

Management of Skincare during a Pandemic

Prevention and Treatment of Skin Damage caused by face masks and frequent hand hygiene during the Covid-19 Pandemic

Coronavirus disease (Covid-19) is an infectious mild to moderate respiratory illness caused by the newly discovered coronavirus named 2019-nCoV.



As the virus is highly contagious via respiratory route (through droplets of saliva, produced during coughs or sneezes, or through nasal discharge from an infected person) and via contact with contaminated surfaces, community transmission can be controlled by implementing the use of protective face masks (PFM) and through the practice of regular and thorough hand hygiene.

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These practices, though protecting us from the virus, can have an impact on our skin: with facemasks being responsible for breakouts and frequent hand washing leading to excessive skin dryness and even contact dermatitis.

Protective Face Masks

Disposable protective face masks (PFM) are the most common type of facemasks used to prevent respiratory infections, however, they may allow air and micro-organism leakages or cause choking sensations. They also are not the most

environmentally and cost-friendly option available, consequently many investors have now started developing different types of reusable and washable options.

It goes without saying that the use of facemasks will not be effective unless they are worn appropriately; in fact, due to resistance in airflow and discomfort related to build-up of facial heat many people use PFM without compliance to safety regulations.

Many are the attributes influencing the good fit for a facemask, such as its permeability, or the



exhaled air and water vapour create their own temperature and humidity levels: excessively high temperatures and humidity may cause moisture to condense on the fabric layers impairing respiratory heat loss and imposing an increased heat burden, along with soaking the mask, causing it to cling to the face increasing friction and discomfort.

In contrast, masks that provide higher thermal conductivity will transfer heat away faster, maintaining a lower in-mask temperature.

Moreover, the fit of the mask will not only affect the comfort, but also its filtration effectiveness: an oversized or ill-fitting mask might allow gaps along the side of the face of the wearer, enabling air to escape or enter, permitting particles to access the respiratory system and as such defeating the purpose of the mask.

Hand Washing

Frequent hand washing and use of alcohol-based hand sanitizers implies a prolonged exposure to water and other chemical or physical agents and, in the long term, can lead to several pathophysiological changes, such as disruption of the stratum corneum, allowing irritants to better traverse the epidermal barrier where they are sensed by pathogen receptors, triggering the stimulation of phagocytes and release of pro-inflammatory cytokines.

Especially in individuals with pre-existing history of atopic dermatitis, adverse dermatological effects such as contact dermatitis (mostly the irritant subtype and lesser frequently the allergic one) can occur.

Sodium lauryl sulphate (SLS), sodium hydroxide (NaOH) and benzalkonium chloride (BAK) are the main constituents of soaps used to perform hand hygiene while ethanol or isopropanol (in concentration variable from 60% - 95%) are the main active ingredients of alcohol base hand sanitizers.

The aforementioned chemicals can also be technically classified as skin irritants, with different mechanisms: SLS emulsifies the fat in the stratum corneum to penetrate the skin barrier; NaOH is a hygroscopic caustic element that penetrates the skin barrier; BAK is directly cytotoxic and ethanol/isopropanol have a highly oxidative metabolism.

It goes without saying that there is going to be a significant association between frequency of hand washing and irritant dermatitis (ID): recent studies link those who wash their hands more than 10 times per day to have 55% higher likelihood to develop some forms of hand dermatitis

most effective indicator of the "breathability" of all the different types of textile materials used for facemasks, and definitely the most significant attribute to determine textile comfort.

The level of comfort that a fabric offer is strongly related to the thermo-regulation and moisture transportation of the material, meaning that masks that can quickly transfer heat and moisture away from the face are considered to provide higher levels of comfort.

Breathing creates a microclimate inside the masks in which the



compared to those who perform hand washing less than 10 times per day. The analysis based on continuous hand washing indicates that for one unit increase in frequency of hand washing, there is a 4% increase of incidence rate of hand dermatitis. Also, a very significant association between season and dermatitis has been highlighted: the risk of developing ID during colder months is three times higher than during warmer climate.

Characteristics of Mask-Related Skin Damage

Although made from different materials and shapes, feedback from frontline workers and people who have been wearing the masks consistently over the lock-downs periods are that PFM may cause a range of skin problems.

The factors contributing to mask related skin complaints include poor local blood circulation, tissue ischemia and hypoxia, skin dehydration, friction and the accumulation on the inside of the mask of a large amount of aqueous vapor, exhaled through breathing.

Keeping the facial skin in a moist environment for a long period of time also reduces the ability of the stratum corneum to resist external pressure and shear forces causing the skin to be prone to indentations. In addition, the friction between the PFM and the skin enhances the development of erythema, blisters, or ulcers, along with pain and even secondary infection.

'Maskne' or Acne Mechanica

Acne mechanica (AM) is a papulo-pustular eruption that simulates acne vulgaris, but is caused primarily by a combination of pressure, occlusion, friction, and/or heat. Stress on the skin

appears to be the key element in AM rather than the inflammation and hyperkeratinization of the pilosebaceous unit seen in acne vulgaris. Sweating also is a key factor in the development of AM, since it produces hydration of keratin, which is known to reduce the pilo-sebaceous duct exit site and so increasing obstruction to sebum flow.

It is most often seen on the chin and jawline and is characteristic for occurring predominantly beneath protective equipment such as PFM in areas of intense friction and humidity buildup.

Treatment is more difficult than typical acne vulgaris. The most important management strategy is prevention, such as wearing appropriate PFM that fits properly and avoiding prolonged use when possible.

