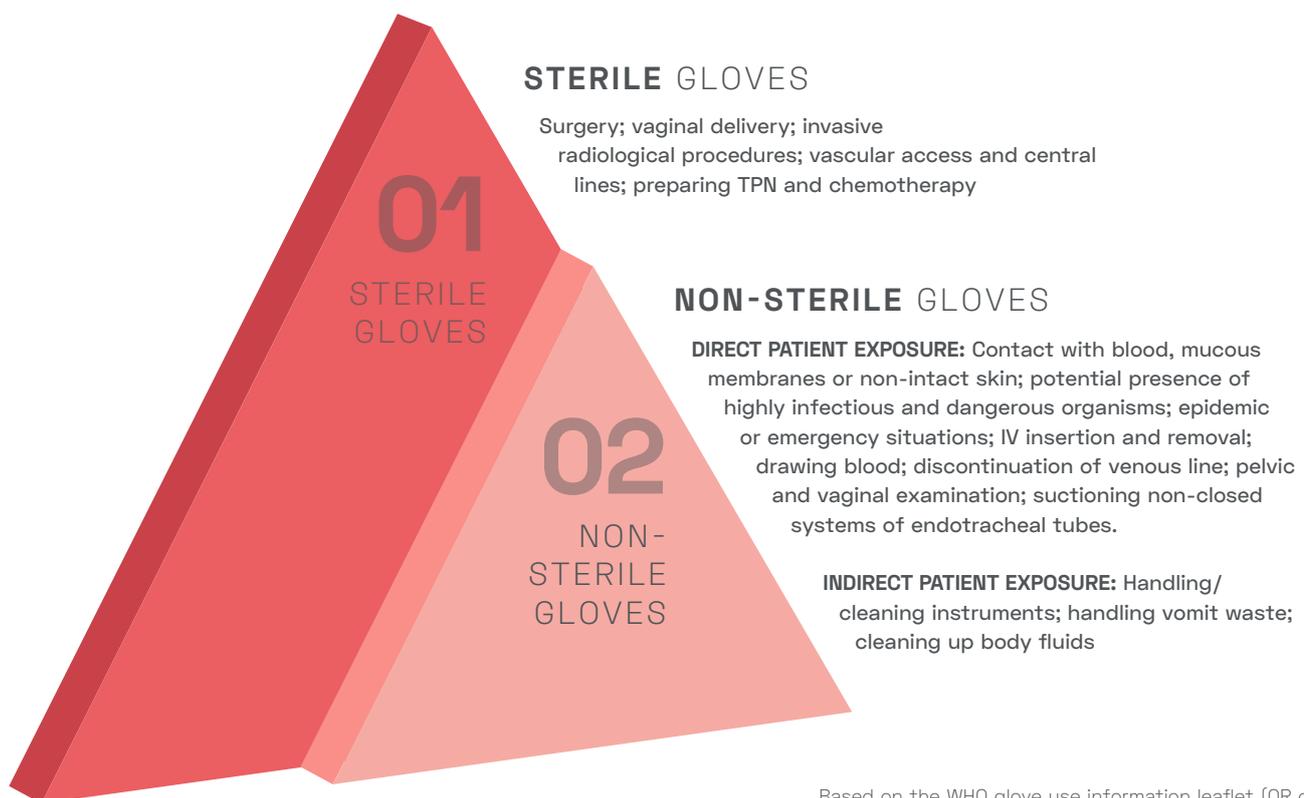
If there is no risk of exposure to body fluids (unless transmission-based precautions are in place), no gloves need to be worn, for example when:

- Changing bedsheets
- Assisting patients to get out of bed
- Helping patients to walk
- Transporting patients
- Touching intact skin

This also reduces the risk of nurses developing allergies to glove materials, such as latex [14]. Healthcare providers may reserve latex gloves for the surgical setting, except for latex-free paths or latex-free operators, and use alternative gloves in other settings. The glove pyramid (Figure 51: The glove pyramid – to aid decision-making) and the WHO glove use information leaflet (QR code 24) provide support in the decision-making process.



