Received: 11 October 2021 | Revised: 1 June 2022 | Accepted: 1 June 2022

DOI: 10.1111/dth.15624

ORIGINAL ARTICLE

DERMATOLOGIC THERAPY WILEY

Personal protective equipment-related dermatoses in COVID-19 frontline health workers. A lesson learned from 1-year single center in the UAE

Amna Al Zaabi[1] | Shaden Abdelhadi[1,2,3] | Zbigniew Ruszczak[3]

[1]Division of Dermatology, Sheikh Khalifa Medical City, Abu Dhabi, United Arab Emirates

[2]Division of Dermatology and Division of Pediatric Dermatology, Department of Pediatric, Sheikh Khalifa Medical City, Abu Dhabi, United Arab Emirates

[3]College of Medicine and Health Sciences, Khalifa University, Abu Dhabi, United Arab Emirates

Correspondence
Amna Al Zaabi Sheikh Khalifa Medical City, PO Box 5312, Abu Dhabi, United Arab Emirates.
Email: amnaalroa@gmail.com

Abstract

Since COVID-19 was declared a pandemic in March 2020, frontline health care workers wear personal protective equipment (PPE, surgical masks, N95 or similar respirators, gloves, goggles, face shields, and gowns). Alcohol-based sanitizers and wipes were recommended. Such measures lead to disruption of the natural skin habitat and skin barrier and various cutaneous reactions. The aim was to assess the prevalence and characteristics of PPE-related dermatoses among health care workers in Sheikh Khalifa Medical City (SKMC), a COVID-19 facility, Abu Dhabi, United Arab Emirates. We conducted a voluntary, cross-sectional anonymous survey among first-line health care workers addressing types of PPE used, dermatoses classified as PPE related, and factors that influence them. Facial, nasal, and hand dermatoses were the most prevalent with 40.2%, 19.9%, and 14.1%, respectively. The changes are primarily attributed to surgical masks, N-95 masks, and gloves. The shift duration is a contributing factor correlating with the severity of skin damage. Results of this study encouraged decision makers to recognize PPE-related dermatoses as a continuously growing burden, reorganized the shift duration and PPE exposure, animated the personal to apply preventive measures, and promoted the well-being of medical professionals in new waves of the pandemic.

KEYWORDS
COVID-19, health care workers, occupational dermatoses, personal protective equipment, PPE-related dermatoses, SARS-CoV-2

1 | INTRODUCTION

Personal protective equipment (PPE) is worn to minimize exposure to hazards. These include gloves, protective goggles, respirators, masks, head cover, and full bodysuits.[1]

After the outbreak of the COVID-19 pandemic in 2020, PPE in the form of medical barriers was recommended by the World Health Organization to prevent transmission.[2] Among health care workers, it became a standard precaution to wear N95 (or equivalent) masks, eye protection in the form of goggles or/and face shields, gloves, and isolation gowns.[1]

During the first peek of the pandemic in March 2020, Sheikh Khalifa Medical City in Abu Dhabi, United Arab Emirates, was designated as the main hospital for patients inflicted with the SARS-CoV-2 virus. Collective efforts of physicians, nurses, and allied health professionals were made to tackle the increasing COVID-19 cases.

Together with the growing number of health care workers involved in direct patient care, we found increased referrals from occupational health to dermatology clinics.

This study discusses the prevalent dermatoses in COVID-19 frontline health care workers and analyzes them in relation to international published data. We also present and discuss the measures

recommended by the SKMC COVID-19 Task Force to prevent or minimize the negative impact of PPE on the skin of health care professionals.

2 | METHOD AND MATERIAL

2.1 | Study Design

It is a cross-sectional study. The survey was anonymous and voluntary. The Institutional Research and Ethics Committee approved the questioner based on the Geneva Convention rules.

2.2 | Inclusion and Exclusion Criteria

Health care workers from all patient care areas, especially emergency departments, intensive care units, surgical and medical wards, clinics, operation rooms, laboratories, and other allied services directly exposed to COVID-19 patients were included in the study. The responders were above 20 years of age of both genders. Since SKMC has a multinational medical team, there was no specific ethnicity selection, and our cohort includes Arabs, Caucasians, Asians, Africans, Indians, and Hispanics. There were no specific exclusion criteria.

