

# Delivering care in the strangest of times — necessity becomes the mother of innovation

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pandemic we would do well to hold on to when the present danger has receded!

One example of the need to respond quickly to the challenges we all face has been the unanticipated rise of pressure damage experienced by frontline healthcare professionals wearing personal protective equipment (PPE). For once, the focus on pressure ulcers has shifted from patients to caregivers. In China, a survey of 4,308 clinicians across 161 hospitals reported a 42.8% prevalence of pressure damage caused by PPE (Jiang et al, 2020). The issue prompted the rapid development of clinical guidance around the world (for example, NHS guideline 'Helping Prevent Facial Skin Damage Beneath Personal Protective Equipment' (NHS England, 2020), the US National Pressure Injury Advisory Panel's 'Position Statements on Preventing Injury with n95 Masks' (NPIAP, 2020) and the Associação Portuguesa de Tratamento de Feridas' White Paper 'PRPPE Guideline Covid 19' (APTferidas, 2020).

One challenge of the rapid evolution of multiple guidance documents lies in the potential for inconsistencies between documents leading to confusion for clinicians. That the current guidance, developed rapidly and with a very limited evidence base, should differ should come as no surprise, simply reflecting that we don't have the time to wait for science to provide answers when there is a need for advice today.

Inconsistencies can be seen in the recent guidance documents around three areas of protecting skin from damage from PPE:

- ▶▶ Use of skin barrier products
- ▶▶ Use of dressings under PPE
- ▶▶ Length of time before which PPE should be removed and mechanical forces on the skin removed.

Considering the use of dressings under PPE to protect the skin, NHS England recommends avoiding the use of dressings but then provides general guidance on selecting dressings to protect skin while avoiding slippage of PPE and maintaining a correct fit and seal. This apparent contradiction is entirely pragmatic; some staff will probably use prophylactic dressings and so the guidance offers tips of their safe use including the requirement for the dressing to be changed each time they doff their PPE. The US guidance includes help on dressing use under surgical and respirator masks but makes no recommendation upon use of prophylactic dressings under respirator masks given the uncertainty whether this practice may increase the risk of COVID-19 infection. The Portuguese guidance includes information about the size and shape of dressings for different areas of the face and head along with a recommendation for use of thin foams with silicone while noting that occlusive films and hydrocolloids may be an alternative solution. To date, dressing manufacturers have been quiet regarding recommending their product use alongside PPE; this would appear to be a sound position to hold until data is available on the extent and impact of prophylactic dressing use.

Guidance differs on the length of time to wear PPE before removing it to free the skin from mechanical loading; with maximum wear times given as 4 hours (Portugal), 2 hours (England) and for 15 minutes every 2 hours where possible (US).

As time passes, and we gain more experience of the impact of PPE on skin damage, these differences between guidance documents will likely reduce

**A**rt imitates nature, and necessity is the mother of invention; science also invites to study and practicks, but theory gives the prospect, and operation finishes the project' (Franck, 1694). This age-old quotation appears particularly apt during this grim period in human history, where in only a few weeks considerable innovation and change has emerged to meet the daily challenges of reducing harm from the coronavirus pandemic. While necessity and the challenge of daily operation of health and social care perhaps have not yet 'finished the project' but have awakened our realization that massive changes in how care is delivered can be achieved very quickly. This may be one lesson from the

and a common position on the prevention of skin damage from PPE will emerge. Institutional policies and procedures must also be considered when considering the implementation of guidance on PPE and skin damage, a point noted in all three guidance documents. Knowledge about and experience of skin damage under PPE is evolving rapidly. The European Pressure Ulcer Advisory Panel (EWMA) created a COVID-19 and Pressure Ulcer Prevention Forum on Facebook for clinicians to share information (EWMA, 2020) and Wounds UK recently launched TVN<sup>TV</sup>, videos offering practical advice to clinicians during COVID-19 and beyond (Wounds UK, 2020).

