Infection prevention and control: the nurse’s role

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Abstract
Healthcare-associated infections and antimicrobial resistance are significant threats to public health. As resistant organisms continue to emerge and evolve, and antimicrobial agents become less effective, infection prevention and control remains a vital aspect of maintaining public health, particularly among vulnerable patient groups such as older people and young children. Because of the increasing complexity of healthcare treatments and interventions, patients are becoming increasingly susceptible to healthcare-associated infections and resistant organisms. This article outlines some of the challenges that nurses may experience in ensuring effective infection prevention and control, and how these can be addressed.

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Healthcare-associated infections are defined as infections that develop as a direct result of a healthcare intervention, or from contact with the environment in any healthcare setting. Microorganisms can spread rapidly throughout a healthcare setting, particularly via the hands of healthcare staff (Pittet 2017) and in the environment, for example on bed tables, patient lockers, equipment used in patient care, nurse call buzzers, telephones and computer keyboards (Chemaly et al 2014). This means that healthcare-associated infections are a serious threat to patients, healthcare staff and visitors.

Patient groups who are particularly susceptible to healthcare-associated infections include older people, young children, those with a suboptimal nutritional status, and those with a compromised immune system because of underlying illnesses, such as cancer, diabetes mellitus or human immunodeficiency virus (HIV). Common healthcare-associated infections include bloodstream infections, urinary tract infections, surgical site infections and respiratory infections. These can be caused by microorganisms such as Staphylococcus aureus, Clostridium difficile, Escherichia coli, carbapenem-resistant Enterobacteriaceae, norovirus and influenza viruses. Of particular concern in healthcare is the significant increase in Gram-negative bloodstream infections, particularly those caused by E.coli, with the UK government aiming to reduce healthcare-associated Gram-negative bloodstream infections by 50% by 2021 (NHS Improvement 2017).

While not all healthcare-associated infections are avoidable, it is estimated that 65-70% of central line-associated bloodstream infections and catheter-associated urinary tract infections, and 55% of ventilator-associated pneumonia and surgical site infections, are preventable (Schmier et al 2016). People who acquire a healthcare-associated infection are at increased risk of a prolonged hospitalisation, developing
Key points

- Patient groups who are particularly susceptible to healthcare-associated infections include older people, young children, those with a suboptimal nutritional status, and those with a compromised immune system because of underlying illnesses, such as cancer, diabetes mellitus or human immunodeficiency virus.

- Common healthcare-associated infections include bloodstream infections, urinary tract infections, surgical site infections, and respiratory infections.

- Since nurses are the healthcare professionals who have the most consistent day-to-day contact with patients, it is crucial that they adhere to standard infection control and transmission-based precautions to prevent further spread of healthcare-associated infections and resistant organisms.

- Communicating with patients about infection prevention and control should be an open and continual process in which patients are active participants.

Infection prevention and control practices

The optimal defence against antimicrobial resistance is strict adherence to infection prevention and control practices, which can significantly contribute to halting the spread of untreatable infections and negate the need for antibiotics. Such practices include the use of standard infection control precautions and transmission-based precautions.

Antimicrobial resistance

Antimicrobial resistance occurs when microorganisms mutate and become resistant to antimicrobial agents. Antibiotics previously used to treat common infections become ineffective if a resistant organism is present, placing patients at risk of prolonged illness, disability and death. While antimicrobial resistance develops through genetic changes to the microorganism, or if the microorganism receives DNA (deoxyribonucleic acid) from a bacterium that is already resistant, the overuse and misuse of antimicrobial agents has accelerated this process. This means that the antibiotics available will become less effective and the risks associated with several treatments that rely on antibiotics to prevent infection will increase (Ventola 2015).

O’Neill (2014) estimated that antimicrobial resistance could cause ten million deaths worldwide each year by 2050, and that unless immediate action was taken, the burden of deaths from antimicrobial resistance was likely to increase at a significant rate. This was supported by the WHO (2017), which warned that there was a lack of new antibiotics under development and that ‘antimicrobial resistance is a global health emergency that will seriously jeopardise progress in modern medicine’. Nurses have an important role in preventing the growing threat of antimicrobial resistance.

Standard infection control precautions

Standard infection control precautions are a set of measures designed to provide antibacterial protection to healthcare staff, patients and visitors, irrespective of whether an infection is present. Box 1 outlines these measures. However, while each of the infection control precautions listed in Box 1 may appear straightforward, research has demonstrated that the adherence of healthcare staff to these measures is often suboptimal in the UK (Shah et al 2015).