2.3 | Method of data collection

We utilized an online platform to create a survey questionnaire. It included a total of 10 questions, divided into three sections. The first section questioned basic demographics, such as gender, age, and occupation (nurses, physicians, or allied health).

The second section assessed different affected anatomical regions (face, nose, ears, eyelids, scalp, neck, hands, arms, trunk, or legs). Associated symptoms (itching sensation, erythema, acne, eczema, swelling, skin tear, excessive sebum secretion, excessive sweating, skin peeling, and nail changes) were analyzed in relation to location, onset (new onset or worsening of preexisting symptoms), severity (mild, moderate, and severe), and causative PPEs (surgical mask, N95 mask, goggles, face shield, head cover, and full-body gown). The last section addressed the impact on quality of life and work (mild; resolved spontaneously or responded to self-treatment, moderate; required dermatological intervention/treatment, severe; affected quality of life or led to work absenteeism). The questionnaire was simultaneously provided online and as physical copies hospital wide to assure that health care workers could choose their convent method of response.

The data were collected over 5 months, from July 2020 to January 2021.

Ethical approval was obtained by the Institutional Research Board (IRB) before the distribution of the questionnaire. IRB-approved photography consent was taken from health care workers willing to share visual documentation, clearly stating the purpose of research, education, and publication in the medical literature.

3 | RESULTS

The SKMC is a leading COVID-19 dedicated public health care facility with over 1000 frontline providers involved in patients' care from the pandemic's beginning. Five hundred and seventy-two responded to the survey. Females accounted for $n = 474$ (82.8%) of the responders, whereas males were $n = 98$ (17%). Majority of responders were nurses $n = 301$ (52.6%), followed by physicians $n = 150$ (26.2%) and allied health $n = 121$ (21.15%) (Table 1).

The 236 responders (41.25%) were staff members who worked on shifts longer than 12 hours a day and required the continuous use of occlusive PPE.

The face was the most affected anatomical region, $n = 230$ (40.2%) (Figure 1). Nasal and hand dermatoses followed, with $n = 114$ (19.9%) and $n = 81$ (14.1%), respectively (Figures 2 and 3).

In all the anatomical regions, erythema $n = 227$ (57.3%), itching sensation $n = 305$ (53.3%), and dryness $n = 227$ (39.6%) were found to be the most common symptoms and were mainly reported to be mild $n = 340$ (59.4%).

Eighty percent ($n = 458$) of the dermatoses were of new onset, whereas the remainder were reported as worsening preexisting conditions ($n = 114$, 19.9%). Of note, $n = 97$ (42.17%) of facial acne cases reported in the survey were adult-onset triggered by using PPE.

The most problematic PPE was the surgical masks $n = 327$ (57.16%), followed by N95 masks $n = 277$ (48.42%) and gloves $n = 70$ (12.23%) (Figure 4).

In terms of impact on the quality of life, the majority considered their dermatological problems mild, self-limiting, self-manageable, and not requiring specific dermatologic intervention $n = 394$ (68.8%), followed by moderate, requiring specialized care $n = 154$ (26.9%), and severe, causing absenteeism from work $n = 10$ (1.7%) as shown in Table 1.

The remaining affected regions reported were ears $n = 68$ (11.8%), eyelids $n = 27$ (4.72%), trunk $n = 23$ (4.02%), scalp $n = 16$ (2.79%), and neck $n = 13$ (2.27%) (Table 2).

4 | DISCUSSION

PPE-related dermatoses are an emerging issue worldwide that aggravated after implementing COVID-19 protection measures.[3]

Since the pandemic beginning in March 2020, Sheikh Khalifa Medical City was designated as the main COVID-19 hospital in the Emirate of Abu Dhabi. The PPE utilization policy, implemented in health care facilities around Abu Dhabi, was created by the Department of Health in line with international guidelines.[4] In designated areas with confirmed or suspected COVID-19 patients, health care workers must wear a surgical mask, face shields, face and head cover, shoe cover, gown, and gloves.

