Sterile versus non-sterile glove use and aseptic technique


Summary

There is evidence indicating that improvements in infection control practice can reduce the incidence of healthcare-associated infection. This article explores the evidence base for glove use and aseptic technique. There is a lack of evidence regarding the influence of sterile versus clean gloves in clinical care. Therefore in practice, clean and aseptic techniques are often used interchangeably. Nurses must learn to select clean or aseptic technique, and therefore clean or sterile gloves, using a risk assessment protocol. Regular audits of aseptic technique and education are needed to improve care.

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HEALTHCARE-ASSOCIATED INFECTION (HCAI) remains a major problem in the UK. HCAI encompasses any infection acquired as a consequence of health care (Department of Health (DH) 2006). The prevention and control of HCAs are priorities for all parts of the NHS. Effective prevention and control of HCAI have to be embedded in everyday practice and applied consistently. All staff should demonstrate good infection control and hygiene practice, using an evidence base to review and inform clinical practice (DH 2006).

The DH has published various documents relating to infection control in England and Wales:

- Towards Cleaner Hospitals and Lower Rates of Infection (DH 2004).
- Saving Lives: A Delivery Programme to Reduce Healthcare Associated Infection including MRSA (DH 2005).


The most recent guidance in England and Wales is the Code of Practice for the Prevention and Control of Healthcare Associated Infections (DH 2008), which forms part of The Health Act 2006. The purpose of the code is to help NHS bodies plan and implement how they can prevent and control HCAIs. It sets out criteria by which managers of NHS organisations are to ensure that patients are cared for in a clean environment, where the risk of HCAIs is kept as low as possible. Failure to observe the code may result in an NHS organisation either being issued with an improvement notice by the Healthcare Commission, or being placed on ‘special measures’ (DH 2008).

One of the duties set out in the code is the duty to adhere to policies and protocols applicable...
to infection prevention, including standard infection control precautions and aseptic technique. For aseptic technique, the code of practice (DH 2008) stipulates the following:

- Clinical procedures should be carried out in a manner that maintains and promotes the principles of asepsis.
- Education, training and assessment in aseptic technique should be provided to all persons undertaking such procedures.
- The technique should be standardised across the organisation.
- Audit should be undertaken to monitor staff compliance with aseptic technique.

The use of gloves is one of the key issues relating to aseptic technique.

**Glove use**

The aim of wearing gloves is to reduce the risks of cross-infection from staff to patients and vice versa, to reduce transient contamination of the hands by micro-organisms that can be transmitted from one patient to another, and to protect users’ hands from certain chemicals (Infection Control Nurses Association (ICNA) 2002a). The rationale for wearing gloves will indicate the choice of glove required.

Pratt et al (2007) carried out a systematic review of glove use. Indications for glove use are set out in Box 1. Gloves must be worn as single-use items, and changed between different patients and between different care/treatment activities on the same patient. Gloves must be put on immediately before an episode of care and removed as soon as the activity is completed (Pratt et al 2007). Although gloves offer protection against hand contamination, therefore hands should always be decontaminated after glove removal (ICNA 2002b). The application of hand disinfectants to gloved hands is not recommended as gloves are single-use medical devices (Medicines and Healthcare products Regulatory Agency 2006), and alcohol products have not been tested on latex or synthetic glove material, only skin (Jones et al 2000).

Legislation relating to glove use is outlined in the Control of Substances Hazardous to Health (COSHH) Regulations 2002 (as amended) (Health and Safety Executive (HSE) 2005a), the Health and Safety at Work etc Act 1974 and A Short Guide to the Personal Protective Equipment at Work Regulations 1992 (HSE 2005b). Employers are required to take all reasonable steps to ensure that personal protective equipment (PPE) provided to employees is used properly, and that employees use PPE in accordance with training (HSE 2005b). Protective clothing must be worn appropriately and correctly to manage the risk of exposure to micro-organisms, which may be hazardous to health.

**Risk assessment**

The ICNA (2002a) recommends that before use a comprehensive risk assessment should be undertaken to determine the most appropriate glove type for the task to be undertaken. A risk assessment will explore the specific nature of the task, the type of contamination, whether the task is sterile or non-sterile, and whether the patient or staff member has an allergy to natural rubber latex (ICNA 2002a).