General treatments include: daily skin cleansing with a selection of lightweight skincare products specific to combination or breakout prone skin types, a low-sugar diet and avoidance of squeezing pimples with the hands.

When these topical treatments do not achieve a good effect, medical treatment will be required and will be similar in regimen to other forms of acne: topical benzoyl peroxide, salicylic acid, topical or systemic antibiotics, topical and systemic retinoids.

Topical agents are available both over the counter and on prescription, and are often used in combination. The absorption of those agents is influenced by multiple factors such as quantity of product applied, surface area, length and frequency of the application, conditions of the skin (such as broken, eroded or thickened). The systemic



absorption, though, is very limited and common topical agents are generically safe to use also in pregnant or lactating women.

The most commonly used topical treatment include:

- **Benzoyl peroxide (BP):** Available in a variety of strengths and formulations (gel, cream, foam), BP is a comedolytic, keratolytic and anti-inflammatory agent with antimicrobial properties. Its activity is connected to the production of reactive oxygen radicals and is often used in addition to antibiotic therapies, as it appears to enhance results and reduce development of antibiotic resistance. Topical BP in varying formulations may be used up to three times daily but its application is dependent on the concentration of the active ingredient as it may cause irritation. Lower concentrations (2.5 - 5%), water based and wash-off formulations are better suited for patient with very sensitive skin.
- **Salicylic acid (SA):** SA is a comedolytic agent available in a variety of concentrations (0.5-2%) and is generally well tolerated. Can be applied up to three times daily and is often used in combination with BP.

In addition to the above, if not effective, topical antibiotic (TA) therapies are prescribed. TA are thought to accumulate in the follicle and work through both anti-inflammatory and antibacterial mechanism.

The main topical antibiotic medications are:

- **Topical Clindamycin (TC):** Available in gel, lotion or topical solution, the Clindamycin 1% is

the currently preferred topical antibiotic medication. It is recommended to apply a thin layer on the affected area once daily.

- **Topical Erythromycin (TE):** Because of developed P. Acnes resistance, TE is less efficacious than TC, but combination with other agents might enhance its effectiveness. Preparations with TE 3% and BP 5% are available and usually administered once or twice daily.

Topical retinoid medications (TRM) are also often used as first line treatments. TRM are vitamin A-derivatives and have both a comedolytic and anti-inflammatory action. TRM use is limited by their side effects, including dryness, peeling, erythema, and irritation, which can be mitigated by reducing the volume used, frequency, and by introducing use of an emollient.

Other agents may also be of benefit, such as newer treatment modalities used to treat refractory acne vulgaris: photodynamic therapy, intense pulsed light therapy or fractionated non-ablative lasers.

From Frequent Hand Washing to Hand Dermatitis

As previously mentioned, frequent hygienization of hands may generate various changes in skin texture, ranging from cutaneous xerosis (dryness of the skin) up to irritant contact dermatitis (ICD) or, rarely, even allergic contact dermatitis (ACD).

Overall, these skin disorders are caused by a various range of mechanisms, including physical, chemical and immunological ones.

When frequent hand hygiene must be implemented, the aforementioned mechanisms are likely to be activated mainly by the following scenarios:

1. Prolonged skin exposure to water and humidity. This creates disruption of the structure of the stratum corneum by swelling and rearranging of the ultrastructure of intercellular lipids, increasing the skin permeability and consequently sensitivity to chemicals and irritants.
2. Frequent use of soaps, surfactants, detergents and solvents. Usually well tolerated, those weak irritants can lead to chronic cumulative irritant contact dermatitis, mainly because of their capacity to remove skin surface lipids and denature epidermal keratin. Furthermore, people with a personal or familiar history of atopic dermatitis present a chronically dysfunctional skin barrier, which makes them even more sensitive to skin irritants.
3. Repeated use of alcohol based hand sanitizers. If water and soap are not available, alcohol based hand rubs are a reasonable alternative to hand washing. Frequent use of those products could also result in excessive skin dryness and irritation.

With this being said, it is important to underline that compliance with hand hygiene guidelines is essential to prevent the spread of COVID-19 and should not be diminished by the eczematous changes that may occur in the hands.

In this context, it is very useful to adopt the following measures:

1. After washing, rinse the hands with gentle maneuvers, avoiding physical irritation of the skin.
2. Moisturizing liberally with skin care products throughout the day and most importantly right after hand cleansing, is the essential step in keeping skin hydrated and avoiding further abnormal skin reactions.
3. Combine humectants (topical urea, propylene glycol) with occlusive emollients (petroleum based products, lanolin, waxes and oils). The synergic action of the two types of products will attract water to the stratum corneum from the environment or deeper layers of the skin and then sealing it at the corneum level to prevent further loss and alleviate irritation.
4. Greasy creams/ointments (petroleum jelly) provide higher protection against xerosis than lotions.
5. Use fragrance free and hypoallergenic products, to further reduce risk of contact sensitization.
6. When the use of alcohol based hand sanitizers is the only option, hydrate the skin right after the application of the gel.
7. For individuals that must work with gloves, it is crucial to systematically wash hands and apply moisturizer whenever gloves are taken off. Gloves, also, must be changed frequently and worn only on dry hands.
8. For people with highly sensitive skin, prone to developing forms of dermatitis, short courses of topical corticosteroids may be used to reduce signs and symptoms of inflammation.

Bibliography

- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7147274/>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4456799/>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7558362/>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7558090/>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1638630/?page=1>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7373692/>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3716855/>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7195203/>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5986265/>