



## **Preventing and treating occupationally induced dermatologic conditions during COVID-19**

The COVID-19 pandemic has resulted in occupationally induced skin conditions in health care workers associated with increased hand washing, repeated exposure to sterilizing agents and increased use of personal protective equipment (PPE) such as respirators, face masks and gloves. The purpose of this document is to facilitate identification, appropriate treatment of, and ultimately prevention of these dermatologic conditions.

### **Hand washing-induced dry skin and dermatitis**

Repeated washing of hands throughout the day, whether with soap and water or alcohol-based hand sanitizers, can result in dried and cracked skin. Dry, cracked skin can cause symptoms of burning, itching, redness known as irritant contact dermatitis that can lead to a local skin infection. Health care workers (HCWs) should be encouraged, after cleaning their hands, to use a moisturizer to protect the skin. Throughout the day this can be difficult and therefore moisturization when off work, or overnight, may be most practical.

Almost all topical moisturizing products available on the market contain a combination of emollients, occlusive ingredients, and humectants with the goals of skin barrier repair and retention of moisture (See Kraft 2005<sup>1</sup> for more information on the roles and lists of emollients, occlusive ingredients, and humectants). The combination of emollients, occlusive ingredients, and humectants is prepared in an emulsion as a form of delivery. Based on the type of emulsion, skin products can be formulated into lotions, creams, and ointments. For example, oil in Water (O/W) emulsions are oil droplets dispersed in water, and often formulate lotions and creams. They are non-greasy and easily removable from skin. Water in oil (W/O) emulsions are water droplets dispersed in oil. Ointments, in general, have the highest percentage of oil, followed by creams, and lotions. Though ointments have the highest oil-to-water ratio and may stay on the skin longer, creams are preferred to prevent dry skin by some people as they are less messy to apply and more readily absorbed. The preferred formulation to use should be based on skin condition as well as personal preference.

When choosing between different products, look for a product with petroleum (the most effective occlusive ingredient). Studies have shown that petroleum, in a minimum concentration of 5%, reduces transepidermal water loss (TEWL) by more than 98%, followed by lanolin, mineral oil, and silicones, which only reduced TEWL by 20-30%.<sup>2,3</sup>

### Preventing contact dermatitis

During the COVID-19 pandemic, health care workers are increasingly exposed to fragrances, surfactants or foaming agents, preservatives in cleansers and lotions, sterilizing agents (e.g. 70% ethyl alcohol, 0.5% sodium hypochlorite), rubber (in gloves and respirators), elastic (bands in surgical masks) and other exogenous compounds which may trigger contact dermatitis. "Contact dermatitis is one of the most common chemically induced occupational illnesses, accounting for 10% to 15% of all occupational illnesses at an estimated annual cost of at least \$1 billion." <sup>4</sup> Both irritant contact dermatitis and allergic contact dermatitis can develop in response to frequent hand washing and the use of protective gloves which can result in occlusion, potentially increasing the absorption and inflammatory response to exogenous compounds.

Signs and symptoms of contact dermatitis include itchy skin, rash (skin red, swollen, and hot), excessively dry skin, burning, stinging, hives (round welts on the skin that itch intensely), fluid-filled bullae, and oozing bullae that leave crusts and scales.<sup>5</sup> In persistent cases, people with contact dermatitis can have skin that flakes, cracks, darkens, thickens, and feels leathery.<sup>5</sup>

### Managing and treating contact dermatitis

Note: Contact dermatitis is commonly treated by board-certified dermatologists. This information is presented here to ensure a comprehensive approach to the topic for all health care professionals. If the treatment strategies presented here do not resolve the contact dermatitis, please see a board-certified dermatologist.

Regardless of which type of contact dermatitis you have (allergic or irritant contact dermatitis), the initial treatment course is similar. The Academy recommends the following for management and treatment of contact dermatitis<sup>7</sup>:

- **Avoid what is causing your rash.** If avoiding the cause will be difficult, ask your dermatologist for help.
  - For example, if you are allergic to rubber but must wear exam gloves, your dermatologist can often recommend an alternative type of synthetic rubber glove that you can wear.
  - Patch testing can be performed to identify causes of allergic contact dermatitis.
- **Treat the rash.** Once you can avoid the cause, your rash should clear. To relieve your symptoms, a dermatologist may recommend the following:
  - **Mild reaction:** Moisturizer can be beneficial in mild cases. In addition, topical corticosteroid and/or topical calcineurin inhibitors can be used to alleviate symptoms. Most patients apply the medicine twice a day for 1 week and once a day for 1 to 2 weeks. Oatmeal baths can relieve discomfort and oral antihistamines can help with itch.
  - **Severe reaction:** If you have a lot of swelling, your face or eyelids becomes swollen, or the rash covers much of your body, you may need evaluation and a stronger, potentially systemic medication. Your dermatologist may prescribe oral prednisone.

The British Association of Dermatologists' contact dermatitis guidelines recommend avoiding allergens and irritants, protecting skin against contact with an allergen with gloves in hand dermatitis, and using topical corticosteroids and topical tacrolimus for persisting contact dermatitis despite allergen/irritant removal and skin protection.<sup>8</sup>

### Preventing skin damage from N95 respirator mask

An N95 respirator is held in place with elastic straps, which immobilize the mask but generate pressure and frictional forces at the mask-skin interface, with the possibility of causing visible tissue damage at the skin surface and/or subdermal damage. If a particular brand or style of N95 is causing unacceptable skin irritation or damage at the end of a shift, the HCW should contact the hospital's safety manager to determine whether another N95 style mask can be tried and fit-tested as an alternative. A different N95 may provide a more equitable distribution of the pressure induced by the mask over the contact areas of the face to alleviate the pressure points that often cause skin irritation or damage.

