Does glove use increase the risk of infection?

In this article...
- Why gloves are misused in practice
- Guidance on the correct use of gloves
- Role of emotions and socialisation in influencing glove use

Over the past two decades gloves have become a routine part of healthcare delivery, and are often used with little consideration for whether it is appropriate in a given situation or the potential hazards associated with their use. While hand hygiene is acknowledged and promoted as a fundamental aspect of infection prevention practice, how the use of gloves may affect compliance with hand hygiene is rarely discussed.

Hands and infection transmission
Numerous studies have shown the role of hands as a vehicle for transmitting infection between patients in healthcare settings (World Health Organization, 2009). Micro-organisms are picked up on hands by touch and, as they are not adapted to survive in the arid micro-environment of the skin, these transient organisms are readily transferred to the next object touched by the hands (Hoffman and Wilson, 1994). Touching any person or non-sterile object is likely to result in the transfer of micro-organisms to the hands, but some surfaces are more contaminated than others and the numbers of organisms transferred from these is likely to be much greater (Mackintosh and Hoffman, 1984). These transient micro-organisms are easily removed from the skin surface by washing or destroyed by contact with alcohol hand rubs (WHO, 2009).

Indications for glove use
Before the mid-1980s, non-sterile examination or clinical gloves were primarily recommended for use with patients under isolation precautions (Garner and Simmons, 1983). However, after the identification of the HIV and evidence that transmission occurred as a result of exposure to infected blood, the Centers for Disease Control in the US recommended the use of “protective barriers to prevent exposure to blood, body fluids containing visible blood”, together with other high-risk fluids such as cerebrospinal and amniotic fluids (CDC, 1988; 1987).

The advice acknowledged the difficulty in identifying those carrying blood-borne viruses and specified the need to apply the precautions in the care of all patients; as a result they were described as “universal precautions” (UPs) (Siegel et al, 2007). UPs also emphasised the importance of risk assessment, with the type of protective barrier(s) selected being appropriate for the procedure performed and the type of exposure anticipated. The principles of risk assessment are summarised in Box 1.

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Use of gloves is widespread in clinical practice, but research suggests they are often used inappropriately, and that this increases infection risks to patients.
Subsequently, CDC guidance on UPs was extended to take account of the fact that potentially infectious micro-organisms are present in “moist body sites or substances”; the use of protective barriers for any direct contact with blood, body fluids (BBF), mucous membranes and non-intact skin became widely recommended (Wilson and Breeden, 1990; CDC, 1988; Lynch et al, 1987).

The primary purpose of this approach was to reduce the risks to patients of cross-transmission of micro-organisms via health professionals’ hands by minimising soiling in situations where gross contamination of the skin was likely (Jackson and Lynch, 1991). Patients are far more vulnerable to infection caused by pathogens acquired on the hands than the staff who care for them, because the organisms can enter their tissues via invasive devices and lesions. In addition, underlying illness, co-morbidities and treatments diminish their ability to fight infection (Wilson, 2006).

The use of gloves to protect health professionals from micro-organisms harboured by their patients is therefore a secondary benefit (Jackson and Lynch, 1991). Table 1 gives examples of procedures where the use of gloves is indicated.

Gloves should be applied immediately before contact with a patient’s BBF, mucous membranes or non-intact skin; this ensures that other micro-organisms are not acquired on the gloves and transferred to susceptible sites on the patient. Likewise, gloves should be removed immediately after the procedure to ensure that contamination is not transferred to other items or patients (Royal College of Nursing, 2012; Jackson and Lynch, 1991). The concept that protective equipment should be used where direct contact with BBF, non-intact skin or mucous membranes is anticipated has now been incorporated into guidance on “standard precautions” (Loveday et al, 2014a). These are a set of principles designed to be used in the care of all patients to minimise the risk of transmission of pathogens (and therefore infection) to patients and staff (Siegel et al, 2007; Wilson, 2006).

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TABLE 1. GLOVE USE IN CLINICAL PRACTICE