FIGURE 51: THE GLOVE PYRAMID – TO AID DECISION-MAKING



35.3 Standard precautions

Standard precautions are designed to reduce the risk of transmission of infection to the nurse or other HCP and from patient to patient. These should be used with every patient, irrespective of whether their infectivity status is known or not. A risk assessment will help to decide what kind of PPE is needed.

Standard precautions include:

- Hand hygiene
- Personal protective equipment (mask, gown, apron, visor/goggles, gloves)
- Proper disposal of sharps
- Environmental cleaning
- Aseptic technique
- Sterile instruments – reprocessing of reusable equipment and instruments
- Cough etiquette
- Waste management
- Appropriate handling of linen

There is no need for isolation in a single room. When standard precautions are not enough to stop the transmission of infections, the next step is transmission-based precautions. For more information look at the CDC (QR code 25) and WHO websites (QR code 26).



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(QR code 25)



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(QR code 26)

35.4 Transmission-based precautions

Transmission based precautions are used as well as standard precautions when there is a risk of patients passing the infection on to others. These patients need to be isolated in a single room or cared for with patients with the same infection. If the door cannot be closed because of safeguarding issues, this will need to be discussed with the infection prevention and control team.

Transmission based precautions differ according to whether it is contact, droplet and airborne transmission (see Figure 52: Transmission-based precautions).

FIGURE 52: TRANSMISSION-BASED PRECAUTIONS



Notes: * Depends on the task being carried out. E.g. If bath bathing a patient, a gown will be more appropriate because of the close contact with the patient. ** It is very important to check the fit before approaching the patient



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[QR code 27]

For more information on transmission-based precautions see the CDC website (QR code 27).

35.4.1 The impact of patient isolation

Patients who are isolated in a single room may become anxious, withdrawn and/or depressed, and feel stigmatised. Patients who are in isolation tend to receive less attention by doctors than patients in normal rooms. They are also twice as likely to have adverse events and eight times more likely to experience falls and pressure ulcers. [15]. This anxiety is worsened by a lack of information (see Figure 53). Nurses can help anxious and isolated patients and their families through good communication, and by providing information and reassurance.

FIGURE 53: LACK OF INFORMATION CAN INCREASE ANXIETY



Case study: lack of information

Following an accident, a male patient was admitted to intensive care. After a few days he was isolated because he was diagnosed as having a multi-drug resistant (MDR) infection. The information given to his wife was so limited she had to go on the internet to search for further information. The internet searches increased her anxiety, stress and fear.

35.4.2 Improving patient-nurse interaction

Nurses need to put on appropriate PPE before entering an isolation room. The time taken to dress can reduce the time that they can spend with patients. The inconvenience of PPEs may also reduce compliance with requirements.

Case study: Isolation floor taping

In a study carried out at Trinity Regional Medical Centre, the hospital used red tape to make a safe zone at the entrance of the isolation room. Nurses standing in this area did not need to put on PPEs to interact with the patient. This increased staff-patient interaction, generating a high level of satisfaction, and reducing PPE costs.

35.5 Aseptic non-touch technique

Aseptic non-touch technique (ANTT) was created to improve the understanding of infection control and reduce or prevent the transfer of microorganisms from nurses, equipment and the environment, so safeguarding patients [17,18]. The aim is to improve patient safety and reduce HAIs.

ANTT was originated by Stephen Rowley in the late 1990s [17] and has since been defined by NICE as,

STEPHEN
ROWLEY

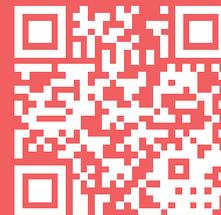


A specific type of aseptic technique, with a unique theory and practice framework [19]

The purpose of ANTT was to highlight the various problems when it comes to practicing aseptic technique, the lack of standardisation of teaching, practice and the confusion of terms «Sterile», «Aseptic» and «Clean» [18].

