

Improving infection control and combating antimicrobial resistance in nursing practice

Robust infection control practices are of paramount importance in health care. England's 5-year antimicrobial national action plan, first published in 2019 (Department of Health and Social Care (DHSC), 2019) stated that the Scottish National Infection Prevention and Control Manual (NIPCM) would be adopted in England as the gold standard for national guidelines, reflecting the NHS's dedication to ensuring high levels of patient safety and care (NHS England, 2023). Tailored specifically for England, the NIPCM serves not only as a guide but also as a foundation for healthcare providers, aiding them in meeting the 10 criteria set out in the Health and Social Care Act 2008 Code of Practice on the prevention and control of infections and related guidance (DHSC, 2022a; NHS England, 2023). This holistic approach emphasises the UK's commitment to establishing and maintaining stringent regulatory measures, affirming that infection control is an integral part of healthcare practice.

Antimicrobial resistance

Actively preventing infections is a crucial strategy in reducing the necessity for antibiotic prescriptions and thus combating the escalating crisis of antimicrobial resistance (AMR). AMR arises when micro-organisms such as bacteria, viruses, fungi and parasites become resistant to treatments, making standard medications ineffective and resulting in prolonged infections (Public Health England, 2017). By lowering infection rates, the reliance on and usage of antimicrobials decreases, consequently reducing the likelihood of resistance development.

Antibiotics are the most commonly prescribed antimicrobials; however, their effectiveness diminishes with overuse. More frequent use of antibiotics increases the likelihood of bacteria adapting and developing resistance (World Health Organization (WHO), 2023). This evolution

of resistance stems from the overuse or misuse of these drugs, enabling bacteria to develop survival mechanisms, resulting in infections that are progressively harder to treat and manage.

Neglecting the AMR issue could result in dire global consequences, with an estimated 10 million deaths annually worldwide by 2050 from resistant infections and could lead to a loss in global economic productivity (de Kraker et al, 2016; Foreign, Commonwealth & Development Office, 2023).

The English Surveillance Programme for Antimicrobial Utilisation and Resistance (ESPAUR) offers vital insights, showing a 5.1% decrease in antibiotic use in England over the past 5 years (UK Health Security Agency, 2023). However, the rate of antibiotic-resistant bacterial infections is still increasing, underscoring the urgent need for efficient and proactive infection prevention strategies.

Gram-negative bacteria

At present, the UK is confronted with a growing threat from drug-resistant Gram-negative bacteria. Characterised by a unique cell envelope that resists certain staining dyes due to its complex chemical make-up, this barrier significantly hinders large antibiotic molecules from penetrating and destroying the bacterial cell. The substantial challenge in creating new antibiotics that can bypass this barrier highlights the critical need for preventive measures.

Although Gram-negative bacteria are often present in healthy individuals, they can lead to severe illnesses and fatalities, particularly when causing bloodstream infections (BSIs) that progress to sepsis – a potentially fatal systemic reaction to infection. The prevalence of infections from these pathogens, including *Escherichia coli* (E coli), *Klebsiella pneumoniae*, and *Pseudomonas aeruginosa*, is increasing. Notably, these three pathogens account for 72% of all Gram-negative BSIs (Public Health England, 2017).

E coli is the most prevalent Gram-negative BSI, comprising 55% of all such infections. Data from NHS trusts in England reveal a disturbing trend, with a 6.1% rise in reported E coli BSI cases between 2016 and 2017, and a 25.6% increase since 2012-2013 (Public Health England, 2017). This significant escalation underscores the critical need for improved infection prevention and control measures.

Considering these challenges, health professionals, especially nurses, are encouraged to bolster and champion strong infection control practices. These include performing strict hand hygiene, prudent antibiotic use, adherence to vaccination schedules, and undertaking ongoing education on the most recent infection control practices. Additionally, healthcare facilities should invest in research and develop innovative treatments and diagnostics to stay one step ahead of these resistant microbes.

Sterile technique and microbial transmission prevention

Sterile technique and microbial transmission prevention are critical aspects of infection control in healthcare environments, particularly in nursing. These practices go beyond mere procedure; they symbolise a dedication to patient safety and high-quality health care. This article aims to delve into sterile techniques and strategies that prevent microbial transmission, highlighting the crucial role nursing professionals play in these tasks.

