Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.
COVID-19: The experience from Beijing, China

Fen Peng, PhD, MD*

Department of Dermatology, Beijing Chao-Yang Hospital, Capital Medical University, Beijing, China

Abstract The epidemiology of coronavirus disease 2019 (COVID-19) in Beijing, China, is summarized. This presentation highlights its main clinical manifestations, including the skin findings in Beijing and sums up the cutaneous damage to the medical staff in their epidemic preventative work. Although there had been few COVID-19 patients who reported skin lesions in Beijing and even in China, dermatologists still needed to pay attention to self-protection in their daily work. Skin damage caused by protective equipment is very common in the majority of the medical staff in Beijing.

© 2020 Elsevier Inc. All rights reserved.

COVID-19 and the epidemic situation in Beijing, China

Almost every year, there is a small epidemic of respiratory tract infection. A previous study found that, from 2015 to 2016, the influenza-associated severe acute respiratory infection hospitalization rate in Beijing, China, was between 39 and 37 per 100,000 persons.1 The major epidemics were coronavirus and H7N9 infection.2 COVID-19 has typical features of the coronavirus family and has been classified in the betacoronavirus 2 b lineage. COVID-19 has a close similarity to bat coronaviruses; it has been postulated that bats are the primary source; however, the origin of the COVID-19 is still being investigated.3

By April 16, 2020, a total of 83,798 COVID-19 cases were confirmed in China. In Beijing, 593 cases were confirmed, and 8 patients died. At present, the Chinese epidemic has been basically controlled with the main crisis coming from imported cases. The situation in Beijing has even been better controlled with quarantine of travelers wishing to enter China.

Manifestation of COVID-19 in China

Patients from Wuhan showed common findings, including fever, fatigue, and a dry cough. Lymphopenia (lymphocyte count, 0.8 × 10^9/L) occurred in 70.3% of patients with prolonged prothrombin time in 58% of patients, and elevated lactate dehydrogenase (261 U/L) in 39.9% of them. Chest Comp CT computed tomographic scans (CT) showed bilateral patchy shadows or ground glass opacity in the lungs of all patients.3 Based on a study enrolling 161 cases from Changsha, Hunan Province, China, fever (71%) and cough (61.1%) were the most common clinical manifestations; fatigue (39.8%) was frequently reported. Muscle soreness, diarrhea, nausea, and headache were rare.4

During the outbreak, a few patients who had been diagnosed with COVID-19 developed urticaria as their first sign, for which they consulted the dermatology department; however, there is an unclear potential relationship between urticaria and COVID-19. Urticaria is known to be caused by SARS-CoV.5 In addition, two infected Chinese doctors developed skin hyperpigmentation after treatment (Figure 1). It was initially thought to be a drug reaction due to polymyxin B, as previous studies had shown that intravenous polymyxin B treatment may cause acquired skin hyperpigmentation.6,7 There are a few reports of such lesions in COVID-19 patients in Beijing, although there are now some reports from

* Corresponding author.
E-mail address: fendyo0jj@163.com

https://doi.org/10.1016/j.clindermatol.2020.12.007
0738-081X/© 2020 Elsevier Inc. All rights reserved.
elsewhere of COVID-19-infected patients who had developed skin eruptions.\(^9\)

These skin findings may be due to a viral variation or even racial body differences. A coronavirus infection can invade multiple body organs. Previous studies have even found the existence of coronavirus in the sweat of SARS patients.\(^9\) The differential diagnoses of fever with such eruptions are listed in Table 1.