TABLE 1 Demographics of participants

Sex	Occupation	Duration of work	Onset	Severity of symptoms	Impact on work
Female $n = 474$ (82.8%)	Nurses $n = 301$ (52.6%)	Less than 8 h, $n = 120$ (20.97%)	New onset, $n = 458$ (80%)	Mild, $n = 340$ (59.4%)	Mild, self-limiting $n = 394$ (68.8%)
Males $n = 98$ (17.1%)	Physicians, $n = 150$ (26.2%)	More than 8 h, $n = 216$ (37.7%)	Worsening of preexisting symptoms $n = 114$ (19.9%)	Moderate, $n = 209$ (36.53%)	Moderate, required medical intervention, $n = 154$ (26.9%)
	Allied Health $n = 121$ (21.15%)	More than 12 h, $n = 236$ (41.25%)		Severe $n = 23$ (4%)	Severe caused absenteeism, $n = 10$ (1.7%)

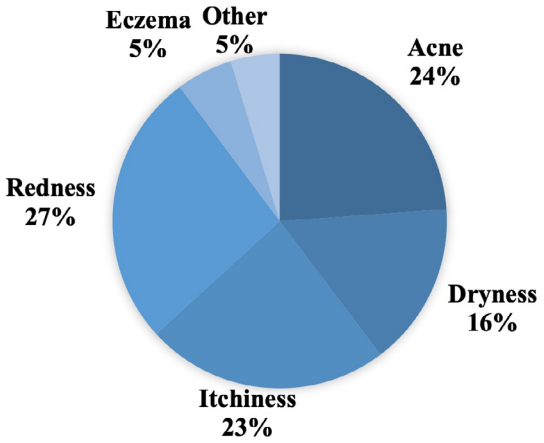

FIGURE 1 The frequency of the reported facial skin changes in caregivers using PPE

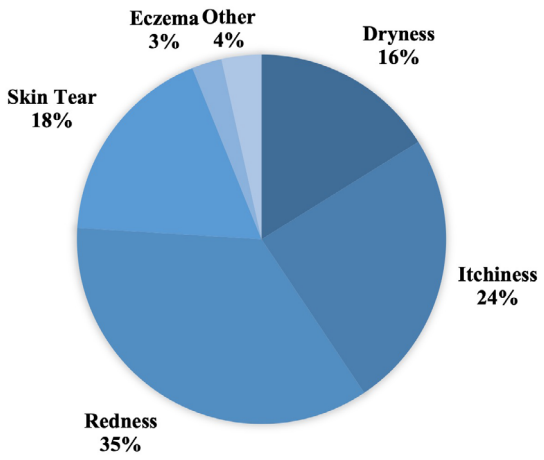

FIGURE 2 The frequency of the reported skin changes on the nose in caregivers using PPE

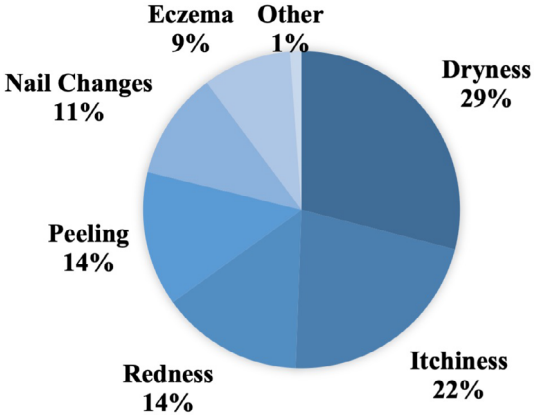

FIGURE 3 The frequency of the reported skin changes on the hands of caregivers using PPE

