

Hand Dermatitis Due to Hand Hygiene During the Pandemic Covid 19

Arifiana Wungu Kartika Dewi¹, Sylvia Anggraeni^{1,2}

sylviaahutomo@gmail.com

¹ Department of Dermatology and Venereology, Faculty of Medicine, Universitas Airlangga, Dr. Soetomo General Hospital, Jl. Prof Dr. Moestopo No. 6-8, Surabaya, 60286, Indonesia

² Universitas Airlangga Hospital, Jl. Dharmahasada Permai, Surabaya, 60115, Indonesia

ABSTRACT

Background: Contact dermatitis can manifest as irritant contact dermatitis and allergic contact dermatitis, which can occur in acute or chronic forms.

Content: Dermatitis of the hands is a chronic disease with significant long-term negative impacts on quality of life and an economic burden on society. Hand dermatitis is defined as eczema or dermatitis located on the hand and / or wrist. Clinical manifestations include macules, papules, vesicles, and edema in the acute stage, and in the chronic stage, crusts, scales, hyperkeratosis, and fissures are the predominant symptoms. The subjective symptoms include itching, burning, pain, sleep disturbances and mood disorders

Conclusion: Washing your hands too often can cause various changes in skin texture, from progression to xerosis cutis to irritant contact dermatitis or, although rarely, allergic contact dermatitis can still occur.

Keywords : Hand dermatitis, Hand hygiene, Covid 19, Contact dermatitis

BACKGROUND

The skin is a complex and dynamic organ with many functions, one of which is to physically and immunologically shelter the body from the environment. As a result, the first line of defense against chemical exposure is the skin. Hand dermatitis is a type of contact dermatitis caused by chemicals or metal ions that cause an irritant effect with a certain level of toxicity, or by small reactive chemicals that cause allergic contact dermatitis, which modifies proteins and triggers an immune response, particularly the T-cell response, which modifies proteins and triggers an immune response, particularly the T-cell response. Irritant and allergic contact dermatitis are two types of contact dermatitis that can be acute or chronic.^{1,2}

Irritant contact dermatitis is sometimes identified as the primary cause of atopic and allergic contact dermatitis, but it also plays a role in predisposing to these conditions. When acute irritant dermatitis is the only diagnosis, patients frequently self-diagnose. Irritative contact dermatitis symptoms began within hours of the initial exposure and disappeared within a few days of ceasing it. On the other hand, allergy contact dermatitis might occur several days after exposure and last for weeks. As a result, correct self-diagnosis of irritating contact dermatitis is more common than correct self-diagnosis of allergic contact dermatitis.⁸

Allergic contact dermatitis (DKA) develops in 20% of new cases of contact dermatitis (with the remaining 80 percent being irritant contact dermatitis). As the name implies, DKA is an inflammatory skin reaction caused by contact with a specific exogenous allergen in a previously sensitized person. More than 3700 chemicals can induce DKA in people. The skin reacts immunologically after coming into contact with an allergen, resulting in eczematous inflammation. Depending on the type and number of allergens, as well as the location and frequency of exposure, the severity of the condition ranges from moderate for a short time to severe, persistent, and chronic. Correct allergen

identification using patch tests has been shown to improve patient quality of life by allowing patients to avoid trigger allergens with proper identification, allowing for long-term remission. Recognition of clinical signs and symptoms, as well as accurate patch testing, are crucial in the assessment of a patient with suspected DKA.^{2,8}

CONTENT

Hand dermatitis

Hand dermatitis is a chronic condition that has long-term detrimental effects on someone's quality of life and is a financial burden on society. Eczema or dermatitis on the hand and/or wrist is well known as hand dermatitis. In the acute stage, macules, papules, vesicles, and edema are common, whereas crusts, scales, hyperkeratosis, and fissures are the most common symptoms in the chronic stage. Itching, burning, pain, sleep difficulties, and mood issues are some of the subjective symptoms.⁵

Dermatitis can be caused by non-occupational or occupational factors. Dermatitis can affect the torso, hands, or both, although hand dermatitis is found in 80-90 percent of OCD patients, according to epidemiology. There are multiple sources of irritation in the workplace, including alkaline compounds such soaps, detergents, and cleaners, which can induce ICD. Caustic characteristics are seen in acidic compounds such as hydrocarbons like petroleum and oil. Frictional dermatitis, a subtype of ICD induced by the presence of particular friction in the workplace, such as fabric, paper, and metal objects, is also a subtype of ICD. ICD can also be caused by organic things such as food.⁶