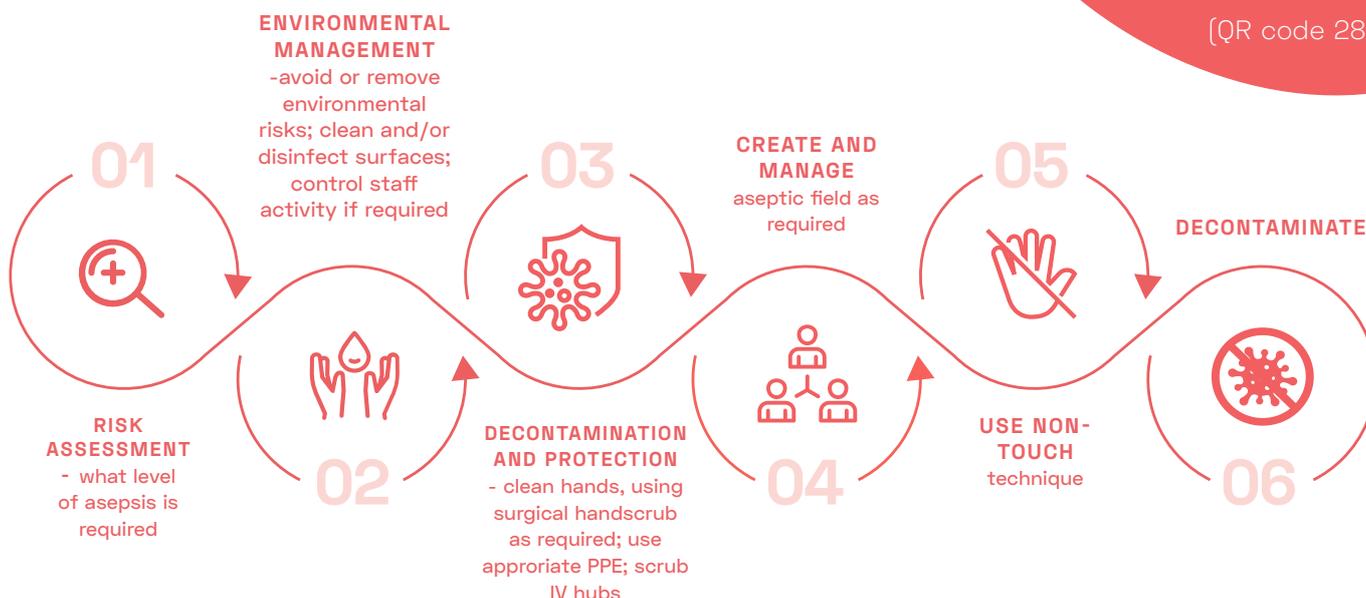
The ANTT Clinical Practice Framework is comprehensive and carefully defines practice, providing a set of clinical rules for supporting effective and safe aseptic technique. The term 'clean' is not used as a practice aim because the definition of 'clean' is a visual one – and micro-organisms are invisible! The term sterile is not used because once sterilized equipment is opened to air, it is not technically possible to maintain its sterility [18]. ANTT is therefore based upon the terms 'asepsis' and 'aseptic' as they are achievable and if established and maintained in practice, will protect the patient.

ANTT helps provide a better understanding of the Infection Control invasive procedures which are undertaken on patients. ANTT can prevent micro-organisms transfer from HCPs, the equipment and the immediate environment safeguarding the procedure Key-Parts and Key-Sites – using a concept called Key-Part and Key-Site Protection (see Figure 54).



SCAN ME
[QR code 28]

FIGURE 54: STEPS TO ENHANCE PATIENT SAFETY



For further information about ANTT and its implementation, go to the ANTT website [QR code 28].

36 Roles and responsibilities of the infection control nurse

The role of an infection control nurse (ICN) is very important in both hospital and community care settings. It includes preventing infection, implementing infection control policies and teaching nurses and other HCPs.

Role of an infection control nurse

Lead the infection prevention and control team and provide high quality infection prevention and control services

Advise and educate patients, carers, nurses and other HCPs

Develop evidence-based policies and guidelines for the prevention and control of HAIs and community-acquired infections (CAIs), and put these in place

Communicate laboratory results, especially relating to multi-drug resistant organisms, to both hospitals and the community

Ensure that patients with MDROs are cared for in isolation or with patients with the same type of infection, so that it does not spread to other patients

Carry out audits of isolation practices and hand hygiene.

Observe nurses and other healthcare professionals to ensure that the necessary precautions are being followed when a patient is isolated



Although the role of the ICN can be quite challenging, it can be very gratifying for its part in both staff and patient safety.

ICNs also have responsibilities leadership, education, quality improvement and clinical practice (see Table 32).

