Evolving our View of Hand Hygiene and Glove Use

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Summary:

While single use disposable gloves are a standard part of providing patient care and part of the personal protective equipment (PPE) used for transmission based precautions, a recent study challenges whether performing hand hygiene by using alcohol based hand rub (ABHR) on gloved hands during a care sequence might be an effective alternative to the gold standard practice of removing gloves, performing hand hygiene, and regloving during a care sequence.

The study conducted by Thom (2024) found that compared to usual care, where the HCP would wear the same pair of gloves for the entire care sequence and not stop to doff gloves, perform hand hygiene, and reglove when there were indications to perform hand hygiene, the intervention of applying ABHR to gloved hands when there were indications to perform hand hygiene resulted in less bacterial and pathogen contamination of gloves than usual care and took half the time of the gold standard practice. However, the intervention was inferior to the gold standard practice in frequency of bacterial contamination and frequency of pathogen contamination.

Hand Hygiene, Glove Use, Standard and Transmission Based Precautions:

Multiple guidelines define the importance and role of healthcare personnel (HCP) performing hand hygiene when in healthcare settings (WHO, 2009) (CDC, 2024).

HCPs routinely wear single use disposable gloves while providing patient care or while within the patient environment performing other tasks. Public health authorities provide guidance on when to don or doff gloves, perform hand hygiene, and reglove.

CDC (2024) recommendations on glove use.

- Wear gloves when contact with blood or other potentially infectious materials, mucous membranes, and nonintact skin could occur
- Remove gloves after caring for a patient. Do not wear the same pair of gloves for the care of more than one patient, and do not wash gloves between uses with different patients.
- Change gloves during patient care if moving from a contaminated body site to a clean body site.

WHO (2009) recommendations on glove use.

- Before a sterile condition
- Before expected contact with blood or a body fluid or contact with nonintact skin or mucous membranes.
- Before contact with a patient and their surroundings during contact precautions

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- Remove gloves when damaged or non-integrity of the gloves is suspected
- Remove gloves when contact with blood, body fluids, non-intact skin, or mucous membranes has occurred and this contact has ended.
- Remove gloves when contact with a patient or their surroundings or a contaminated body site on the patient has ended
- Remove gloves and perform hand hygiene when there is an indication for hand hygiene.

Gloving practices (WHO, 2009) are driven by the need to:

- Reduce the risk of HCP acquiring pathogens on their hands while providing patient care, especially from exposure to blood and body fluids, which can either result in infection to the HCP or,
- Dissemination and transmission of pathogens to other patients, either directly via contaminated hands or indirectly via contaminated surfaces, which can result in infection of other patients.

It is important to note that glove use does not eliminate the need to perform hand hygiene. HCP should remove gloves and perform hand hygiene to protect a body site from the flora of a previously touched body site on the same patient, especially when moving from a dirty or contaminated body site to a clean body site (WHO, 2009). This can necessitate the HCP changing gloves and performing hand hygiene multiple times during a care sequence on a single patient (WHO, 2009). Doing this multiple times during a single care sequence on a patient can take a considerable amount of time, as it can take 30 sec each time the HCP removes gloves, performs hand hygiene, and regloves.

The role of gloving itself is not without some controversy. While gloves can provide an effective barrier to protect the HCP, multiple studies have found that HCP who wore gloves were less likely to perform hand hygiene upon leaving the patient room, while other studies found glove use increased hand hygiene compliance (CDC, 2024) (WHO, 2009). The evidence linking the importance of gloving and hand hygiene is substantial. Also, some studies show glove defects can facilitate the contamination of hands either in use or upon glove removal (CDC, 2024). The barrier integrity of the gloves is affected by the type and quality of the glove material, type of care provided, and length of care, among other factors (CDC, 2024).

The WHO “My 5 Moments” model (WHO, 2009) provides HCPs with indications of when to perform hand hygiene while in a patient room. One of the concerns with the model is the amount of time it would take HCP to perform hand hygiene at 100% compliance. A systematic review by Boyce (2017) found that while the median nurse may perform hand hygiene an average of 5 times per hour during a 12 hour shift, approximately 5% of nurses may need to perform hand hygiene at 3 times that rate, or 15+ times per hour. Assuming 30 seconds per hand hygiene event, this would take ~8 min per hour, or ~13% of the hour, just to perform hand hygiene, which may affect the nurse’s ability to provide care. Consequently, there has been interest in considering alternatives to the WHO 5 moments model that may be similarly effective but take less time when applied in a healthcare facility. One such study (Thom, 2024) is discussed below.