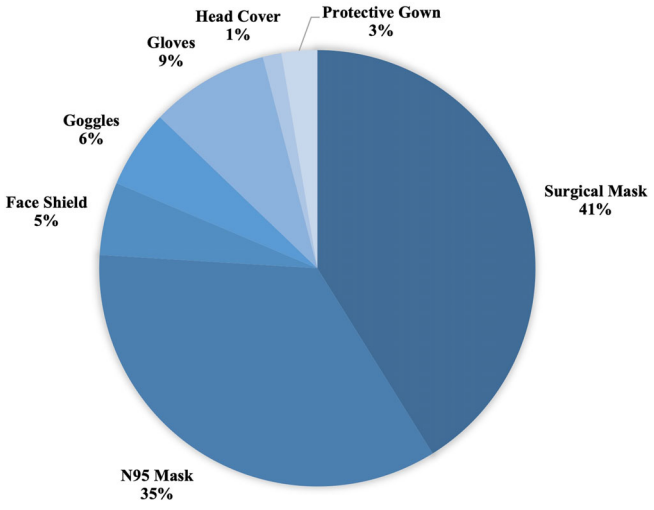

FIGURE 4 The types of PPE reported as causative for skin lesions

While performing an aerosol-generating procedure, such as suctioning, high-flow nasal cannula, non-invasive ventilation, intubation, bronchoscopy, or cardiopulmonary resuscitation, the surgical mask was replaced by N95 respirators or equivalent.[4] While ventilated or ICU cases, the use of whole-body PPEs/barrier protections was made obligatory.[4] In addition, hand disinfection was made mandatory before and after encountering patients.

The survey started in July 2020, a few months after the onset and at the peak of the first wave of SARS-CoV-2 infection in the UAE, which allowed enough time for PPE-related cutaneous complaints to manifest.

TABLE 2 Cutaneous symptoms associated with different anatomical regions

Ear	Hands	Scalp	Neck	Eyelid	Face	Body	Nose
Dryness, $n = 10$ (14.7%)	Dryness, $n = 74$ (91.35%)	Dryness, $n = 6$ (37.5%)	Dryness, $n = 4$ (30.76%)	Dryness, $n = 9$ (33.33%)	Acne, $n = 131$ (56.9%)	Excessive sweating, $n = 18$ (78.26%)	Dryness, $n = 37$ (32.45%)
Itching sensation, $n = 33$ (48.52%)	Itching sensation, $n = 55$ (67.9%)	Itching sensation, $n = 9$ (56.25%)	Itching sensation, $n = 10$ (76.9%)	Itching sensation, $n = 13$ (48.14%)	Dryness, $n = 87$ (37.8%)	Eczema, $n = 4$ (17.39%)	Itching sensation, $n = 56$ (49.12%)
Erythema, $n = 48$ (70.58%)	Erythema, $n = 37$ (45.67%)	Erythema, $n = 2$ (12.5%)	Erythema, $n = 6$ (46.15%)	Erythema, $n = 8$ (29.62%)	Itching sensation, $n = 129$ (56.0%)	Overheating, $n = 13$ (56.52%)	Erythema, $n = 81$ (71.05%)
Skin Tear, $n = 31$ (45.58%)	Peeling, $n = 35$ (43.2%)	Excessive oiliness, $n = 6$ (31.25%)		Eczema, $n = 3$ (11.11%)	Erythema, $n = 146$ (63.4%)		Skin tear, $n = 41$ (35.96%)
Eczema, $n = 4$ (5.88%)	Nail changes, $n = 28$ (34.56%)	Pimples, $n = 4$ (25%)		Swelling, $n = 3$ (11.11%)	Eczema, $n = 30$ (13%)		Eczema, $n = 6$ (5.26%)
	Eczema, $n = 23$ (28.39%)						

FIGURE 5 New onset of acne in facial mask users

FIGURE 6 New onset of rosacea in an atopic person after prolonged use of surgical type of mask

The majority of the survey participants (82.8%) were female. This could be explained by a higher prevalence of females under SKMC medical staff (mainly nurses) and their interest in seeking medical help earlier than males, except if the symptoms were severe.

Correlating with longer work shifts and closer contact with COVID-19 patients, nurses were more represented in the study (52.6%).

Facial, nasal, and hand dermatoses were the most frequent, corresponding to the use of facial masks and gloves. Other contributing factors were trapped moisture, heat, and imbalance of commensal skin flora.[5] As a specific example, the name "maskne" was recently introduced and became a widely recognized term that describes facial acne due to the use of protective masks.[6] In our study, acne represented 27% of all reported facial dermatoses. Interestingly, the new onset and the aggravation of preexisting acne presented clinically as

FIGURE 7 Persistent facial erythema and extensive hyperhidrosis in a physician using N95 mask

an inflammatory papulopustular and nodular subset rather than a comedonal or macrocystic one. This may be explained by the long-standing skin barrier dysfunction, altering the normal skin pH, imbalance of skin flora, and homeostasis under the mask, leading to derangement of local innate immunity of the skin. It manifests clinically as acne rosacea (Figure 5) or rosacea (Figure 6) with an eventual absence of follicular occlusion typical for comedonal acne. There is no established correlation between the health care worker's metal braces and his rosacea in Figure 6. The patient had used these metal/silicone-containing dental devices for a long time before without any irritant and contact allergy symptoms. He does not have any mucosal or facial skin involvement. No allergy tests are needed in such cases and were not performed before.