Washing hands was one of the wet labor activities that was frequently performed during a pandemic, and thus contributed to the occurrence of hand dermatitis, particularly among medical workers. Mathias criterion can help determine the likelihood of occupational dermatitis. The Mathias criteria are a collection of seven questions that can be used to discover the particular cause of dermatitis in the workplace. If the patient's dermatitis is caused by work and the response to four or more of these seven questions is "yes," the patient's dermatitis is 50 percent likely to be caused by work.¹⁷

Mathias criteria for assessing work-relatedness
1. Is the clinical appearance consistent with contact dermatitis?
2. Are there workplace exposures to potential cutaneous irritants or allergens?
3. Is the anatomic distribution of the dermatitis consistent with cutaneous exposure in relation to work tasks?
4. Is there a temporal association between onset of dermatitis and exposure consistent with contact dermatitis?
5. Are nonoccupational exposures excluded as probable causes?
6. Does dermatitis improve away from work exposure to the suspected allergen or irritant?
7. Do patch or provocation tests identify a probable causal agent?

Table 1 Mathias criteria for assessing occupational dermatitis.⁶

Hand dermatitis is a type of contact dermatitis, which is split into two categories: irritating contact dermatitis and allergic contact dermatitis. Dermatitis is an inflammatory condition of the epidermis that is triggered by physical or immunological mechanisms. The terms dermatitis and eczema are frequently interchanged. On histological

investigation, dermatitis appears as spongiosis. The skin barrier is compromised in generalized dermatitis, resulting in increased transepidermal water loss (TEWL). Irritant dermatitis is caused by a breakdown of the skin barrier, which can lead to higher levels of exposure to bacteria, yeasts, and germs that can trigger an immunological response. Irritant contact dermatitis starts with the disintegration of keratinocytes, which triggers the release of danger signals that attract inflammatory cells. Necrotic keratinocytes can form in extreme situations.¹⁰

Physical injury to the epidermis causes irritant contact dermatitis, and its clinical symptoms are faster than the delayed hypersensitivity reaction that contributes to allergic contact dermatitis. Climate and season, occlusion, frequency of irritant exposure, and irritant concentration are all factors that influence the manifestation of irritant contact dermatitis. Irritative contact dermatitis is divided into ten categories based on the causes and effects of various factors, including irritant reactions, acute irritant contact reactions, delayed acute irritation, chronic cumulative contact dermatitis, subjective irritants, suberythematous irritations (nonerythematous), friction dermatitis, traumatic reactions, pustular reactions (acneiformis), asteatotic irritant dermatitis, and asteatotic irritant Chronic cumulative contact dermatitis is a kind of contact dermatitis that is extremely frequent in clinical practice, and it is one of the ten varieties of irritating dermatitis. Cumulative irritant contact dermatitis occurs as a result of recurrent skin exposure to a variety of chemicals, many of which are mild and insufficient to induce irritant dermatitis. Soaps, detergents, surfactants, organic solvents, and oils are the most frequent marginal irritants. Symptoms that emerge days, months, or years after contact to the irritant, rather than immediately after exposure. When the skin is exposed to several irritants on a regular basis, it becomes hardened, and further exposure to the same irritants may be more difficult. Irritating contact dermatitis is more common on the hand. Repeated wetting and drying of the skin, especially if it dries quickly owing to low ambient humidity, can produce cracks.^{7,11}

In previously sensitized individuals, allergic contact dermatitis is an inflammatory skin reaction produced by contact with certain exogenous allergens. In humans, there are about 3700 substances that can induce allergic contact dermatitis. After coming into contact with an allergen, the skin reacts immunologically, resulting in eczematous inflammation. Depending on the kind and amount of allergens, as well as the area and frequency of exposure, sensitivity can range from moderate for brief times to severe, persistent, and chronic. Allergens can be discovered via a standardized patch test, which can enhance patients' quality of life by allowing them to avoid the trigger allergen and so maintain remission. In the evaluation of a patient with suspected allergic contact dermatitis, recognition of clinical signs and symptoms, as well as appropriate patch testing, is critical.⁷