One significant factor in the transmission of infection is the hands of healthcare staff, and optimal hand hygiene is one of the most effective methods of preventing the spread of healthcare-associated infections (Allegranzi and Pittet 2009). Despite this, adherence to hand hygiene guidelines among healthcare staff is suboptimal. A systematic review of 96 studies exploring compliance with hand hygiene guidelines in hospital care found an overall compliance rate of 40%, with a compliance rate of 48% among nurses (Erasmus et al 2010). Lower compliance with hand hygiene policies was often associated with high activity levels, whereas higher compliance was associated with: undertaking ‘dirty’ tasks, such as those that involve contact with body fluids; the introduction of disinfectant alcohol-based hand rubs or gels; performance feedback; and accessibility of hand hygiene materials.

Studies have also found that there is suboptimal adherence to other standard infection control precautions. Wilson et al (2015) identified inappropriate use of non-sterile gloves, for example nurses touching bed-bay curtains after putting on non-sterile gloves and then touching patients. Carling et al (2008) described inadequate decontamination of patient-associated equipment and the healthcare environment, such as the cleaning of clinical surfaces. Outbreak reports have also detailed failures to isolate patients in a timely manner following identification of a healthcare-associated infection (MacLean 2014).

Reasons stated for non-adherence to standard infection control precautions by a range of healthcare professionals, including nurses, nursing students, operating theatre personnel and intensive care staff, included a lack of motivation and knowledge, insufficiently qualified healthcare professionals, high workload, lack of orientation to the healthcare environment, and suboptimal role models (de Carvalho Nagliate et al 2013).

Transmission-based precautions

In addition to standard infection control precautions, healthcare staff should also adopt transmission-based precautions when caring for a patient with specific infections, or if a specific infection is suspected. Box 2 outlines the types of transmission-based precautions. However, knowledge of, and adherence to, transmission-based precautions is suboptimal among healthcare staff for reasons including: low-risk perceptions, where staff did not perceive certain infections to be a risk; suboptimal knowledge;
insufficient training and education; and challenges in the healthcare infrastructure, for example when cleaning is undertaken in the same area as clinical procedures (Maroldi et al 2017).

Since nurses are the healthcare professionals who have the most consistent day-to-day contact with patients, it is crucial that they adhere to standard infection control and transmission-based precautions to prevent further spread of healthcare-associated infections and resistant organisms. However, research indicates that there are significant challenges for healthcare organisations to address, particularly in relation to improving the adherence of healthcare staff to infection prevention and control policies (Erasmus et al 2010, Wilson et al 2015, Maroldi et al 2017).

Actions that individual nurses and healthcare organisations can take to improve adherence to infection prevention and control procedures include (Loveday et al 2014, Shah et al 2015, Storr et al 2017):

- Avoid focusing on ineffective infection prevention and control procedures and instead identify effective strategies and maximise these.
- Provide healthcare staff with constant feedback, which focuses on success rather than failure. This will motivate and empower healthcare staff to continue to undertake optimal practice.
- Ensure that infection prevention and control policies and guidance are communicated and implemented effectively, and that healthcare staff can access and understand them.
- Invest in regular education and training for healthcare staff.
- Ensure that any infection prevention and control interventions are measurable, to support ongoing evaluation, enable improvement and sustain behavioural change.
- Make it straightforward for healthcare staff to adhere to infection prevention and control procedures. Ensure that they have the appropriate equipment and resources to enable them to undertake the optimal action at the optimal time.

**Antimicrobial stewardship**

Antimicrobial stewardship is a term used frequently in relation to global antimicrobial resistance and patient safety. The Centers for Disease Control and Prevention (2017) described antimicrobial stewardship as the implementation of programmes that assist clinicians to ‘improve the quality of patient care and improve patient safety through increased infection cure rates, reduced treatment failures, and increased frequency of accurate prescribing for therapy and prophylaxis’.

However, many healthcare staff, including nurses, believe that antimicrobial stewardship is primarily concerned with antibiotic prescribing and therefore not part of their role (Olam et al 2016).

