

The challenges of personal protective equipment induced skin damage during COVID-19: two perspectives, one mission

KEY WORDS

- » COVID-19
- » Masks
- » Medical-device related skin damage
- » Personal protective equipment (PPE)
- » Risk management strategies,
- » Skin damage

Protecting the skin of frontline NHS staff suddenly became a priority during the COVID-19 pandemic. This article includes two reflective accounts, one from a critical care sister and another from a tissue viability nurse consultant, both working in acute hospital settings. It details the challenges encountered as staff developed skin damage from wearing personal protective equipment (PPE) and the range of interventions employed to reduce this risk. The importance of learning from this experience and sharing data on a national level is highlighted.

A PERSONAL ACCOUNT: CRITICAL CARE SISTER

As a sister working within a critical care (CC) service when COVID-19 arrived, my working life changed dramatically. The number of CC patients increased significantly and two extra CC units were established to manage the extra capacity of high dependency. At the peak we had 36 CC patients, plus high dependency level patients. The CC service is funded to 30 points (and we flex this with critical care and high dependency level patients) At the peak we were delivering 78 points. New ways of working were introduced and around 200 extra staff were drafted in to the CC service to assist during the surge period. These included nurses, doctors, healthcare assistants and operating department practitioners, alongside increased numbers of physiotherapists, pharmacists and domestic teams. The nurses came from a range of areas, for example outpatients, theatres and the cancer services.

This article describes a personal experience of life on the frontline of a critical care unit and the sudden realisation that we had a serious skin issue likely to affect the welfare of staff and potentially, the availability of our CC teams. Caring for patient's skin and preventing their device-related pressure ulcers (DRPU) was something we were set up for, supporting staff to reduce the risk of their own skin damage was an entirely new concept.

Wearing personal protective equipment (PPE) became standard practice. This involved a tight-

fitting FFP3 mask (FFP is an abbreviation for filtering face piece, and the number relates to the level of protection it offers), full length gown, a theatre hat and a double set of gloves, taped to the sleeves. Nursing and healthcare assistants generally worked 12 or 13 hour shifts, sometimes on consecutive days, taking a 45 minute lunch break and 30 minute dinner break. Although personally, during the peak, even this was not always possible. As the company representative confirmed, the masks were never designed to be used for such extended periods. In a collective effort to manage the increased capacity, staff were also working overtime, sometimes in addition to their full-time hours. Nurse colleagues generally prefer to group their 12 hour night shifts together, so could be doing four, 12 hour night shifts in a row. We were busy and despite air-conditioned units, hot under the PPE and often dehydrated.

A combination of all these factors meant that we quickly saw skin breakdown among staff members. The dehydrated sweaty skin caused moisture to build up under the mask, the friction and the sustained pressure were a perfect blend for skin breakdown. The areas affected were the bridge of the nose, across the cheeks, under the chin and the back of the neck. Gefen and Ousey (2020) explain in greater detail the physiological effect on the skin of PPE. Without any preventive measures there was real concern that staff would experience discomfort and possible facial scarring. In addition, health

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professionals whose skin did breakdown would be unable to wear PPE and potentially need to be relocated to other roles; losing some of our much-needed critical care expertise.

Practices implemented

As a sister who played a key role within the critical care tissue viability group across the two (soon to be four) rapidly expanding critical care units, it was very clear we needed to up our game. To mitigate the skin damage risks we needed to act quickly. At the entrance to each critical care area we had PPE stations set up for staff to don and doff. After a particularly demanding 13 hour shift, I remember driving home trying to figure out how to best support staff, what the most effective approach would be. It seemed an obvious strategy to set up a skin protection trolley (*Figure 1*) alongside the PPE equipment so that all staff had access to additional measures to protect their skin.