Epidemiology

Contact dermatitis accounts for around 30% of all occupational diseases resulting in dermatitis of the hands in developed countries. Contact dermatitis is the most common occupational skin condition, accounting for about 95% of all occupational skin illnesses. In the United States, occupational skin disorders account for 15.2 percent of all skin illnesses. 0.5-1.9 instances per 1000 full-time workers are diagnosed with occupational skin diseases each year. In 2005, the annual incidence of OCD in Australia was 2.15 per 10,000 full-time workers. Over the course of a year, OCD affects 8.5 percent of all textile sector workers in China. However, there was a difference in the prevalence of OCD among managers (3.2 percent) vs workers in the manufacturing industry (2.4 percent). (10.8 percentage point). Meanwhile, in Indonesia, the prevalence of OCD is at 29%, with workers in the shoe-making industry being the most affected. In a prospective study of nurse interns in the Netherlands, the prevalence of dermatitis on the hands during the first year was 23 percent. Dermatitis on the hands climbed to 25% in the second year and to 31% in the third year that they worked.⁶

Etiopathogenesis

Exposure to solvents that remove fat from the epidermis top layer, or thinning of the stratum corneum layer as a result of recurrent rapid drying, may weaken the epidermal barrier function in irritating contact dermatitis. According to solvent extraction studies, epidermal lipids, which comprise ceramides (45–50%), cholesterol (25%), free fatty acids (10–15%), and other lipids including cholesterol sulfate, are a crucial component to the skin barrier.

Lipids are made up of lamellar granules that form in the cells of the epidermis' granular cell layer and are stacked as membrane sheets in the intercellular gaps. Another cause of hand dermatitis is DKA, which is a type IV delayed hypersensitivity reaction. In most cases, re-exposure to the allergen induces a delayed reaction, which means it does not happen straight away. This period of time can range from a few hours to several days. The source of the allergic reaction may be difficult to determine due to the delay in responding. Even at low concentrations, when lesions appear following exposure to a drug, the effects can build up over time, resulting in long-term skin damage and lesions. As a result, the skin barrier will progressively change, be damaged, and be destroyed, particularly the protective lipid layer on the surface of the horny layer. Skin lesions in allergic contact dermatitis, on the other hand, are caused by an immunological response and sensitization to a variety of substances (allergens), which is mediated by T cells and occurs in two phases: sensitization (afferent) and elicitation (efferent). The patch test used to detect and show a delayed hypersensitivity reaction type IV is the most essential diagnostic signal in distinguishing between irritant and allergic contact dermatitis.⁵

Clinical manifestation

Irritating contact dermatitis can be acute or persistent. Lesions can form everywhere on the body, although they're most frequent in the hands. Acute irritating contact dermatitis can cause erythematous macules, maceration, pustules, bleeding, crusts, scales, erosions, pruritus, and even pain. The skin lesions in acute irritant contact dermatitis are frequently asymmetrical and well-defined in the contact area. Diffuse or localized lesions with ill-defined erythematous scaly patches and plaques, dry skin, lichenification, and desquamation, as well as lichenification and desquamation, characterize chronic irritating contact dermatitis. Irritated skin lesions are most commonly found on the backs of the hands and forearms. It's common for the disease to be asymmetrical, with one hand dominating. As the condition progresses to a chronic stage, lichenification and fissures may appear.¹

Papules, vesicles, and pruritus on an erythematous base describe acute allergic contact dermatitis. Allergic contact dermatitis is characterized by erythematous, firm, scaly plaques. In severe situations, vesiculation and bullae might be detected. Allergic contact dermatitis is characterized by a well-defined eruption, itching, and eczema that is limited to the area of skin that has been exposed to the allergen. In the chronic phase, which is brought on by repeated or continuous contact with allergens. Dry, scaly, and thicker skin develops. Excoriation or impetiginization, lichenification, and fissures are all common secondary alterations.⁸