Reuse of Gloves:

Public health authorities, including the CDC and WHO, state that single use/disposable gloves should not be reused and that HCP should remove gloves, perform hand hygiene, and reglove as needed while providing patient care, following the principles outlined in transmission based precautions (CDC, 2024) (WHO, 2009).

Observations performed by Thom (2024) prior to conducting their study found that most HCP wore a single pair of disposable gloves during a care sequence regardless of whether there were indications to stop care, remove gloves, perform hand hygiene, and reglove as would be required by the gold standard practice and the CDC and WHO guidelines. Despite all HCP being trained in the gold standard practice, this was rarely the procedure followed by HCP.

Thom et al. (2024):

In this study performed at 4 sites in the US, the authors compared usual care to the intervention in the first part of the study or compared the intervention to the gold standard practice in the second part of the study. The practices are described below.

- **Usual care**, where the HCP donned gloves at the start of the care sequence for a single patient and removed gloves at the end of the care sequence, ignoring indications to stop care, remove gloves, perform hand hygiene, and regloving before continuing care.
- **Intervention**, where the HCP donned gloves at the start of the care sequence for a single patient and stopped care to perform hand hygiene by using ABHR on gloved hands when there were indications to perform hand hygiene per the WHO 5 moments model.
- **Gold Standard Practice**, where the HCP donned gloves at the start of the care sequence for a single patient and stopped care when there were indications to perform hand hygiene per the WHO 5 moments model to remove gloves, perform hand hygiene by using ABHR, and regloved before continuing care.

The authors performed sampling of the gloves using palm imprints of the used gloves on agar plates. For the gold standard practice, gloved hands were sampled after they removed gloves, performed hand hygiene, and regloved. As these gloves were not directly used in care activities, they would be expected to have no contamination. For the intervention, gloved hands were sampled after performing hand hygiene to the gloved hands and the ABHR had dried on the gloved hands after an indication to perform hand hygiene per the WHO 5 moments model. For the usual care arm, they sampled gloved hands after the indication for a WHO moment of hand hygiene as the HCP moved to the next task.

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When comparing the intervention to the gold standard practice arm, the authors found bacteria on gloved hands in:

- 67.4% (432 of 641) of observations in the gold standard practice arm
- 82.8% (548 of 662) of observations in the intervention

When compared to the gold standard practice, where testing was done on freshly applied gloves, the frequency of bacterial contamination was surprisingly similar to the intervention although the gold standard practices was statistically superior. When testing specifically for pathogenic bacteria, 7.3% of intervention gloves and 3.9% of gold standard practice gloves were contaminated with pathogens.

The amount of time needed for the intervention was 14 seconds, while the amount of time needed for the gold standard practice was 29 seconds. While the intervention was similar but not microbiologically equivalent to the gold standard practice, it only took half the time to perform.

When comparing usual care to the intervention, the authors found bacteria on gloved hands in:

- 98.5% (133 of 135) observations in the usual care arm, and
- 76.6% (173 of 226) observations in the intervention

As expected, applying ABHR to gloved hands reduced the amount of bacterial contamination versus usual care, where almost all gloves were contaminated after performing care.

When testing specifically for pathogenic bacteria, 7.1% of intervention gloves and 28.1% of usual care gloves were contaminated with pathogens.

Additionally, the authors tested 331 gloves after use in the various arms and found micro-perforations in 2.9% (6 of 205) of gloves used in the intervention, while gloves used in the other 2 practices showed no micro-perforations, suggesting that using ABHR on gloved hands may carry some risk of creating micro-perforations in the glove.

The authors concluded that given poor adherence to the gold standard practice observed during the study and the clear advantages to usual care, performing hand hygiene to gloved hands with ABHR during a care sequence may be a practical method to decontaminate gloved hands during patient care sequences.

Conclusion:

In healthcare facilities where it is challenging to get staff to comply with gold standard practices for various reasons, Infection Preventionists are often faced with the challenge of considering less effective practices that may achieve higher compliance. The risk tolerance of the Infection Prevention team at a healthcare facility may be a substantial factor in what are considered acceptable alternative practices.

In this case, the standard hand hygiene practice recommended by the CDC and WHO was found to have very little compliance in these hospitals, despite routine education about the importance of the practice. The authors

considered an alternative practice and properly compared it to the gold standard practice and what was commonly done by HCP. In this case the intervention proposed by Thom was found by the authors to be a reasonable alternative, but further research should be done to determine the level of staff compliance versus the gold standard practice and whether the practice studied by Thom has any clinical impact, which was not evaluated in this study. A practice that is somewhat less effective but performed more frequently may be preferred to one that is more effective but performed less frequently and ultimately may provide better patient outcomes across a facility. Additional research is needed before adopting this practice in a facility, but it is an interesting approach to addressing an established risk.

References:

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