Looking to the future, the experience gained around PPE and skin damage will help inform science to consider new materials for constructing medical devices such as PPE to help reduce future risk of skin damage. A recent international consensus statement on device-related pressure ulcers (DRPU) (Gefen et al, 2020) and discussion around the improvement of medical devices (MedicalResearch.Com, 2020) emphasized the need for health professionals, bioengineers and industry to work closely together to develop designs for medical devices that will reduce the risk of DRPU.

While future medical devices will surely see developments that reduce skin damage, the crisis is here today and this necessity is truly the mother of invention!

WUK

*Michael Clark and Jacqui Fletcher*

### 1. With experience of PPE and skin damage growing daily, what advice would you give on the use of prophylactic dressings under PPE?

**FD:** This is an interesting question. Before we discuss a prophylactic dressing, we need to consider preparation of the skin ready for the wearing of a mask. Staff, including males, need to hydrate their skin prior to their shift (and post-shift)

with their usual skin moisturiser and be taking fluids to hydrate. Fundamental prophylaxis should include a skin barrier (e.g. Cavilon™ or Sorbaderm® No-Sting Barrier Film) in combination with a soft silicone fixation tape product (e.g. Siltape® or Opsite Flexifix Gentle™) over the areas that will be subjected to friction, possible sweating and pressure when the PPE is in place. It is, however, crucial if any dressing product is used under PPE that it must have a low profile and be removed at the time of doffing. In addition, if any dressing product is used that contains a medical adhesive, it should always be removed with a medical adhesive remover; this should be available and used every time a dressing is removed.

**LO:** Within the organisation, we decided to advise clinicians to use barrier films as a prophylactic dressing to reduce the shear, friction and moisture damage caused by face masks. Further advice has been given to the clinicians with regards to maintaining skin hydration by drinking plenty of fluids, wash the skin with warm water and use a light moisturizer twice daily. We have also advised not to apply a moisturizer before donning a mask as this could affect the fit of the mask. We took the decision not to advise other prophylactic dressings, e.g. thin hydrocolloids, silicone dressings because when clinicians are fit-tested, they do not have a dressing in place and we cannot be sure that this does not affect the face fit. If a dressing was used, we would have to advise that every time the mask was removed and reapplied, the clinician would have to either re-fit test or do a fit check. This is because dressings can move, which would affect the contour of the face. Depending on the type of dressing used, heat and moisture can break it down, causing an issue with fit and possibly add to skin damage. Rather than applying a dressing, we would look for other alternatives for the clinician to wear, such as a hood. The mask needs to fit correctly

to prevent the clinician from being exposed to an unknown risk which could have great consequences to their health.

**JT:** Unfortunately, even though there is evidence that the use of a prophylactic dressing can reduce the effects of pressure (and shear and friction) on the skin under medical devices for patients, there currently isn't any which supports their use under FFP3 masks without potentially putting staff at risk by compromising the seal of the mask. As such, we have advised not to use a dressing as a general rule. However, we have seen a number of staff who could not have continued to wear the masks unless some additional protection was used. We have advised a thin hydrocolloid dressing (DuoDerm® Thin), using a standard width and length, ensuring no creases or folds when applied, but the staff member must be re-fit tested with the dressing on before they can use under their masks in practice. Re fit-testing larger numbers of staff, of course, has a resource implication, and at a time where PPE supplies may be limited, this may not be possible. What we aimed at was where new staff were being fit tested for the first time, we re-fit test (at the same time) with DuoDerm® on the bridge of the nose, using the PortaCount respirator fit testing equipment. Unfortunately, at the fit-testing sessions, due to the time it takes to complete each test (approximately 15 minutes or more), only 2 have been completed, but results indicated that the use of DuoDerm® under the mask did not affect the seal (one even improved the seal!). There is scope for this to develop into a research study which could help inform future guidance.