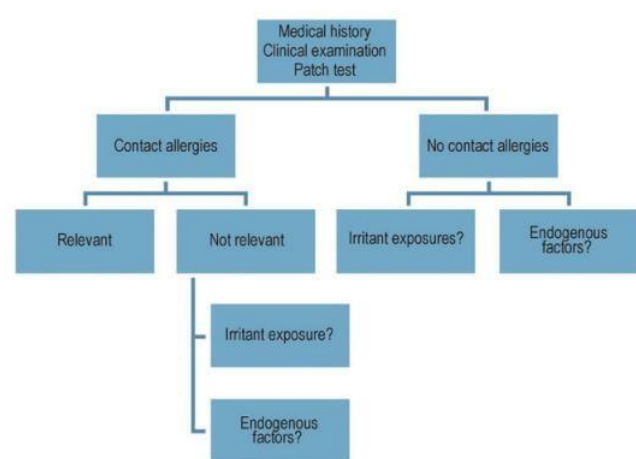


Figure 1 The Chart Diagnostic of Hand Dermatitis⁹

An integrated interview should be used to obtain the history, which should include the precise exposure materials linked to clinical manifestations. This should cover the dermatitis pattern, length, reasons of exacerbations and remissions, including any work-related linkages, use and response to skin care products and medicines, glove history, hand washing frequency, hobbies, and daily activities. Information on previous recorded allergies and test processes, as well as atopic condition, including prior atopic dermatitis, should be gathered. Patch testing, skin prick tests, and skin biopsies are some of the various techniques that can be used to get a diagnosis.⁹

Treatment

There are numerous options when it comes to treating hand dermatitis. Elimination procedures, which are difficult to eliminate dangers in the workplace, are among the approaches that can be used. This is the most effective method of health prevention. Then there's the substitution in the form of the dangerous material itself being replaced. Some studies have found that employing this treatment to lower the prevalence of dermatitis on the hands, such as the use of latex in gloves and chromate in cement, has been successful. The third method is isolation and engineering control, which is a method of avoiding harmful worker contact. The fourth method is administrative control, which involves altering the way work is done, such as rotating staff through different duties. The last thing is a personal protection which is often to be the first thought but it is the least effective. This safeguards workers by advising them on the use of adequate personal protective equipment, such as the use of proper and appropriate gloves.²¹

Aside from these procedures, dermatitis of the hands can be treated in a variety of ways. Topical treatments for barrier repair seek to heal the epidermal barrier that was previously exposed to various chemicals. Ceramide is one of the substances that can aid with hand dermatitis by restoring the barrier. In contrast, protective topical therapies try to shield the epidermis against additional irritants. At large doses of application (2-20 times the normal application), skin barrier protection cream with dimethicone can help prevent DKI.⁶

In most cases, topical corticosteroids are the first-line treatment. Dermatitis can be helped by using a strong topical steroid once or twice a day, but it should be tapered and eventually stopped as soon as feasible. Epidermal atrophy, which makes the skin more vulnerable to irritants and allergens, can be a side effect of long-term topical steroid treatment. Topical calcineurin inhibitors can be administered instead of or in addition to topical steroids if possible. If accessible, phototherapy is the best treatment for dermatitis of the hands. Hand dermatitis has traditionally been treated using ultraviolet A light devices, which can be used with or without topical or oral psoralen. Hands can also be treated with ultraviolet B radiation.¹⁰

Patients with hand dermatitis who do not respond to topical therapy may benefit from systemic medications. Psoriasisiform or hyperkeratotic hand dermatitis can be treated with oral retinoids such as acitretin. Mycophenolate mofetil, cyclosporine, methotrexate, and azathioprine are examples of systemic immunosuppressants that can benefit in this situation. Any systemic treatment has the potential for negative side effects and hazards, therefore it should be taken with caution.¹²

Complication

An inflammatory response is involved in the problems of hand dermatitis. Avoiding allergies can help to reduce inflammation. Diffuse dermatitis may result if the allergen is ingested systemically, but this is not considered a dermatological emergency.¹⁰

Hand hygiene

Hand hygiene is a broad phrase that refers to the act of washing hands, whether with an antiseptic, a hands rub, or medical hand antiseptis. Infections associated with health care pose a serious hazard to patient safety, affecting hundreds of millions of people around the world. HAIs (hospital-acquired infections) led in higher mortality and

morbidity, as well as longer hospital stays and higher health-care expenses. In 2011, 648,000 hospitalized HAI cases were discovered in the United States, accounting for around 1 in every 25 patients and resulting in approximately 80,000 deaths each year. The costs of HAI are anticipated to be between \$ 8.3 and \$ 11.5 billion. Many HAIs may be avoided with adequate hand hygiene, despite the fact that it is a severe hazard to patient safety.¹¹