Antimicrobial stewardship involves more than antibiotic prescribing alone; it is crucial for healthcare staff and patients to adhere to standard infection control precautions, which, if undertaken effectively, will prevent infection transmission and remove the need for antibiotics. The role of antimicrobial stewardship is to prevent infection in the first instance, and one challenge for healthcare organisations is to ensure that healthcare staff are provided with the appropriate training, education and support so that antimicrobial stewardship is embedded within their role.

As part of antimicrobial stewardship, nurses are accountable for safe and appropriate medicines management (Nursing and Midwifery Council 2010). The nurse’s role in relation to medicines management includes antimicrobial administration, management and monitoring, as well as understanding the principles of antibiotic prescribing (Ellen et al 2017). This includes ensuring the appropriate drug has been prescribed at the appropriate dose, at the appropriate time and for the appropriate duration, as well as encouraging patients not to share antibiotics and not to store them for later use. Antimicrobial stewardship also requires nurses to understand when to initiate antibiotics and when a patient should be changed from intravenous to oral antibiotics, as well as undertaking medicines management as a member of the multidisciplinary team (Ladenheim et al 2013).

Specimen collection is another important activity that should be embedded within optimal antimicrobial stewardship. The collection of specimens is predominantly undertaken by nurses. Appropriate sampling is vital to achieve timely and accurate laboratory diagnosis; ineffectively collected specimens can lead to inaccurate or misleading laboratory results, which can result in misdiagnosis and inappropriate treatment (Miller 2016). Additionally, being able to interpret microbiological results will enable nurses to engage in multidisciplinary team discussions concerning clinical assessment, treatment and management. Although often not recognised as important elements of antimicrobial stewardship, it is crucial to provide continual patient assessment and nursing care in areas such as

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**BOX 1. Standard infection control precautions**

- Patient placement and assessment for infection risk
- Hand hygiene
- Respiratory and cough hygiene
- Personal protective equipment
- Safe management of care equipment
- Safe management of linen
- Safe management of blood and body fluid spillages
- Safe disposal of waste, including sharps
- Occupational safety: prevention and exposure management, including sharps

(Adapted from NHS National Services Scotland 2018)

**BOX 2. Transmission-based precautions**

- Contact precautions, for example the use of gloves and aprons. These precautions are used to prevent infections that spread via direct contact with a patient or indirectly from the patient’s environment. Examples of infections transmissible by the contact route include *Staphylococcus aureus* and herpes simplex virus
- Droplet precautions, for example the use of water-resistant surgical masks. These precautions are used to prevent infections spread over short distances (at least one metre) via droplets from a person’s respiratory tract. Examples of infections transmissible by the droplet route include influenza virus and * Bordetella pertussis* (whooping cough)
- Airborne precautions, for example the use of respiratory masks. These precautions are used to prevent infections spread via aerosols from a person’s respiratory tract. Examples of infections transmissible by the airborne route include *Mycobacterium tuberculosis* and variella zoster virus

(Adapted from NHS National Services Scotland 2018)
nutrition and hydration, prevention of urinary tract infections, respiratory infections, wound infections and pressure ulcers. Thorough nursing assessment and management can reduce the risk of acquiring resistant organisms and prevent the need for antibiotic prescribing. For example, if patients are malnourished, this can lead to immunodeficiency, which is associated with a suboptimal immune response to infection; similarly, when a patient’s fluid intake is reduced, the risk of urinary tract infection increases (Edwards et al 2011).

Knowledge and competence
Addressing infection prevention and control in complex healthcare settings can be challenging. To enable nurses to practise safely, act as a role model for colleagues and educate patients about infection prevention and control, they should ensure that their knowledge and skills are up to date and evidence based. However, this is not always the case. The Report of the Mid Staffordshire NHS Foundation Trust Public Inquiry (Francis 2013) identified suboptimal infection prevention and control in the trust, including inadequate hand hygiene and environmental cleanliness.

To ensure that nurses contribute to a competent workforce that adheres to infection prevention and control policies, they must undertake appropriate education and training. This requires healthcare organisations to provide effective training that links theory to nurses’ clinical practice (Ward 2011). However, Eslamian et al (2015) identified that some nurses may find it challenging to focus on educational events because these often take place before or after ward shifts or informally at the nurses’ station, which affects their motivation and concentration. Other nurses questioned the competence of teachers who might come from a medical background and not understand nurses’ requirements, which made them less trusting of the education provided.

The study concluded that healthcare organisations must ensure that education meets the needs of nurses, that dedicated time is set aside for nurses to attend educational events and that they are supported to apply their learning to practice (Eslamian et al 2015).