The tissue viability team were in regular contact and undertook their own work around fit testing all the potential dressings that could be used under a mask, to assess whether the dressing affected the fit of the mask and hence the safety. All dressings failed the fit test except the thin hydrocolloid dressing (DuoDerm Extra thin, Convatec). The trolleys were stocked with skin barrier films and barrier creams; thin hydrocolloid dressings; scissors and adhesive remover wipes. Moisturising creams and face wipes for the end of shift were also provided. Stock supplies



Figure 1. Photo of a skin protection trolley

of these products were dramatically increased, I know that company representatives personally dropped stock off at the Trust. Staff were advised that if they needed to use hydrocolloid dressings, they should have a repeat FIT test with the dressing in place.

A poster was designed to advise staff on the different options available to them and this was reviewed by the tissue viability clinical nurse specialist. At this point guidance was being prepared, with national guidelines from NHS England being drafted and under consultation. In due course articles and guidance were published (Gefen and Ousey, 2020; NHS England and NHS Improvement, 2020), but there was a need to offer some considered options in the meantime. Staff were found using a variety of measures, one member of staff was very keen on her daughter's 'Hello Kitty' plasters. When the poster was designed it included the best available evidence, with the expectation it would need updating as new evidence emerged.

Identifying the most effective communication method to update all the multidisciplinary team (MDT), when we were already receiving an abundance of emails relating to the wider picture, was a dilemma. The poster was emailed to the whole CC MDT, including those drafted into CC. The posters were also displayed in the coffee rooms and near the trolleys. The Trust's tissue viability team produced a more detailed information sheet, which was emailed across the teams. I was acutely aware of wider guidelines advising to reduce the period that PPE was being worn for. While I recognised this advice had to be included, I was sympathetic to staff reading this and thinking 'well we would if we could'

Additional measures were sought to support colleagues with skin issues and the tissue viability team attended the units every few days for drop in sessions to assess the skin of staff and advise on the limited options available, one day there was a queue down the length of the unit. Naturally I was also advising and supporting staff during my shifts and liaising regularly with the tissue viability nurses (TVN), sharing ideas and updates. I know I was not the only one who experienced the frustration of only being able to suggest a limited number of options. Other dressings were sought and investigated to identify if they were safe to use under the PPE masks, and offered any additional

protection, but were all found to fail the fit test. Despite following the guidance, some individuals still experienced category II PU. A new category was introduced into the incident reporting system, to capture data around such incidences 'Skin damage to face of staff'

A standard procedure to follow when staff developed category I or II PUs was clarified with the senior management team. The idea of 'rehydration stations' was also proposed. Potentially this could allow a safe space for staff to remove their masks and provide both a short period of pressure relief from the masks and a chance to rehydrate. This was investigated but found to not be a viable option on safety grounds. The issue of breaks was also reviewed, with the option of introducing a third break. However, at the time the supply of PPE was an absolute priority and with two additional critical care units now in operation, and an additional workforce (sometimes around 20 extra staff on each of the four units) the impact on the usage of PPE was a significant factor. PPE supply projections had been made based on donning and doffing twice per shift, not three times. This illustrates just one of the many complex decisions required during this time.

STAFF SURVEY

Following the surge period, a small working party was formed, made up of a CC consultant, CC doctor and myself. Our aim was to undertake a staff survey across the MDT, including the staff drafted into CC, to capture some data around the experiences of staff during this period. Objectives included reviewing the interventions implemented during the COVID-19 surge period to determine which were perceived by staff to be of most benefit. The survey was sent to 403 healthcare staff who had been working in the CC unit during the Covid-19 surge period. Of 206 respondents, 76% of staff either agreed or strongly agreed that they 'felt the CC department cared about my welfare during this time' 82% either agreed or strongly agreed with the statement 'I felt well supported within my department during the COVID-19 surge'.

A further question asked 'which interventions available within the CC were perceived to be the most useful?' The skin protection trolleys were selected by 51% of respondents and were the third most selected answer. Hopefully the measures

introduced around their skin care played a small contributory role here. The two interventions found to be of more benefit related to drink, food and toiletry provision.

Given the dilemma around how to communicate with and update staff during this period, a question around preferred communication methods to keep clinically updated was also included. With advancements in technology, is there another way the MDT would prefer to receive updates? Emails (from within CC) emerged as the most preferred method with 147 respondents stating this preference. What's app messages was identified to be the second (n=44).