His rosacea appeared and aggravated only after using the typical surgical mask. The lesions are clearly limited to the mask-covered area (similar to "maskne" symptoms seen in new-onset or aggravation of acne while using any type of face mask as per COVID-19 guidelines).

Some caregivers reported extensive hyperhidrosis of the face area below the mask, especially if double-layer surgical masks (as recommended during the late first wave of the pandemic) or N95 masks were used (Figure 7). Such a phenomenon was further aggravated if more occlusive respirators were required.

In addition to creating an occlusive barrier, multiple irritants and contact allergens, that is, formaldehyde and formaldehyde releasers, were found in surgical and N95 masks,[6] contributing to the clinical symptomatic. This study aimed, however, not to report contact allergy to PPE equipment used in the pick of the COVID-19 pandemic but to report new onset or aggravation of the preexisting condition by mostly highly occlusive or full-body PPE. The patch testing with PPE materials or suspected contact allergens/irritants was performed in some patients (see Figure S2) but was not generally feasible due to hygienic and sterility policy/guidelines.

Nasal dermatoses were mainly related to the use of N95 masks and similar highly occlusive respirators. The pressure on the nasal bridge induces pain and indentation of the nose and grooving of the cheeks corresponding to the pressure lines of the mask already after short-term use (Figure S1), while ulcers and erosions occurred after a more extended use time. Resulting post-inflammatory hyperpigmentation was explicitly common in persons with darker skin color.

The intensified hand hygiene measures such as the frequent use of alcohol-based sanitizers and extensive hand washing (soap, other detergents) have led to irritant and allergic contact hand dermatitis (Figure S2). Appropriate patch testing was performed accordingly. In some patients, Beau's lines and indentations across fingernails appeared even without clinically manifested paronychia. Isopropyl alcohol, a major component of hand hygiene products, is a notorious potent irritant through the protein denaturation and extraction of intercellular lipids from the stratum corneum.[7,8] Additionally, occlusion, moisture, friction, imbalance of normal flora, and atopic predisposition worsen the skin condition even further.

Non-dermatological PPE-related health problems were frequently reported in the survey, including excessive lacrimation, rhinorrhea, dehydration, dizziness, shortness of breath, coughing, and aggravation of preexisting asthma. These problems were addressed by the occupational health department and the respective specialties and were not included in this analysis.

Standard skin care was enforced among health care workers to reduce the negative impact of PPE.[9-11] Dermatology appointments were given to affected staff, and skin complaints were addressed and treated as per guidelines. It was frequently observed that topical retinoids used to treat facial acne were more irritative and much less tolerated when surgical masks or N95 respirators were used. Intermittent application, extra moisturization, and the use of alternative topical treatment were applied in such cases. In addition, several measures were found beneficial in reducing the incidents and severity of PPE-related dermatoses. For example, using a cotton mask below the surgical mask or applying a hydrocolloid film on the nasal bridge while using an N-95 mask was advantageous without reducing such masks' protective effect.

Due to the number of cases and the enormous workload for the existing medical personnel, reducing the duration of shifts while using PPE was initially challenging. However, we managed to implement alternating 4 h shifts for staff members between high-risk areas requiring level 2–3 PPE (disposable fluid-resistant gown, eye, and face protection; respirator; and shoe cover) and low-risk care areas requiring level 1 PPE (disposable apron, disposable gloves, eye protection, face protection, surgical mask) instead of a continuous 8 h shifts, as it was suggested previously.[12] Since one of the most encountered cutaneous reactions was itching sensation, it was predictable that manipulation or scratch the facial skin and eyes, as a natural reaction, may increase the risk of potential viral contamination. Reducing and alternating shifts addressed this issue as well.