If an alternative N95 mask is not available, there are some things health care workers can do to help. One is to apply liquid skin sealants/protectants on areas affected by the mask. It's important for these to dry fully before putting on the mask. Petrolatum is **not** recommended as a skin sealant, as it could interfere with the function of the mask. Because N95 respirator masks require a tight seal, it is not recommended to place any material or cushioning between the skin and the mask, as it could interfere with the function of the mask and increase the health care worker's risk of contracting COVID-19.

Make sure your N95 respirator has been fit-tested according to OSHA standards for the best protection. Carefully read and follow the instructions on how to appropriately use the mask.

HCWs should check with their own institution's recommendations on donning and doffing their N95. Many institutions are re-sterilizing N95s after use and recommend that the HCW does not touch their N95 unless they are planning to remove or change the N95. The HCW must wash their hands before and after touching the masks at any time. Follow the CDC's guidance on how to perform a seal check after each adjustment for your safety.

The most important thing you can do to prevent irritation and breakouts is to keep your skin clean and well moisturized. HCWs should wash their face gently but thoroughly using a pH balanced non-comedogenic cleanser after wearing a mask to remove oil, dirt and bacteria, and apply moisturizer immediately after washing. Some moisturizers can interfere with the re-sterilization of the mask, so HCWs should be careful about applying moisturizer at least one hour before donning their N95.

Once safely inside their homes, those wearing PPE for long periods of time can apply a cream or ointment, such as petrolatum, to areas where the skin has been compromised, especially the forehead, cheeks, and bridge of nose. Overall, keep your face well moisturized, possibly with a dimethicone-based moisturizer. Dry, irritated skin may make it easier for bacteria, viruses, and other organisms to create infection in the skin. Since the mask covers your face, you should consider skipping makeup, such as foundations and concealers.

If your institution is encouraging the use of masks for a prolonged period due to the PPE shortage and to minimize touching your face with contaminated hands through mask adjustment or removal and putting back on, at the end of day, dry the mask completely before putting on the mask again the next day. Excessive moisture can lead to softening of the stratum corneum, resulting in increased permeability, susceptibility to irritants, and skin barrier disruption.<sup>9</sup> Completely drying masks also prevents bacteria from growing in the masks.

### Preventing skin damage from surgical or isolation masks

Most HCWs are wearing non-airtight surgical masks (tie behind the head) or isolation masks (elastic ear loops), which can result in different skin issues. The elastic bands that are used to hold the isolation mask in place can result in contact, frictional or pressure-related dermatitis. There are several prevention methods that can help with this issue. Consider the use of headbands with buttons to secure the isolation mask. A barrier film wipe can be applied behind the ears prior to use of the mask and may protect the skin behind the ears. A thin foam dressing can also be applied behind the ears beneath the ear loops of an isolation mask for protection. If the skin becomes damaged under surgical or isolation masks (or goggles/face shields), then a thin hydrocolloid dressing or thin foam dressing can be used.<sup>10</sup> These dressings can be cut and adjusted to fit the application site and applied without tension to avoid medical adhesive-related skin injury. Once the PPE has been removed, wash hands, don clean gloves, gently and slowly remove prophylactic dressings, and wash hands again. When removing prophylactic dressings, close eyes, and avoid inhaling any aerosolized particles.

### Reference

1. Kraft J, Lynde C. Moisturizers: what they are and a practical approach to product selection. *Skin Therapy Lett.* 2005;10(5):1-8.
2. Ghadially R, Halkier-Sorensen L, Elias PM. Effects of petrolatum on stratum corneum structure and function. *Journal of the American Academy of Dermatology.* 1992;26(3):387-396.
3. Lynde C. Moisturizers: what they are and how they work. *Skin Therapy Lett.* 2001;6(13):3-5.
4. The Center for Disease Control and Prevention. Immune, Dermal and Infectious Disease: Dermal Diseases. <https://www.cdc.gov/niosh/programs/idid/derm/default.html>. Published 2012. Accessed April 2020.
5. American Academy of Dermatology. CONTACT DERMATITIS: SIGNS AND SYMPTOMS. <https://www.aad.org/public/diseases/eczema/types/contact-dermatitis/symptoms>. Accessed April 2020.
6. Beiu C, Mihai M, Popa L, et al. Frequent Hand Washing for COVID-19 Prevention Can Cause Hand Dermatitis: Management Tips. *Cureus Journal of Medical Science.* 2020;12(4).
7. American Academy of Dermatology. CONTACT DERMATITIS: DIAGNOSIS & TREATMENT. <https://www.aad.org/public/diseases/eczema/types/contact-dermatitis/treatment>. Accessed April 2020.
8. Johnston G, Exton L, Mohd Mustapa M, et al. British Association of Dermatologists' guidelines for the management of contact dermatitis 2017. *British Journal of Dermatology.* 2017;176(2):317-329.
9. Gefen A, Alves P, Ciprandi G, et al. Device-related pressure ulcers: SECURE prevention. *Journal of Wound Care.* 2020;29(Sup2a):S1-S52.
10. Penn Medicine. Preventing and Treating PPE Related Skin Damage, April 2020.

Other Resources

National Pressure Injury Prevention group (NPIAP0), NPIAP POSITION STATEMENTS ON PREVENTING INJURY WITH N95 MASKS,

[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)

National Pressure Injury Prevention group (NPIAP0), NPIAP Protecting Facial Skin Under PPE N95 Face Masks info-graphic,

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