TABLE 32: 1.1 RESPONSIBILITIES OF THE INFECTION CONTROL NURSE

Role	Competences
Leadership & management	<ul style="list-style-type: none"> Lead and manage the work of the infection prevention and control team to achieve objectives Lead high quality infection prevention and control services Design, plan and monitor the development of services Demonstrate leadership and management skills
Education	<ul style="list-style-type: none"> Develop own knowledge, skills and practice Advise and educate patients, carers and all the staff working in health and social care settings Identify and respond to the need for learning opportunities using an evidence-based approach Work with others to embed infection prevention and control within workforce and organisational development strategies
Quality improvement	<ul style="list-style-type: none"> Utilise improvement methodologies to enhance and sustain infection prevention and control practices Demonstrate the use of risk assessment in infection prevention and control practice IPC is an integral part in preventing antimicrobial resistance Research in clinical practice
Clinical practice	<ul style="list-style-type: none"> Collect, understand, interpret and report surveillance data Monitor, review and advise on service developments to support the infrastructure of the organisation in relation to decontamination and the built environment Improve quality and safety by developing and implementing evidence-based policies and guidelines for the prevention and control of infection Maintain patient safety by recognising, reporting and managing incidents and outbreaks

Adapted from the Infection Prevention Society [20]

37 Infection control challenges in long-term care facilities (LTF)

Although residents in a residential care setting do not undergo complex or invasive, they are still at risk of transmissible infections, and the consequences can be serious. Elderly people's immune systems may also be impaired, affecting their ability to fight infections [21]. Elderly people are also more at risk of pneumonia, urinary tract infections (UTIs) and soft tissue infections than younger people, and these carry a high risk of illness and death.

The nurse or carer's role in infection control and prevention is to reduce the risk of infections being passed on to residents from HCPs or other residents. Vaccination in elderly people may not always be effective, so vaccination of nurses and other HCPs may help in controlling the spread of infections.