Communication and providing information
Because of the regular contact they have with patients, nurses are well-placed to discuss healthcare-associated infections and infection prevention and control with patients and visitors. However, ineffective communication, for example where patients are not informed that they are being treated for a specific infection, can result in a suboptimal patient experience, causing increased anxiety and distrust towards healthcare staff (Taran 2011). Communicating with patients about infection prevention and control should be an open and continual process in which patients are active participants. This will enable nurses to address and alleviate any anxieties and uncertainties patients may have. For example, media reports of ‘superbugs’ may cause anxiety in some patients, and nurses can manage this by providing specific factual information.

Nurses should also feel confident in the information they are communicating to patients. For example, if a patient has been diagnosed with a healthcare-associated infection, the nurse should be able to respond to a range of questions, for example which microorganism is involved, how the patient potentially acquired the infection, how it is spread, what the treatment will be, and any infection prevention and control implications. However, suboptimal communication between healthcare staff and patients has been widely documented. For example, during the Vale of Leven Hospital C. difficile outbreak inquiry in the UK, a patients’ and relatives’ group expressed significant concern about the lack of communication from nurses and doctors, specifically that information was not volunteered and only obtained following persistent requests (MacLean 2014). It was also reported that there was a significant lack of information about C. difficile and that patients and families often received inconsistent information from various healthcare professionals, in particular nurses.

Another study found that patients who had been diagnosed with a healthcare-associated S. aureus bloodstream infection received little or no verbal or written information about their infection until late in their admission (Burnett et al 2010). Patients also stated that they were not informed about the microorganisms causing their infection, or subsequent laboratory test results.

Communicating important information can be challenging, particularly when managing complex issues such as healthcare-associated infections. Barriers to optimal communication between nurses and patients include high workloads, shortage of nurses, lack of time, language and cultural differences between nurses and patients, and patients’ anxiety, pain or discomfort levels (Norouzinia et al 2016). Additionally, because of the amount of online information available and the reporting of adverse events in the media, patients and their families are often well-informed about healthcare-associated infections and may have their own opinions on the subject, which nurses must consider (Burnett et al 2013). It is important that nurses have sufficient knowledge to be able to respond to complex questions about healthcare-associated infections in a confident manner; however, the nurse must also be aware of the limits of their competence or knowledge and seek assistance from another member of the multidisciplinary team where necessary.

Effective leadership
In any healthcare organisation, leadership is crucial to successfully develop, implement and evaluate effective infection prevention and control measures. According to Gould et al (2016), the purpose of effective leadership in infection prevention and control is to reduce the risks of healthcare-associated infection, particularly those caused by antimicrobial-resistant organisms, and to achieve continuous quality improvement. Saint et al (2010) conducted a study across 14 healthcare organisations that explored the reasons why some healthcare organisations engaged with infection prevention...
and control activities, whereas other healthcare organisations did not. They found that leaders who successfully implemented such activities in their healthcare organisation (Saint et al 2010):

» Cultivated a culture of clinical excellence and effectively communicated this to staff.

» Focused on overcoming barriers and resistant staff, and managed issues that impeded the prevention of healthcare-associated infection.

» Inspired their employees.

» Thought strategically while acting locally. For example, using their personal prestige to take initiatives forward and form partnerships across professions. A leader in infection prevention and control, such as a senior infection prevention and control specialist nurse, would ideally have a clear vision, effective communication skills, and be able to implement strategies that improved patient safety and reduced the risk of harm. An effective leader would also recognise the skills of colleagues while improving competence where necessary through a non-punitive culture (Collinson 2006). However, members of the multidisciplinary team also need to work with such a leader; the success of any infection prevention control and prevention strategy depends on the efforts of the whole multidisciplinary team and should not rely solely on the leader.

Conclusion

Significant improvements have been made in infection prevention and control to address the evolving challenges of healthcare-associated infection and antimicrobial resistance. However, despite the concerted efforts of many individuals and healthcare organisations, these challenges continue to increase, in part as a result of the development of antimicrobial resistance. A clear, comprehensive and consistent approach to infection prevention and control is essential to ensure that patients receive safe and effective care. Each nurse has a responsibility to educate patients, visitors and colleagues about healthcare-associated infections and infection prevention and control measures, and to continually update their knowledge and skills to promote widespread adherence to these measures.

References