Hand dermatitis due to hand hygiene during the Covid pandemic 19

Corona virus is one of the most prevalent viruses affecting the human respiratory system. SARS-CoV and Middle Eastern Respiratory Syndrome (MERS-CoV) are two previous Coronavirus (CoV) epidemics that were classed as major public health concerns. At the end of December 2019, a group of patients was taken to the hospital with an initial diagnosis of pneumonia of unknown origin. These people have been linked to a wholesale market for seafood and wet animals in Wuhan, Hubei Province, China. According to existing epidemiological statistics, COVID-19 spreads more faster than SARS, despite its pathogenicity being much lower when compared to MERS and SARS.^{4,16}

Risk factor

Washing your hands too often can cause a variety of skin texture changes, from xerosis cutis to irritating contact dermatitis and, in rare cases, allergic contact dermatitis. This skin disorder is caused by a combination of physical, pharmacological, and immunological causes.¹⁷ Medical volunteers in Hubei Province who were forced to wear PPE such as N95 masks, latex gloves, and protective clothing for extended periods of time suffered from a range of skin reactions, according to a study done by Xiang Zhou et al.¹⁷

Reaction	Total	Precentage
Dry skin	34	55.8%
Itching	19	31.2%
Rash	14	23.0%
Chapped skin	13	21.3%
Wheals	5	8.2%
Skin soaked with sweat	3	4.9%
Edema	1	1.6%

Table 2. Side effects of using latex gloves⁴

Soap, synthetic detergents, antiseptic hand wash, alcohol-based hand sanitizer, and disinfecting tissue are examples of allergens or irritants that can cause skin irritation. According to the facts, the usage of hand rub solution (hands rub) has expanded fast around the world, and various cases of connected hazards have been highlighted, necessitating the consideration of the alcohol concentration in terms of quality and the implementation of stringent control measures. Another issue with hand rubbing is the potential for skin problems. Alcohol-based antiseptics can cause skin irritation in persons who use them regularly due to misuse.²⁰



Figure 2 Contact Dermatitis and Acute Exacerbating Atopic Dermatitis of the Hand ²⁰

Therapy

According to WHO standards, hands should be properly cleansed (including nails, interdigital area, and wrists) for at least 20 seconds with warm water and soap after being in public places, before eating, after coughing or sneezing, after using the bathroom, and whenever the hands appear unclean. To avoid inflicting physical irritation to the skin, it's a good idea to rinse your hands with gentle motions after washing them. Following hand washing with moisturizing skin care products is critical for maintaining skin moisture and preventing further abnormal skin reactions. This moisturising lotion can be applied several times throughout the day, particularly after washing your hands. There are many different types of moisturizers available, but combining humectants and occlusive emollients is the best option for increasing the skin barrier quality. Humectants such as topical urea and propylene glycol can draw water from the environment and deeper layers of the skin into the stratum corneum. Occlusive emollients, such as petrolatum-based creams, lanolin, mineral and vegetable oils, and waxes, restrict water loss and minimize irritation. Both attract and seal water in the corneum layer, as well as chilling the skin.²¹

When wearing protective gloves, it is imperative that they wash their hands and apply a moisturizer every time they remove them. To reduce humidity, it should be replaced on a regular basis and only used on dry hands. It can be used to reduce the signs and symptoms of inflammation in those with extremely sensitive skin who have dermatitis that is resistant to topical corticosteroids for a limited period of time.⁴

CONCLUSION

People and health workers in general, especially those involved in the direct care of COVID-19-infected patients, must wear personal protective equipment (PPE) for several hours each day and take efforts to prevent transmission, such as washing hands. Long-term glove use, as well as the recommendation to wash hands, produce skin reactions in health workers and the general public, which must be avoided, diagnosed, and treated therapeutically.