**PW:** Prophylactic dressings can provide an additional layer of material to cushion loads between the PPE equipment, e.g. facemask and the skin. They are commonly used in critical care environments to provide protection from device related

pressure ulcers in adult and paediatric patients. Any additional prophylactic dressings between PPE and the skin may affect the seal and therefore protective performance of the equipment. Therefore, additional fit testing is advised when PPE application has been modified. There are many commercial prophylactic dressings on the market, typically designed for skin sites at risk of pressure ulcers e.g. sacrum. At this time, there is no skin protection product which has been tested for use with PPE equipment. Prophylactic dressings are made of different materials, with characteristics that may result in varying levels of skin protection and suitability for use with PPE. Specifically, the prophylactic material should be thin, non-traumatic when removed, absorb moisture, adapt to the contour of the face structures and critically guarantee the correct sealing of the PPE device to the user.

## 2. How should healthcare organisations best help staff remove their masks frequently to prevent skin damage?

**FD:** There are several things to take into consideration here, they include: keeping skilled staff where they are needed clinically; wastage of PPE if staff are frequently donning and doffing; and the importance of skin recovery time. For the first two considerations, it may not always be possible to give staff relief from the mask every 2–3 hours per shift, as recommended, so it is important that we think of other possible solutions, for example, if available, staff could switch to a Tornado hood rather than a mask. Again, if skill-mix allows, staff could be rotated to a non-COVID area when they are beginning to show signs of skin damage; if this is not possible, a consideration of rotas being organised to give staff additional time off between shifts to allow skin to recover. This is an area where many things have to be balanced to ensure skilled intensive care staff are where they need to be during the pandemic.

**LO:** Wearing a mask for long periods of time can cause skin damage and we are aware that surgical mask a less effective after approximately 30 minutes, so these should be removed and a new mask donned. Depending on the make of the FFP2/3 mask, they remain effective for longer periods and can cause varying levels of damage if worn too tightly and for too long. Clinicians need to have regular breaks to hydrate and go to the toilet; therefore, in areas where masks have to be worn for a full shift (8 to 12 hours), we recommend masks are removed every 2 hours; or, if the mask is causing irritation, to move away from the patient area when safe to do so, to wash and freshen up the face and apply another mask.

**JT:** The prolonged and continuous use of FFP3 masks increases the risk of damage from pressure, friction and moisture to staff's skin. The best way to reduce pressure is to take the mask off — and achieve total pressure relief! There are different approaches healthcare organisations could consider which could reduce prolonged and continuous use of the masks, such as: **Frequent breaks**, limiting the time the mask is worn before staff take a break, i.e. opportunity to remove their mask. **Ensuring the staff's break** is long enough to allow the skin time to recover. **Create shorter shifts** if possible, for staff who may work longer days (12-hour shifts) who would be agreeable to spread their hours over a larger number of days, and in wards/clinical areas where this would be feasible. **Rotate staff** to work in other areas within the organisations if possible, where FFP3 masks are not required — to ensure that staff are not wearing FFP3 masks over consecutive days. **Split up staff's days** in work to allow for 'skin recovery' days.

**PW:** Pressure damage to the skin can be prevented with several simple steps, i) minimise the loads to vulnerable skin

sites ii) cleans and monitor the skin regularly iii) provide regular periods of recovery to the skin. Healthcare organisations can support this by providing regular skin checks and reporting if any issues occur. Creating the means for staff to rotate on and off coronavirus wards where possible will also provide the opportunity for clinicians and healthcare workers to have working periods without PPE equipment in place. For those who are reporting skin damage, a sustained period of recovery should be allowed where possible, to protect the individual from further damage which could lead to tissue breakdown.