Due to specific geographic location, the city of Abu Dhabi encounters a hot and humid climate for most of the year, with the temperature reaching up to 48 degrees Celsius and the humidity of 79.2%.[13] Applying both the WHO and national protective measures, health care providers are exposed to PPE such as face masks and

gloves even outside of working hours. This additionally contributes to the development of cutaneous reactions. On the other hand, exposure to the air condition system indoors leads to another extreme situation resulting in cutaneous and mucosal dehydration, skin dryness, and aggravation of eczema and atopic dermatitis, as commonly seen in our staff.

However, an air-conditioned environment may explain a lower prevalence of hyperhidrosis, intertrigo, and fungal infections among health care workers using PPE in this study compared to previously published data.[14]

Two studies from Saudi Arabia recently investigated the prevalence of PPE-related dermatoses among the general population and COVID-19 health care workers, demonstrating the predominance of nurses being the most responders, the female gender, and the long work shifts.[15,16] Our data showed a similar pattern. Hand dryness, itching sensation, and erythema were the primary dermatoses related to prolonged use of gloves and extensive sanitization.[15]

In other studies, gloves-related hand irritant contact dermatitis was the most prevalent of PPE dermatoses with dryness, desquamation, and itching sensation as primary symptoms, followed by lesions on the nose/nasal bridge and face due to the use of goggles, surgical masks, and N95 respirators.[5,17-20]

In our study, the face was the most common anatomical region of erythema, itching, peeling, and new development or aggravation pre-exacting acne or rosacea. Nose bridge lesions were the second common, followed by hand dermatitis.

5 | CONCLUSION

To the best of our knowledge, this is the first study to investigate the occupational hazard of PPE on COVID-19 health care workers in the United Arab Emirates.

Based on this study, measures such as alternation or splitting of shifts, reducing the time of use class 2/3 PPE, and full-body protection, along with adequate prevention and education, were timely implemented at SKMC and showed positive outcomes already during the first wave of the pandemic. These measures were continuously improved, leading to a significant reduction of PPE-related skin complaints among first-line health care workers during the second wave of the pandemic earlier in 2021 (unpublished data).

Highlighting the importance of PPE and the enforcement of infection control policies to ensure the safety of health care workers, we encourage decision makers to recognize PPE-related dermatoses as a continuously growing concern and apply measures promoting the well-being and subsequently the overall morale of medical professionals during the possible future waves of the pandemic.

6 | LIMITATIONS

The limitation of our study is the participants' self-selection bias. Since participation was voluntary, the number of responders does not represent the number of affected health care workers. We believe that the actual number is much higher.

The questionnaire was simplified for self-evaluation of symptoms making profound data analysis difficult, especially in distinguishing whether erythema, itching sensation, and eczema indicated irritant contact dermatitis, allergic contact dermatitis, or the aggravation of seborrheic dermatitis. Further evaluation and classification were not possible since some participants did not present at their appointments in the dermatology clinic and were not adequately examined. Hence, the exact figure for each specific diagnosis could not be calculated.

ACKNOWLEDGMENTS

All authors equally contributed to the study, data selection, and evaluation as well as the preparation of the final manuscript.

CONFLICT OF INTEREST

The authors have no conflict of interest to declare.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

IRB APPROVAL STATUS

Department of Health, Abu Dhabi; approval #DOH/CVDC/2020/1310.

REPRINT REQUEST

Amna Al Zaabi.

REFERENCES

1. CDC. Healthcare Workers. Cdc.gov. Published June 5, 2021. Accessed August 11, 2021. https://www.cdc.gov/coronavirus/2019-ncov/hcp/infection-control-recommendations.html
2. Personal protective equipment for COVID-19. World Health Organization. Accessed August 10, 2021. https://www.who.int/teams/health-product-and-policy-standards/access-to-assistive-technology-medical-devices/medical-devices/ppe/ppe-covid
3. WHO announces COVID-19 outbreak a pandemic. Published online 2020. Accessed August 9, 2021. https://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/news/news/2020/3/who-announces-covid-19-outbreak-a-pandemic
4. COVID 19 guide for health care professionals – Abu Dhabi. Department of Health. Accessed May 10, 2021. https://www.doh.gov.ae/-/media/7BD7B077D8F846B48A70C5872902DD1C.ashx
5. O'Neill H, Narang I, Buckley DA, et al. Occupational dermatoses during the COVID-19 pandemic: a multicentre audit in the UKand Ireland. *Br J Dermatol*. 2021;184(3):575-577.
6. Kosasih LP. MASKNE: Mask-induced acne flare during coronavirus disease-19. What is it and how to manage it? *Open Access Maced J Med Sci*. 2020;8(T1):411-415. doi:10.3889/oamjms.2020.5388
7. Bhatia R, Sindhuja T, Bhatia S, et al. Iatrogenic dermatitis in times of COVID-19: a pandemic within a pandemic. *J Eur Acad Dermatol Venereol*. 2020;34(10):e563-e566. doi:10.1111/jdv.16710
8. Brinkmann I, Müller-Goymann CC. Role of isopropyl myristate, isopropyl alcohol, and a combination of both in hydrocortisone permeation across the human stratum corneum. *Skin Pharmacol Appl Skin Physiol*. 2003;16(6):393-404. doi:10.1159/000072935