REFERENCES

1. Novak-Bilić, G., Vučić, M., Japundžić, I., Meštrović-Štefekov, J., Stanić-Duktaj, S., & Lugović-Mihić, L. (2018). Irritant and allergic contact dermatitis – skin lesion characteristics. *Acta Clinica Croatica*, 57(4), 713–720. <https://doi.org/10.20471/acc.2018.57.04.13>
2. Nedorost, S. T. (2019). Chapter 25 : Irritant Dermatitis. *Fitzpatrick's Dermatology*, 1–33.
3. Otálora, M. M. C. (2020). Yuliana. *Parque de Los Afectos. Jóvenes Que Cuentan*, 2(February), 124–137. <https://doi.org/10.2307/j.ctvzxxb18.12>
4. Hu, K., Fan, J., Li, X., Gou, X., Li, X., & Zhou, X. (2020). The adverse skin reactions of health care workers using personal protective equipment for COVID-19. *Medicine*, 99(24), e20603. <https://doi.org/10.1097/MD.00000000000020603>
5. Agner, T., & Elsner, P. (2020). Hand eczema: epidemiology, prognosis and prevention. *Journal of the European Academy of Dermatology and Venereology*, 34(S1), 4–12. <https://doi.org/10.1111/jdv.16061>
6. Lampel, H. P., & Powell, H. B. (2019). Occupational and Hand Dermatitis: a Practical Approach. *Clinical Reviews in Allergy and Immunology*, 56(1), 60–71. <https://doi.org/10.1007/s12016-018-8706-z>
7. Turrentine, J. E., Sheehan, M. P., & Cruz, P. D. (2019). *Fitzpatrick's Dermatology. Edisi ke -9. Volume 1. United states : Mcgraw-Hill;2019. Chapter 24 : 395-413.*
8. Ljubojevic Hadzavdic, S., Pustišek, N., Žužul, K., & Švigir, A. (2018). Contact allergy: An update. *Giornale Italiano Di Dermatologia e Venereologia*, 153(3), 419–428. <https://doi.org/10.23736/S0392-0488.17.05844-8>
9. Diepgen, T. L., Klaus, E., Coenraads, P. J., English, J., Gimenez-arnau, A., & Nixon, R. (2017). *Guidelines for diagnosis , prevention and treatment of hand eczema. December*, 1–22. <https://doi.org/10.1111/ddg.12510>
10. Lampel HP, Powell Hb. Occupational and Hand Dermatitis: a Practical Approach. *Clin Rev Allergy Immunol*. 2019 Feb;56(1):60-71
11. Hoang D, Khawar N, George M, Gad A, Sy F, Narula P. Video didactic at the point of care impacts hand hygiene compliance in the neonatal intensive care unit (NICU). *J Healthc Risk Manag*. 2019 Apr;37(4):9-15
12. Biezen R, Grando D, Mazza D, Brijnath B. Visibility and transmission: complexities around promoting hand hygiene in young children – a qualitative study. *BMC Public Health*. 2019 pr 11;19(1):398
13. Kang YS, Chang YJ. Using a motion-controlled game to teach four elementary school children with intellectual disabilities to improve hand hygiene. *J Appl Res Intellect Disabil*. 2019 Jul;32(4):942-951
14. Yap M, Chau ML, Hartantyo SHP, Oh JQ, Aung KT, Gutierrez RA, Ng LC. Microbial Quality and Safety of Sushi Prepared with Gloved or Bare Hands: Food Handlers Impact on Retail Food Higiene and Safety. *J. Food Prot*. 2019 Apr;82(4):615-622.
15. Mutters R, Warnes SL. The method used to dry washed hands effects the number and type of transient and residential bacteria remaining on the skin. *J. Hosp. Infect*. 2019 Apr; 101(4): 408-413.
16. Rothan, H. A., & Byrareddy, S. N. (2020). The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak. *Journal of Autoimmunity*, 109(February), 102433. <https://doi.org/10.1016/j.jaut.2020.102433>
17. Beiu, C., Mihai, M., Popa, L., Cima, L., & Popescu, M. N. (2020). Frequent Hand Washing for COVID-19 Prevention Can Cause Hand Dermatitis: Management Tips. *Cureus*, 12(4). <https://doi.org/10.7759/cureus.7506>
18. Rothan, H. A., & Byrareddy, S. N. (2020). The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak. *Journal of Autoimmunity*, 109(February), 102433. <https://doi.org/10.1016/j.jaut.2020.102433>
19. Sonja A. Rasmussen, MD, MS, J. C. S. (2020). Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-. *Ann Oncol, January*, 19–21.
20. Emami, A., Javanmardi, F., Keshavarzi, A., & Pirbonyeh, N. (2020). Hidden threat lurking behind the alcohol sanitizers in COVID-19 outbreak. *Dermatologic Therapy*, 33(4), 17–19. <https://doi.org/10.1111/dth.13627>
21. Rundle, C. W., Presley, C. L., Militello, M., Barber, C., Powell, D. L., Jacob, S. E., Atwater, A. R., Watsky, K. L., Yu, J., & Dunnick, C. A. (2020). Hand hygiene during COVID-19: Recommendations from the American Contact Dermatitis Society. *Journal of the American Academy of Dermatology*. <https://doi.org/10.1016/j.jaad.2020.07.057>