## 3. How is the occurrence of skin damage under PPE being reported and monitored?

**FD:** Firstly, staff must inform their line manager immediately they identify skin damage; this would include even a blanching redness to the affected area/s. Then an incident form should be completed by the member of staff, using the incident reporting system employed by their organisation. Staff need to clearly identify on the incident form that they are a member of staff and not a patient; it is important, post the COVID-19 pandemic, that we are able to identify skin damage in both patients and staff. These incident reports can help highlight themes within the two groups, but also help manufacturers identify how their PPE/medical devices can be redesigned to mitigate the risk of skin damage. Health care organisations should ensure, where there is a Tissue Viability Nurse (TVN), that their staff have access to that TVN for an individualised plan of care for that staff member.

**LO:** Any form of skin damage caused by PPE is reported on the hospital incident reporting system. This alerts managers, Risk Teams, the Tissue Viability lead and Employee Health and Wellbeing Service

(EHWBS) plus other senior nurses/managers that a member of staff has sustained an injury. This enables each department to monitor the numbers and types of injuries sustained and which PPE has caused the damage. We can then review how long the clinician has been wearing the equipment for and what advice they have had and followed. The EHWPB service provides skin care advice and can review the clinician's condition and give appropriate recommendations.

**JT:** I initially developed a PPE Skin Clinic and advised any staff who developed irritated, damaged or broken skin to contact the Tissue Viability Service, to arrange a date and time to be seen. For staff working nights or are on days off, this was still offered either as a face to face review or a remote review, emailing photographs of the skin damage and answering some questions via email. I developed a PPE Skin Clinic Record which included date seen, staff details, name and location of work; and a description of the skin damage. It collected information on the mask worn, fit testing history, skin preparation/use of moisturiser/barrier cream prior to using the mask; how many occasions the mask was worn (prior to skin damage) and the longest period the mask was worn without a break. We advise staff to complete a Datix (Clinical Incident Report) using category *Health and Safety* and a new subcategory *PPE skin-related Injury*. In practice, however, many staff have not completed a Datix. Local data collected can hopefully be shared in the future to provide a national insight into the type and extent of skin damage suffered by healthcare workers, with a view to improve PPE to reduce this in the future.

**PW:** Skin damage reporting appears to vary between organisations. Some are reporting issues as a Adverse Event (AE), while others are reporting them as a device related pressure ulcer. Organisations should take responsibility for local and national reporting of PPE related skin damage, in

order to share critical information on devices which are commonly causing damage and best practice for ensuring safe application (see also our recent YouTube video on preventing and reporting DRPUs: <https://youtu.be/-enA2xIEKmk>). A common reporting tool should be used by all organisations, where data can be collated and research conducted to support practice. In addition, this could provide the means to report issues to regulatory agencies such as the Medicines and Healthcare products Regulatory Agency (MHRA). This will create an opportunity to lobby industry to improve device designs.

#### 4. How can clinical staff best inform their organisations about new innovations to protect skin under PPE?

**FD:** By utilising all communication channels available to them. Most health care organisations have communications departments that put important messages out via internal email, staff briefings etc., but also via social media. The organisations' TVN would have a role to play within this by sharing and passing on knowledge with fellow TVNs, both nationally and internationally. In addition, if a staff clinic is available, the staff attending will be able to discuss what has and hasn't worked for them; with this information the TVN can both increase their own knowledge/experience, and be able to pass on to other staff members/TVNs. When there is breathing space from this present Covid-19 pandemic it would be helpful if TVNs published/presented their experiences with both staff and patients' skin damage related to the pandemic.

**LO:** With any new innovations, clinicians are encouraged to advise companies to send their product to the procurement team who, with the clinical procurement matron and appropriate specialists, can review products.