The choice between sterile and non-sterile gloves is based on contact with susceptible sites or clinical devices. Sterile gloves have been recommended to be worn in the following circumstances (Raybould 2001):

- Surgical procedures.
- Procedures requiring an aseptic technique.
- Sterile pharmaceutical preparations.
- Invasive procedures, for example lumbar puncture.
- Surgical wound dressings.
- Invasive procedures for immunocompromised patients.
- Insertion of invasive devices, for example urinary catheters.

**Aseptic versus clean technique**

Aseptic technique has been defined as:
‘the purposeful prevention of the transfer of organisms from one person to another by keeping the microbe count to an irreducible minimum. This involves hand decontamination, use of a sterile field, sterile gloves and sterile equipment’ (Crow 1997).

A clean technique adopts the same aims as aseptic technique but uses clean rather than sterile gloves (Preston 2005). Clean technique involves hand decontamination, maintaining a clean environment by preparing a clean field, using clean non-sterile gloves, sterile instruments and prevention of direct contamination of materials and supplies (Association for Professionals in Infection Control and Epidemiology (APIC) 2001).

Aseptic non-touch technique (ANTT) is a specific method of applying aseptic technique and was developed in the 1990s in response to a need to standardise the practice. ANTT is a clinical guideline for aseptic technique based on an evidence-based framework (Rowley and Sinclair 2004). Much of the research has focused on intravenous (IV) therapy, but the authors claim that the technique can also be used for other aseptic procedures such as urinary catheterisation or wound care. The definition of a key part is one of the key principles of ANTT. A key part is any part of equipment that if touched directly or indirectly could result in infection (Rowley and Sinclair 2004). For example, in IV therapy key parts are parts of equipment that come into direct contact with the infusion fluid. Key parts should be protected at all times using a non-touch technique (Rowley and Sinclair 2004). Non-touch technique is a method of manipulation of invasive devices or wounds without directly touching the wound, device, or any surface that might come into contact with those sites (APIC 2001).

**Insertion and care of invasive devices**

Patients who develop an infection and/or become colonised with organisms such as meticillin-resistant *Staphylococcus aureus* (MRSA) may do so because their body’s natural defences are breached when catheters, tubes and drains are inserted as part of the process of care (DH 2003). In England, almost two thirds of bacteraemia of a known source were associated with an intravascular device or with device-related infections, such as catheter-related urinary tract infection or ventilator-associated respiratory tract infection (Public Health Laboratory Service (PHLS) 2002). Central venous catheters (CVCs) were the most common source of hospital-acquired bacteraemia (PHLS 2002).

For CVCs, good standards of hand hygiene and aseptic technique can reduce the risk of infection (Pratt et al 2007). Pratt et al (2007) state that, for care of CVCs, appropriate ANTT does not necessarily require sterile gloves, and that a new pair of disposable non-sterile gloves can be used in conjunction with a non-touch technique, for example in changing catheter site dressings. However, given the risk of healthcare-associated bloodstream infection linked to CVCs, trusts need to integrate the evidence with local practice guidelines and carefully consider whether sterile or non-sterile gloves are required for CVC site care and for accessing the system. In the document *Winning Ways*, the DH (2003) stated that strict aseptic technique must be carried out by trained and competent staff for:

- Urinary catheter insertion, manipulation, washing out and urine sampling.
- CVC insertion, manipulation and removal.
- Insertion, manipulation and removal of IV feeding tubes (parenteral nutrition).
- Insertion of peripheral catheters.

**Aseptic technique and wound care**

Aseptic technique is traditionally used in wound care, yet several authors (Briggs et al 1996, Hollinworth and Kingston 1998) have questioned whether this is ritualistic, based on limited research and rationale (Gilmour 2000). Some authors have suggested that sterile gloves are only necessary if the practitioner’s hands come into contact with sterile body areas such as during surgery or urinary catheterisation. They argue that non-sterile gloves provide adequate infection control if linked with effective hand decontamination (Hollinworth and Kingston 1998).

Hartley (2005) reported that aseptic technique is still not being carried out to a high standard across the UK. This may be related to the theory-practice gap and/or confusion and complacency in professional practice (Hallett 2000). In the United States, a survey on aseptic technique found that technique choices among staff nurses were based on the education level of the care giver and perception of infection risk to the patient, and that there were no specific scientific research studies to support the use of either ‘clean’ or ‘aseptic’ technique (Wise et al 1997).