CONCLUSION

The immense resilience shown by both the CC staff and the teams drafted in during this time is something that will stay with me. I came across staff who downplayed their own skin damage; they felt strongly that, with the exact skill set needed during this national crisis, they had to stay in CC. Looking back now, it feels a privilege to have been a small part in a much wider collective effort to care for those seriously ill from COVID-19 and their loved ones. I thank my colleagues in the Trust's tissue viability team who at a moment's notice would respond to my varied requests, supporting both me and the wider CC team.

As we move into a period of reflection on this time, my concern is that when the collected data from incidence reports is reviewed at a national level, the true scale of the issue will not be evident. During the peak of the surge, with staff working absolutely flat out, patient care and safety were prioritised and completing incident reports in relation to skin damage of staff was just not always possible. With hindsight we should have undertaken some prevalence studies during this time. I also hope that there is planned research into the design of masks that can be worn for extended periods with reduced risks to the skin.

A PERSONAL ACCOUNT: TISSUE VIABILITY NURSE

During the COVID-19 pandemic, healthcare providers were faced with a very new and different challenge, to support the prevention and management of skin damage, not for patients, as is usually the case, but for its own staff.

'Staff' suddenly became a new 'patient group' as it quickly became evident that wearing PPE was causing some to develop skin damage. This damage resulted in moderate or even severe harm, ranging from areas of superficial skin loss to category III or IV PUs. Common sites where skin damage occurred were the bridge of the nose, the face and the tops of the ears.

Interventions

Many organisations looked to their tissue viability service (TVS) for guidance and support, although there was no national guidance available in the initial weeks of the pandemic for them to refer to. NHS England and NHS Improvement (2020) reacted quickly, releasing guidance *'Helping prevent facial skin damage beneath personal protective equipment'* on 9 April 2020. As a tissue viability nurse (TVN), I felt a responsibility to communicate guidance and advice to staff who needed it. A local *'Guide to staff wearing PPE'* was quickly compiled and agreed by the executive and senior nursing teams before being communicated to staff. Recommendations included how long to wear a mask before taking a break, this had been discussed and agreed with ward managers and heads of departments to ensure that it would be feasible in clinical practice. Advice also included the importance of staff keeping well hydrated, the skin moisturised and the use of a barrier cream. It was recognised that moisture, as well as pressure, was contributing to the development of skin problems.

The TVS initially provided the barrier cream to all clinical areas where staff wore PPE and it was later added to the 'PPE Supply List', to allow wards and departments to order their own supply at the same time as ordering PPE equipment.

Early in the pandemic, the TVS at Liverpool Heart and Chest Hospital (LHCH) set up a 'PPE Skin Clinic', providing an opportunity for any member of staff who experienced skin problems to be seen and reviewed by a TVN. As far as possible, this review was arranged at the convenience of the staff member. If a face-to-face review was not possible, staff emailed a photograph to the TVN and a remote review was provided. A proforma 'PPE Skin Clinic Record' was compiled and completed at each review. It recorded information including: the date of the

review, their details including role and work location; a description of the skin damage; details of the name and manufacturer of the mask worn, the number of occasions it had been worn and the duration before the initial damage; their fit testing history, if known; and any skin care i.e. if a barrier cream had been applied before using the mask. Staff were also advised to complete a clinical incident report and use the new field set up specifically for this skin issue.

In addition, the proforma also captured any preventive actions previously taken and whether their line manager had been informed. Consent was also requested for sharing this information with their line manager.

Informal feedback from staff who used the 'clinic' has been positive. Staff commented that they felt supported and appreciated the additional advice given about treating existing skin damage and on preventing a similar reoccurrence in the future.

Information collected using the PPE Skin Clinic Records has been used to record actions taken for individual members of staff and share with their manager. Additionally, they were used to monitor and identify any trends to enhance the provision of care. It was reassuring that staff, for the most part, were wearing their masks for the recommended 3 hours before taking a break. Exceptions included theatre staff who maintained that they could not take a break during surgery, some had worn their FFP3 mask for up to 5 hours. The data quickly highlighted that one specific mask was attributed to most of the initial cohort of attendees. This information was shared with staff, they were advised to be fit tested for another mask if this was possible and they were reminded of the local guidance.

