**How to use personal protective equipment**

**Learning points...**
- Details of different types of personal protective equipment
- When PPE should be used
- How to safely remove PPE

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This article offers a refresher on what personal protective equipment (PPE) is, how to choose the right PPE and how to wear and remove it safely. PPE aims to improve staff and patient safety, but self-contamination commonly occurs during its removal; failure to remove PPE carefully can lead to contamination of the user’s skin, own clothes, uniform or scrubs, hair, face and hands. The importance of correct PPE use has been highlighted by the ebola crisis and NHS preparations to deal with patients who are infected.

Protecting staff and patients from infection is vital so all staff who may have to use personal protective equipment must know how to use and remove it correctly.

Before using PPE, staff should be educated and their competence assessed in the assessment of risk, and selection and use of PPE, as well as the use of standard precautions. It is important to assess whether the selected PPE will be effective – for example, staff using respirators will need to be “fit tested” to ensure masks are a correct and safe fit (NHS England and Public Health England, 2013a).

Using unfamiliar PPE can increase the risk of self-contamination due to lack of skill and confusion in the correct removal method. PPE should not be used, nor tasks undertaken that require its use, until staff are confident and competent in doing so.

**When should PPE be used?**

**Gloves**

Gloves are single-use items and should be used for invasive procedures including contact with sterile sites, non-intact skin or mucous membranes, and for all activities that have been assessed as carrying a risk of exposure to blood, body fluid or infectious respired aerosols or droplets.

They must be put on immediately before an episode of patient contact or treatment; they must not be used to open doors and collect equipment before patient contact.

**Gloves should be:**
- Used when handling sharps or contaminated devices (Loveday et al, 2014) – micro-organisms can survive on objects, or “fomites”, and become a risk for transmission of infection;
- Removable as soon as the episode of care is completed – hands must be decontaminated immediately after glove removal;
- Changed when soiled – they must not be washed or decontaminated with

**5 practice points**

1. Health professionals must use personal protective equipment (PPE) when undertaking any procedure that carries an infection risk
2. PPE is only as effective as the user’s skill in use and removal
3. PPE can protect staff from infection risks, and vulnerable patients from acquiring infections from staff
4. PPE must be assessed for each procedure
5. Change PPE whenever it is heavily splashed and between procedures with different patients

**Box 1. Hand Hygiene**

Hands must be decontaminated in line with the World Health Organization’s (2009) five moments:
- Immediately before each episode of direct patient contact or care
- Before clean/aseptic procedures, whether or not personal protective equipment has been worn
- After risk of body fluid exposure
- After touching a patient
- After touching a patient’s surroundings

Hands should also be decontaminated immediately after gloves have been removed.
alcohol products between procedures and should be changed between caring for different patients.

Since the effect of alcohol hand gels on glove material has not been tested, the integrity of gloves decontaminated in this way cannot be guaranteed.

Aprons and gowns

Aprons are single-use items and must be worn when in close contact with patients, materials or equipment that pose a risk of contamination with blood or body fluids (Loveday et al, 2014). Fluid-repellent gowns must be worn when there is an extensive risk of the splashing of blood or body fluid onto the skin or clothing of health workers.

Staff should ensure aprons/gowns are:
- Changed when visibly soiled – although it takes some time for fluid to seep through fluid-repellent gowns (strike through), they are not waterproof;
- Worn for one procedure or episode of patient care only.

Non-disposable PPE should be sent for appropriate decontamination (Loveday et al, 2014).

Footwear

Wellington boots or water-repellent boots should be worn when there is a risk of blood/body fluid splashes, leaks or large spillages, such as oesophageal bleeds and in the operating theatre. If protective footwear is required, consider the following:
- Hands become contaminated from touching and pulling on footwear from whatever has splashed onto its surface or been picked up on the sole during a patient care episode;
- If you remove footwear and stand in the same space, your feet will be contaminated. Have a “dirty” area for footwear removal and a “clean” one where nobody walks in contaminated footwear;
- There is little evidence of gross infection transmission from the floor surface unless there are large spillages of infected material so protective footwear is not usually required;
- Where possible, protective footwear should be single use. If re-used, follow the manufacturers’ instructions to decontaminate. Dependent on the contamination, 10,000ppm chlorine agent should be used.

Head protection

Hair nets and caps are single-use items and prevent shedding from the wearer’s hair onto the patient, as well as acting as a barrier protecting hair from inadvertent hand contact and loose hair falling forward. All strings from masks and visors should be placed over hair protection – this allows them to be removed after a procedure without contaminating the hair.