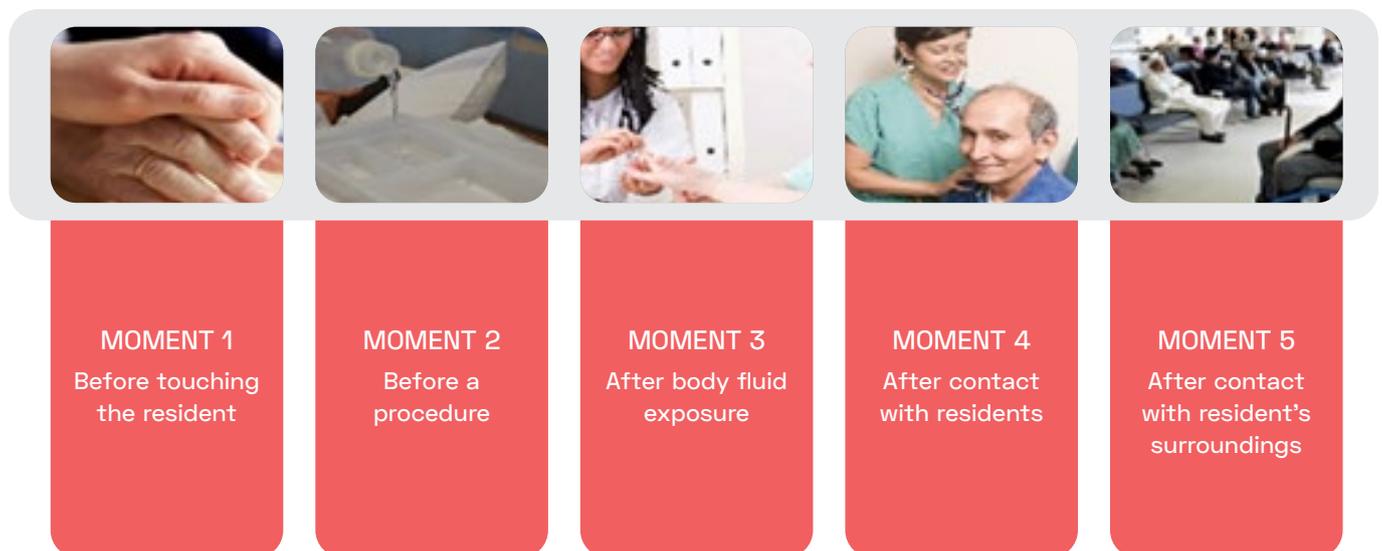
37.1 Managing residents with MDROs

Managing MDROs is a major challenge in residential care settings such as nursing homes. The spread of MDROs can be increased because of the longer length of stay compared with an acute care setting, and because of the homelike environment that potentially means less stringent infection prevention and lack of support from an infection prevention and control team. Frequent transfers to and from acute care to nursing homes can also increase the transmission of MDROs [22]. Elderly people are more likely to get infections. This, combined with issues of self-care and difficulties with diagnosis, can lead to greater antibiotic prescribing which then increases the risk of antibiotic resistance [23].

Long term care facilities may not have nurses on site, and they may not have isolation facilities. This means that infection control measures must be adapted according to the facility [24].

37.2 Hand hygiene

The WHO's 'moments of hand hygiene' (see 37.1: Hand hygiene) are also important for care of elderly persons in residential care (see Figure 55).



Adapted from the WHO's five moments of hand hygiene

Case study: Hand hygiene and infection rates

Implementing hand hygiene for residents, nurses and other healthcare professionals in a long-term care facility aimed to reduce cross-transmission, given that the residents shared the dining room, bathrooms and rehabilitation facilities. The greatest decrease in infections was that of LRTI (lower respiratory tract infections) from 0.97 LRTIs pre-intervention, to 0.53 post-intervention per 1,000 resident-days [25]

37.3 Managing outbreaks within the residential homes

Because of shared facilities, residential care homes run the risk of disease outbreaks.

TABLE 33: MOST COMMON TYPES OF INFECTION OUTBREAKS IN CARE HOMES

Type of infection	Most common causative infectious agents	Mode of transmission
Respiratory infection	Influenza virus (A or B)	Droplets and physical contact
	Mycobacterium tuberculosis	Airborne infection
Skin and soft tissue infection	Streptococcus pyogenes	Droplets and physical contact
	Staphylococcus aureus (MSSA or MRSA)	Physical contact and airborne dissemination
	Sarcoptes scabiei (the mite causing scabies)	Physical contact
UTI (with or without a urinary catheter)*	Escherichia coli MDROs	Physical contact (transmission will have taken place sometime before the organism causes UTI)
Gastrointestinal infections	Norovirus Salmonella and other foodborne infectious organisms	Physical contact with contaminated items followed by ingestion** or direct ingestion of contaminated food
	Clostridioides difficile	Physical contact with contaminated items followed by ingestion**

*UTIs are more often caused by a resident's own gut flora than by an external infectious organism

** Also known as the faecal-oral route

Adapted from Curran [26]

37.4 Prevention of outbreaks in nursing homes

Outbreaks in nursing homes can be prevented by making sure that nurses, carers and other HCPs follow standard precautions (see 37.3: Standard precautions).

Vaccination against influenza is important to prevent outbreaks. Influenza can cause serious illness and death in elderly people. There are a lot of myths and misconceptions about Influenza vaccination and these should be addressed both in HCPs and the residents within the nursing homes to increase vaccination uptake.

If a resident is diagnosed as having an infection that might cause an outbreak, he/she must be segregated from the other residents until he/she is no longer infectious.

Once an outbreak is declared it is important to carry out a risk assessment to understand the extent of the outbreak and its cause. The questions in Figure 56 are useful.

FIGURE 56: MANAGING AN INFECTIOUS DISEASE OUTBREAK

About the people who are sick

What are the people sick with?

How many are/have been sick?

When did they get sick?

Which GPs have been called?

About the care home

How many people live in the home?

On how many floors is the accomodation?

On how many floors are the sick residents?

Do staff work on affected as well as unaffected floors?

Are there any plans in place for the next few days?



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Once an outbreak is confirmed the target is to bring that particular outbreak to an end. The following may be included as measures to control the outbreak:

- Close the care facility to admissions and stop transfers
- Limit or stop visits from friends and family
- Clean the facility thoroughly, especially high touch surfaces, using appropriate disinfectants

For more information on standard infection control and prevention in residential homes see the CDC website (QR code 29).

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