<table>
<thead>
<tr>
<th>Gloves not indicated</th>
<th>Gloves indicated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean</td>
<td>Sterile</td>
</tr>
<tr>
<td>Taking patient</td>
<td>Touching/handling blood or body fluids (BBF)</td>
</tr>
<tr>
<td>observations</td>
<td></td>
</tr>
<tr>
<td>Subcutaneous/</td>
<td>Contact with mucous membranes</td>
</tr>
<tr>
<td>intramuscular injections</td>
<td></td>
</tr>
<tr>
<td>Administration/</td>
<td>Insertion/removal of peripheral cannula</td>
</tr>
<tr>
<td>preparation of IV</td>
<td></td>
</tr>
<tr>
<td>drugs</td>
<td></td>
</tr>
<tr>
<td>Bathing/dressing patient</td>
<td>Contact with non-intact skin</td>
</tr>
<tr>
<td>(unless visible BBF)</td>
<td></td>
</tr>
<tr>
<td>Handling used linen</td>
<td>Removal of invasive devices (eg urine catheters, endotracheal tubes)</td>
</tr>
<tr>
<td>(unless soiled with BBF)</td>
<td></td>
</tr>
<tr>
<td>Manipulation of</td>
<td>Taking a blood sample</td>
</tr>
<tr>
<td>vascular lines</td>
<td></td>
</tr>
<tr>
<td>(using aseptic technique)</td>
<td></td>
</tr>
<tr>
<td>Physiotherapy (unless procedure involves direct exposure to BBF)</td>
<td>Vaginal/pelvic examination</td>
</tr>
<tr>
<td>Giving oral</td>
<td>Oral/tracheal suctioning</td>
</tr>
<tr>
<td>medications</td>
<td></td>
</tr>
<tr>
<td>Feeding a patient</td>
<td>Handling hazardous chemicals, eg disinfectants, chemotherapy agents</td>
</tr>
<tr>
<td>Transporting a patient</td>
<td>Handling instruments, equipment or items contaminated with BBF</td>
</tr>
<tr>
<td>Writing on charts</td>
<td>Handling waste contaminated with BBF</td>
</tr>
<tr>
<td></td>
<td>Handling sharp instruments contaminated with BBF</td>
</tr>
<tr>
<td></td>
<td>Cleaning BBF spills</td>
</tr>
</tbody>
</table>


1 May be preferred for handling contaminated sharps. 2 Only indicated for preparation of hazardous drugs such as chemotherapy agents. BBF = blood, body fluids. IV = intravenous.

Participants also saw gloves as a way to save time and avoid the need for hand hygiene, and considered that hospital policy on gloves contradicted their perception of infection control practice. Gloves were also justified as something that patients expected as a demonstration of high standards of hygiene or as a physical barrier, although participants acknowledged that it might negatively impact on their relationship with patients. There is currently no evidence on patients’ views on glove use; this is an important area for further research (Loveday et al, 2014b).

The role of disgust in hygienic behaviour in different countries has been described as an innate mechanism for defence against infection (Curtis, 2007). The work of Whitby et al (2007; 2006) suggested that feelings of disgust towards “dirt and germs” are important drivers for hand hygiene behaviour in healthcare settings and that these attitudes are established early in life and become a form of ritualised behaviour to protect the self from infection (Whitby et al, 2007). However, there is evidence that an assessment of the risk of exposure to “dirt” rather than infection is the key driver, and that perception of dirt is highly contextual, encompassing much more than BBF – examples include washing water contaminated by “body debris” and fingers that may have had contact with faeces; health professionals are also strongly influenced by value judgements made about patients and their standard of cleanliness (Jackson and Griffiths, 2014).

Perceptions of dirt also seem to be moderated by familiarity and are applied differently to adults and children, even though both may be incontinent (Jackson and Griffiths, 2014), and precautions may be relaxed if the patient is “known” or is perceived to be clean. Health professionals’ focus on the protection of self from dirt, rather than on the risk of infection may therefore lead to behaviour that increases the risk of transmitting micro-organisms between patients, such as the observed conduct in relation to the use of gloves.

These studies show the importance of addressing underlying motivators of glove use if behaviour is to be modified. It is possible the strong messages in recent years about the risks of infection in healthcare settings may have increased health professionals’ perceived need to protect themselves and contributed to gloves being seen as an essential part of this protection.

Approaches that provoke emotions of disgust have been proposed as a means of improving hand hygiene behaviour (Porzig-Drummond et al, 2009). However,
the emerging evidence about glove use suggests this could be a high-risk strategy as it is likely to increase the triggers for using gloves and decrease the focus on the critical points for glove removal and hand hygiene. Education and training of the multidisciplinary team to address the lack of knowledge, the irrational beliefs and the inaccurate perceptions of risk is needed but may not be enough to counteract these emotions (Prieto and McLeod Clark, 2005).

Conclusion
Recent achievements in the UK relating to reducing infections caused by MRSA and C. difficile are impressive but represent a very small part of the problem of healthcare-associated infection (Johnson et al, 2012; Health Protection Agency, 2011). As well as the endemic problems of healthcare-associated pneumonia, surgical site and urinary tract infections, there are now new threats in the form of increasing cases of severe infections caused by Gram-negative pathogens such as E. coli and Klebsiella pneumoniae, and a rapid rise in strains that are highly resistant to antimicrobial agents (Chief Medical Officer, 2011; Wilson et al, 2011). The highest standards of practice in relation to the prevention of HCAIs therefore continue to be paramount in assuring patient safety.

The emerging evidence of excessive and inappropriate glove use in healthcare settings and associated risks of cross-contamination indicates the need to challenge health professionals’ perceptions of risk, the role of gloves in preventing HCAIs and hazards associated with their misuse.

It is likely that many of the factors that have been successful in improving compliance with hand hygiene, such as using cues to action and influencing system change at an institutional level, will be relevant to improving glove use behaviour. However, educational approaches that address the motivators of this behaviour are essential if change in practice is to be effective and sustained.

References
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