Sterile technique encompasses a series of practices designed to eradicate all microorganisms from an area, object, or individual. It is primarily used during surgeries and in managing invasive medical devices. Thus, sterile items should only come into contact with other sterile items. This extends to the environment, equipment and the personnel involved in medical procedures (DHSC, 2022b).

The principles of sterile technique involve a variety of practices. Healthcare workers, for instance, are required to don sterile gloves and gowns and use sterile instruments and drapes. A sterile field is required for surgeries, initiating a central line or a peripherally inserted central catheter, inserting urinary catheters, caring for and maintenance of a tracheostomy and placing arterial lines or central venous catheters. Any item that exits this field or contacts a non-sterile object is deemed contaminated and needs immediate replacement.

The environment for sterile procedures must meet strict cleanliness and sanitisation criteria. Operating rooms, for example, maintain a controlled setting with filtered air, frequent cleaning routines, and limited access to reduce microbial presence. Whereas sterile technique is central to infection control in surgeries and invasive procedures, preventing microbial transmission is a broader concept that permeates all aspects of nursing. See Table 1.

Table 1. Preventing microbial transmission

Infection control practice

Hand hygiene

Hand hygiene is universally acknowledged as the most crucial practice in reducing the transmission of infectious agents and is a core component of infection control. It entails washing hands with soap and water or using an alcohol-based hand rub at critical junctures in patient care. The World Health Organization's (WHO) 'Your 5 Moments for Hand Hygiene' offers a detailed framework for when hand hygiene should be performed to effectively disrupt the chain of infection (WHO, 2009)

Personal protective equipment (PPE)

PPE serves as a critical barrier against the spread of pathogens. Depending on the context, it may comprise gloves, gowns, masks and eye protection. Properly putting on and removing PPE is essential to avoid self-contamination and the proliferation of infectious agents

Aseptic technique

Aseptic technique extends beyond surgeries to routine tasks such as administering injections or inserting catheters. It involves procedures such as using alcohol wipes to clean the skin before an injection and frequently changing IV lines and catheters to hinder bacterial accumulation (Loveday et al, 2014)

Environmental controls

Routine cleaning and disinfection of the environment and equipment are vital in reducing microbial presence. High-touch areas such as bed rails, door handles, and medical devices are especially critical and should be prioritised in cleaning protocols

Sterilisation and disinfection

Sterilisation eradicates all microbial life, whereas disinfection lowers it to non-harmful levels. Comprehending the correct degree of decontamination for various scenarios is key to preventing pathogen transmission

Isolation precautions

Certain patients with infectious diseases might need to be nursed in isolation to curb pathogen dissemination. Nurses should be well versed in and comply with isolation protocols, which may involve contact, droplet or airborne precautions, each necessitating particular PPE and patient care approaches

Education and awareness

Ongoing education on the latest best practices in infection control and comprehension of the transmission modes of various pathogens is vital. Nurses need to recognise the signs of infection both in patients and in staff as a result of occupational exposure to guarantee prompt detection and intervention

Vaccination

Keeping up to date with recommended vaccinations protects nurses and their patients from diseases such as influenza, hepatitis B and pertussis

Antibiotic stewardship

Responsible use of antibiotics is crucial in preventing the development of antibiotic-resistant strains of bacteria. The nurse's role in observing patients' responses to antibiotics and championing their appropriate use is crucial

A complex challenge

The battle against AMR and infection in healthcare settings is a complex challenge that demands a coordinated and informed approach. This article has underscored the indispensable role of rigorous infection control practices, including sterile technique, hand hygiene, and the prudent use of antimicrobials.

Nurses are at the forefront of patient care and are instrumental in implementing these strategies and advocating for a culture of safety and continuous improvement. Furthermore, the importance of ongoing education, vaccination, and antibiotic stewardship has been

highlighted as key in sustaining the efficacy of current treatments and preventing the spread of infections. By embracing these multifaceted strategies, nurses and other health professionals can significantly contribute to a more resilient and healthier global population, ensuring that antibiotics remain effective for future generations. It is clear that infection prevention and control is not merely a set of guidelines but a fundamental aspect of health care that requires diligence, innovation and collective responsibility.