Some staff reported that they had used a dressing under the FFP3 mask, against local (and national) guidance. Guidance had stated that dressings should not be used unless the staff member had been re-fit tested with the dressing in place. Staff reported that they had felt so desperate, given that a mask had to be worn and their skin was becoming more sore and painful. This was one of the aims of the PPE Skin Clinic, to escalate to line managers the details of staff with skin damage so that other options could be explored, for example redeployment to non-COVID-19 areas.

It was reinforced to staff that there was no evidence to support the safe use of dressings under

FFP3 masks without potentially compromising the seal, thereby possibly putting themselves at risk. As a TVN at that time, I remember feeling helpless in what I could offer as a solution.

After some discussion to find a work around, the TVS proposed that when new staff were being fit tested that they be re-fit tested again with a dressing on. This was agreed with the fit testing team. A thin hydrocolloid dressing was advised, cut to a standard length and width each time. It was hoped that enough comparative data could be collected to be able to share with NHS England as an indicator of whether this dressing interfered with the seal of the mask, and potentially take this forward as a larger study. Unfortunately, due to the demands on the fit testers at that time (a large number of staff requiring fit testing in a short period of time) and the additional time it would take to complete an additional fit test, only 2 staff were fit tested with and without a dressing. Interestingly, these 2 results indicated that there was no compromise with the seal, one even improved the seal. Some staff are now being re-fit tested as some FFP3 masks have become low in stock or out of manufacture and alternatives sourced. This has provided another opportunity to obtain this comparative data.

Ongoing interventions

During the initial COVID-19 period, facemasks were recommended when treating patients. New national guidance was then released in June 2020, advising that 'all hospital staff (both in clinical and non-clinical roles), when not otherwise required to use PPE, should wear a facemask' (Public Health England, 2020). The TVS envisaged an increase in incidences of skin damage, as the result of more staff wearing surgical masks and for much longer periods. The TVS at LHCH compiled another proforma and asked for ward managers and heads of departments to record details of staff who experience skin problems from wearing PPE and submit this each week. In addition, the proforma included general advice on how to help protect skin under masks. Skin problems which were reported from surgical (TR2) masks included reddened and sore skin, rashes, itchy, dry/cracked or broken skin, lip or eye swelling/puffiness, itchy or watery or sticky eyes and even nose bleeds. Skin

becomes hot and humid under any mask and this alone can cause skin problems, from moisture and friction. Chemicals, colours and other irritants in the surgical masks can also cause some people to experience contact dermatitis/hypersensitivity or allergic reaction.

General advice for staff was provided:

- Identify the mask attributed to the side effects and avoid wearing it
- Ideally, do not wear makeup because it clogs pores under any mask
- Cleanse skin and keep skin well hydrated, use a moisturiser
- Medihoney barrier cream is recommended under the mask to protect from sweat and friction, this can also be applied before bed, as it is anti-inflammatory and has additional moisturisers
- Take an antihistamine if needed, to reduce swelling and itching
- If skin is still irritated and itchy, use 1% hydrocortisone (over the counter) to treat until it resolves
- Seek advice from the TVN (PPE Skin Clinic).

CONCLUSION

The TVS continues to monitor skin problems caused by PPE. Many lessons have already been learned from this experience, and the learning will undoubtedly continue—locally, nationally, and internationally. It has been frustrating at times, as a TVN, as there has been only so much practical advice which could be offered. Seeing so many colleagues suffer skin problems has been a new experience and not a pleasant one. Masks are likely to be worn for a long time to come and as such TVNs must take their experiences and seek to make improvements where possible. We must ensure that they remain up-to-date with national guidance on preventing skin damage and have systems in place for updating and sharing this within their organisation. Where possible, they should also have systems for collecting data on incidences of staff reported skin damage, the type of skin damage and any trends in the data. This will undoubtedly be useful to inform future studies and for potential collaborative working with manufacturers of PPE, hopefully resulting in redesigned PPE with reduced risk of skin damage.

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