Stotts et al (1997) examined wound healing in a sample of 30 patients following elective gastrointestinal surgery. Wound dressings were changed three times per day, with aseptic technique used for half of the patients and clean technique for the other half. There was no difference in wound healing after four days. This study was limited by the small sample size and
the fact that patients’ wounds were assessed only four days following surgery, before completion of healing and with no long-term follow up.

Sage and Argall (2003) carried out a review to establish whether the use of sterile gloves during the treatment of simple traumatic wounds reduced infections. Although 48 articles were examined, the authors found no available evidence for the use of sterile gloves in preference to clean gloves in the treatment of simple traumatic wounds. The authors argued that it may be unethical to start using non-sterile gloves and that this was an area for potential research.

St Clair and Larrabee (2002) examined the practice of using sterile gloves for post-operative wound dressing changes in acute care. On reviewing the data, the authors found neither infection rate nor wound healing was adversely affected by using non-sterile rather than sterile gloves. Because of the risk of increased post-operative infection rates and delayed wound healing, the authors found insufficient evidence to warrant a change in practice from the use of sterile to non-sterile gloves. The authors concluded that multidisciplinary studies that investigate the relative influence of factors which influence susceptibility to wound infection, such as surgical asepsis during the perioperative period, and intrinsic patient factors such as nutritional status, would be most informative.

Where the level of risk to the patient is not clear, erring on the side of safety must be the only option (Heenan 1995). It is acknowledged that in some practice environments where the assessment of risk is low it would be acceptable to use clean technique, for example chronic leg ulcers when managed in the patient’s home (Hampton and Collins 2004).

Factors to be considered when making the choice between aseptic and clean technique for wound care include the following (APIC 2001):

- Healthcare setting, for example acute hospital versus patient’s home.
- Immune status of the patient, which is influenced by:
  - Underlying disease, for example patients with debilitating or malignant disease.
  - Age: neonates and older people are more at risk because of their less efficient immune system.
  - Medication, for example corticosteroids and immunosuppressive drugs.
  - Patient procedures, for example surgery.
- Type of wound, for example acute versus chronic.
- Location and depth of wound.
- Invasiveness of the procedure, for example whether debridement or extensive packing of the wound is to be performed.

Implications for clinical practice

Bree-Williams and Waterman (1996) found that 33% of nurses contaminated their hands and equipment during the aseptic technique procedure, due to factors such as poor glove technique and making the procedure more complicated than necessary. Davey (1997) found that nurses were not clear about when to apply gloves during aseptic technique for wound care, and that some nurses did not know that the wound dressing could be removed with the sterile waste bag to avoid contaminating their hands, so reducing the need for an extra pair of gloves or forceps.

Improving skill-based care should be a focus for ongoing post-registration education (Preston 2004). This includes ‘skills in glove selection and technique, maintaining a sterile field with the use of non-touch principles and developing risk assessment protocols’ (Preston 2005). Rowley and Sinclair (2004) recommend implementing ANTT in more hospitals, ensuring good practice is created through a process of training, audit and assessment, and continuing to evaluate it through the audit cycle.

Wise et al (1997) found that, for wound care, nurses seldom deviate from patterns they learned during their basic education, so that nursing practice patterns may be resistant to modification by policy change alone. Regular audits of aseptic technique, formulation of action plans where necessary and educational support programmes are needed to improve standards of care (Preston 2005).

Conclusion

In practice, clean and aseptic techniques are used interchangeably, often without risk assessment (Gilmour 2000). Nurses must learn to select clean or aseptic technique, and therefore clean or sterile gloves, using a risk-assessment protocol. Risk assessments on types of gloves, equipment and exposure to blood and body fluids should be completed for all aseptic procedures (Weaver 2004). This should guide nurses to adopt safer principles when using gloves (Preston 2005).

Variability in practice occurs when nursing practice is not guided by research (Wise et al 1997). However, it would be easy to lose track of the principles of aseptic technique when
questioning every action (Gilmour 1999). There is a lack of evidence regarding the influence of sterile versus clean gloves in clinical care, including post-operative infection rates and delayed wound healing rates. The risk requires further evidence before healthcare staff change practice from sterile gloves to clean gloves (Rosswurm and Larrabee 1999). Where the evidence base is lacking, best practice must be guided by expert opinion and national and international guidance, which need to be integrated into local practice guidelines (Pratt et al 2007).

Although ritualistic practice needs to be questioned, with the rising incidence of multi-resistant infections, it seems prudent to err on the side of caution when in doubt.

References