Putting on PPE

When putting on PPE, the following sequence should be followed:
- Decontaminate hands before putting on PPE – gloves provide an ideal, warm, moist environment where bacteria thrive. Hand decontamination will remove any transient bacteria from a previous patient or the environment (Box 1);
- Put on plastic apron. Usually aprons are supplied on a roll and are folded. Open the apron outwards towards the patient so any environmental contamination on the outer surface does not come into contact with the patient;
- Put on gloves. Remember, touching door handles or equipment after putting on gloves may contaminate them before you reach the patient.

Removing PPE

PPE must be removed in the following sequence to minimise the risk of cross/self-contamination:
- Gloves;
- Apron/gown;
- Mask/respirator, when worn;
- Hands must be decontaminated after the removal of PPE (Loveday et al, 2014).

Aprons and gowns should be removed by pulling them away from the face/shoulders and rolling them downwards so the contaminated outer surface is folded inwards; in this way, only the clean, inner surface is exposed. This reduces contami-
nated surface contact with user's skin, clothing and the environment in which PPE is being removed. Fig 3 outlines the procedure for removing gloves.

Masks and visors should be removed by pulling strings (or other securing devices) away from the side of the face. If a surgical cap is used, the strings can be removed from the back of the head. Remember:

- If the health professional is not wearing a cap, fumbling for strings will contaminate the hair;
- Pulling masks off from the front surface means the hands grasp the most contaminated surface of the mask, thereby increasing the risk of self-contamination.

**Disposal of PPE**

It is vital that PPE is disposed of correctly:

- PPE from non-infectious patients can be disposed of in "offensive" waste (yellow and black striped bags) or clinical or infectious waste (orange bags) streams.
- PPE from patients who are infectious must go into clinical infectious waste streams (orange bags), usually for incineration. This waste may be autoclaved and sent for alternative treatment like shredding and landfill. Yellow waste bags may also be used.
- PPE from cytotoxic management must go into the cytotoxic waste stream (purple and yellow striped bags).

**Enhanced PPE**

Enhanced PPE must be used with high-risk patients including those with ebola virus disease (EVD). Expert guidance on ebola is continually being updated as lessons are learnt from workers on the front line. The most up-to-date version of guidance from the Department of Health (2014) provides information on what PPE should be considered for use in caring for patients with suspected or confirmed ebola infection. Nurses should consult local policies and procedures in their own organisations for further information.

**PPE choice, training and support**

There are often no set rules for PPE choice and practice in patient care so a risk assessment based on patient history, presenting care needs and experience of the user must guide PPE use. The steps detailed above provide a guide for users, but additional advice should always be sought from local infection prevention and control specialists.

All staff should be trained in using the PPE they need in their normal working duties. Those who have not had appropriate training or lack confidence in using PPE should not be expected to undertake these procedures. All staff using PPE should be competence assessed as safe to do so and understand the underpinning evidence to support their practice.

A “buddy” is always helpful in ensuring the safe use and removal of PPE. This is another trained person who:

- Checks that items fit correctly;
- Prevents inadvertent breach of PPE;
- Assists in the removal of PPE to reduce the risk of self-contamination by the wearer.

A buddy is essential in high-risk care situations such as EVD.

Staff should be actively encouraged to challenge potential breaches in PPE use and removal, regardless of the seniority of the wearer. A culture promoting courteous acceptance of a challenge should be adopted to ensure staff safety in high-risk situations. Junior staff and learners watch senior, experienced staff and learn from their practices so keeping very strict observance of protocol in PPE use and removal fosters a safe environment for all staff.

**Patient wellbeing in isolation**

Patients with an infection or suspected infection may be kept in isolation. There are many studies of the impact of such isolation on patients (Abad et al, 2010; Madeo, 2003) and, while they may initially feel alone and abandoned, these feelings can give way to an appreciation of a quiet, private space. Everyone reacts differently in stressful surroundings and care should be individualised.

When dealing with infections such as ebola, strict isolation is vital for containment and must be the prime consideration. All efforts must be made to make patients in these circumstances feel as informed, comfortable and anxiety free as possible.

**Conclusion**

PPE is part of everyday healthcare and it is vital that nurses and other health professionals have appropriate training to minimise the risks of cross-contamination between patients and between patients and staff. Staff should feel able to challenge practice and have access to training that is based on the best available evidence. Hand hygiene remains the cornerstone of infection prevention and all health workers must be aware that wearing PPE does not replace the need to carry out safe, hand-hygiene practices and hand decontamination.

**References**


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