9. Navarro-Triviño FJ, Ruiz-Villaverde R. Therapeutic approach to skin reactions caused by personal protective equipment (PPE) during COVID-19 pandemic: an experience from a tertiary hospital in Granada, Spain. *Dermatol Ther*. 2020;33(6):e13838.
10. Zhou N-Y, Yang L, Dong L-Y, et al. Prevention and treatment of skin damage caused by personal protective equipment: experience of the first-line clinicians treating SARS-CoV-2 infection: experience of the first-line clinicians treating 2019-nCoV infection. *Int J Dermatol Venereol*. 2020;3(2):70-75.
11. Desai SR, Kovarik C, Brod B, et al. COVID-19 and personal protective equipment: treatment and prevention of skin conditions related to the occupational use of personal protective equipment. *J Am Acad Dermatol*. 2020;83(2):675-677.
12. National Health Scotland, UK. Accessed August 9, 2021. https://www.nipcm.hps.scot.nhs.uk/media/1437/2019-02-11-aide-memoire-for-levels-of-personal-protective-equipment-ppe-for-healthcare-workers-for-patient-care.pdf
13. NCM.AE. NCM.ae – National Center of Meteorology. Accessed August 11, 2021. https://www.ncm.ae/services/climate-reports-yearly?lang=en
14. Lee HC, Goh CL. Occupational dermatoses from personal protective equipment during the COVID-19 pandemic in the tropics – a review. *J Eur Acad Dermatol Venereol*. 2021;35(3):589-596.
15. Alluhayyan OB, Alshahri BK, Farhat AM, et al. Occupational-related contact dermatitis: prevalence and risk factors among healthcare workers in the Al'Qassim region, Saudi Arabia during the COVID-19 pandemic. *Cureus*. 2020;12(10):e10975.
16. Alsaidan MS, Abuyassin AH, Alsaeed ZH, Alshmmari SH, Bindaaj TF, Alhababi AA. The prevalence and determinants of hand and face dermatitis during COVID-19 pandemic: a population-based survey. *Dermatol Res Pract*. 2020;2020:6627472-6627478.
17. Singh M, Pawar M, Bothra A, et al. Personal protective equipment induced facial dermatoses in healthcare workers managing coronavirus disease 2019. *J Eur Acad Dermatol Venereol*. 2020;34(8):e378-e380. doi:10.1111/jdv.16628
18. Kiely LF, Moloney E, O'Sullivan G, Eustace JA, Gallagher J, Bourke JF. Irritant contact dermatitis in healthcare workers as a result of the COVID-19 pandemic: a cross-sectional study. *Clin Exp Dermatol*. 2021;46(1):142-144.
19. Trepanowski N, Larson AR, Evers-Meltzer R. Occupational dermatoses among frontline health care workers during the COVID-19 pandemic: a cross-sectional survey. *J Am Acad Dermatol*. 2021;84(1):223-225.
20. Balato A, Ayala F, Bruze M, et al. European task force on contact dermatitis statement on coronavirus disease-19 (COVID-19) outbreak and the risk of adverse cutaneous reactions. *J Eur Acad Dermatol Venereol*. 2020;34(8):e353-e354.

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Al Zaabi A, Abdelhadi S, Ruszczak Z. Personal protective equipment-related dermatoses in COVID-19 frontline health workers. A lesson learned from 1-year single center in the UAE. *Dermatologic Therapy*. 2022;35(8):e15624. doi:10.1111/dth.15624