**JT:** Clinical staff (TVNs and Infection Prevention Nurses, for example) should try and keep up to date with new knowledge

and guidance. This can be achieved through regional forums/groups or relevant websites. We should also try and contribute to local and/or national work streams looking at skin protection under PPE, and where possible clinicians need to be involved in discussions with manufacturers of PPE. Manufacturers need to understand the skin problems experienced by staff and look for solutions to try to prevent them when developing future PPE products — this may be their ergonomic design, the materials used, etc. Only by working collaboratively will manufacturers be aware of the issues and potential solutions can be found. Clinical staff (independently or working with other specialists) can look to contribute to the evidence base — for example, use of dressings under FFP3 masks (e.g. study comparing fit test results with and without different dressings); or how long it takes for mechanical forces to cause different severities of pressure damage. Clinical staff should communicate information about innovations to protect the skin to senior managers and executive teams. Clinical staff such as TVNs would be key in supporting the implementation of new guidance. This would provide assurance (and reassurance) that this is recognised as an important part of staff's physical wellbeing.

**PW:** Several national and international guidelines have been published to aid healthcare workers and organisations protect skin from PPE related damage. These should be selected and disseminated to staff to provide education and advice. Where staff have successfully used prophylactic dressings or skin care regimes this should be shared with the organisation, disseminated through specialists such as the Tissue Viability Team. Where evidence is emerging, best practice guidelines should be updated and implemented at regular intervals to prevent future incidences of skin damage. To this end, each organisation should keep an up-to-date standard operating procedure (SOP) for the application of PPE and the associated protection of skin health. **WUK**

## REFERENCES

- Associação Portuguesa de Tratamento de Feridas (2020) PRPPE Guideline Covid 19. Available at: <https://www.aptferidas.com/geral/paginas.aspx?cod=225&Redirect%20=%20true> (accessed 29 April 2020)
- European Pressure Ulcer Advisory Panel (2020) COVID-19 and Pressure Ulcer Prevention Forum. Available at: <https://www.facebook.com/groups/3285977198294372/> (accessed 29 April 2020)
- Franck R (1694) Northern Memoirs, Calculated for the Meridian of Scotland. London: printed for the author, to be sold by Henry Mortclock
- Gefen A, Alves P, Ciprandi G et al (2020) Device-Related Pressure Ulcers: SECURE prevention. Available at: <https://www.magonlinelibrary.com/doi/full/10.12968/jowc.2020.29.Sup2a.S1> (accessed 29.03.2020)
- Jiang Q, Song S, Zhou J et al (2020) The prevalence, characteristics, and prevention status of skin injury caused by personal protective equipment among medical staff in fighting COVID-19: A Multicenter, Cross-Sectional Survey. *Advances in Wound Care*. 9(7): doi: 10.1089/wound.2020.1212
- MedicalResearch.Com (2020) Coronavirus Outbreak: Prevention Of Device-Related Pressure Ulcers And Injuries. Available at: <https://medicalresearch.com/author-interviews/coronavirus-outbreak-prevention-of-device-related-pressure-ulcers-and-injuries/53779/> (accessed 29.03.2020)
- NHS England (2020) Helping Prevent Facial Skin Damage Beneath Personal Protective Equipment. Available at: [https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/04/C0129\\_Preventing-skin-damage-under-PPE\\_9-April.pdf](https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/04/C0129_Preventing-skin-damage-under-PPE_9-April.pdf) (accessed 29.03.2020)
- National Pressure Injury Advisory Panel (2020) NPIAP Position Statements On Preventing Injury With N95 Masks. Available at: [https://cdn.ymaws.com/npiap.com/resource/resmgr/position\\_statements/Mask\\_Position\\_Paper\\_FINAL\\_fo.pdf](https://cdn.ymaws.com/npiap.com/resource/resmgr/position_statements/Mask_Position_Paper_FINAL_fo.pdf) (accessed 29.03.2020)
- Wounds UK (2020) *TVN<sup>TV</sup> Tissue Viability News*. Available at: [https://tvntv.co.uk/?\\_ga=2.231062879.115849496.1589532729-1046887307.1573477881](https://tvntv.co.uk/?_ga=2.231062879.115849496.1589532729-1046887307.1573477881) (accessed 15.05.2020)



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