### Skin damage caused by personal protective equipment for fighting against COVID-19

The National Health and Health Commission of China has classified COVID-19 as a class B infectious disease, but it has now adopted class A infectious disease prevention and control measures. Medical staff personnel are required to wear level one to three protective equipment according to exposure risk (low, medium, or high), and level three protective equipment must be worn when diagnosing or treating nursing confirmed or suspected cases, including medical protective masks, goggles or protective masks, isolation clothes, protective clothes, latex gloves, and shoe covers. These measures need to be renewed every 4 hours, according to the exposure risk. Wearing protective masks for a long period often causes 80% of the medical staff to suffer from skin injury and facial abrasions.

| Classification       | Diseases                                                                 |
|----------------------|---------------------------------------------------------------------------|
| Virus infection      | Measles, rubella, varicella, infantile dermatitis hand-foot-and-mouth disease, infectious mononucleosis, herpes virus infection, viral hemorrhagic fever, popular purpuric gloves and socks syndrome |
| Bacterial infection  | Meningitis, scarlet fever, cellulitis, impetigo, erysipelas, staphylococcal scalded skin syndrome, streptococcal toxic shock syndrome |
| Drug reactions       | Stevens-Johnson syndrome, toxic epidermal necrolysis, acute generalized exanthematous pustulosis |
| Autoimmune diseases  | Systemic lupus erythematosus, erythroderma, dermatomyositis, vasculitis |
| Malignant tumor      | Lymphoma, Sezary syndrome |
| Other special skin diseases | Sweet syndrome, Henoch-Schonlein purpura, erythema multiforme, Kawasaki disease, erythema nodosum, still disease, purpular psoriasis, panniculitis, cytopathic histiocytic panniculitis, erythroderma |

A small cross-sectional study in China reported the main skin damage caused by protective equipment in health care staff and pointed toward pressure injury (26.58%), moisture-associated skin damage (8.83%), and skin tears (3.12%).\(^10\) We classified skin damage accordingly:

1. Pressure ulcers caused by wearing protective tools such as masks and goggles for an extended period
2. Skin immersion caused by long-term dampness
3. Skin allergy caused by protective equipment
4. Hand dermatitis caused by frequent cleaning

### Protection of dermatologists

Some medical staff members were still being infected with this new coronavirus, even though they were wearing masks and isolation clothing. Experts hypothesized that the virus could be spread by the hands or by touching the eyes. The World Health Organization (WHO) then suggested that hand washing should be done more frequently:

1. Before patient contact
2. Before cleaning instruments
3. After contact with body fluids
4. After any contact with patients
5. Any contact with the patients’ surrounding environment
Table 2 Survival period of viruses on inanimate surfaces and hands.²

| Pathogen                      | Survival period on inanimate surface | Survival period on hands |
|-------------------------------|--------------------------------------|--------------------------|
| Influenza virus               | 12–48 h                              | 10–15 min                |
| Parainfluenza virus           | 10 h                                 | NA                       |
| Respiratory syncytial virus   | 6 h                                  | <20 min                  |
| Adenovirus                    | 7 d–3 mo                              | NA                       |
| SARS-CoV                      | 72–96 h                              | NA                       |
| Rhinovirus                    | 6–60 d                               | 2 h                      |
| Rotavirus                     | 8 h–12 d                             | 4 h                      |
| HAV                           | 2 h–60 d                             | Several days             |
| HBV                           | 7 d                                  | NA                       |
| HCV                           | 7 d                                  | NA                       |
| HIV                           | 7 d                                  | NA                       |
| HPV                           | 7 d                                  | NA                       |

HAV: Hepatitis A Virus, HBV: Hepatitis B Virus, HCV: Hepatitis C Virus, HIV: Human Immunodeficiency Virus, HPV: Human Papillomavirus, SARS-CoV: Severe Acute Respiratory Syndrome Coronavirus.

It has become important to clean the hands before touching the mucous membrane of the nose and eyes to avoid the virus infecting the mucous membranes of the nose and eyes through droplets or aerosols. Dermatologists should necessarily be cautious, even with patients with nonrespiratory infectious diseases. The survival period of viruses on inanimate surface and hands are shown in Table 2.

Conclusions

The main manifestation of COVID-19 in China includes fever, fatigue, and a dry cough. A few patients developed urticaria as their first sign. In addition, two infected Chinese doctors developed skin hyperpigmentation after treatment. The main skin damage caused by protective equipment in Chinese health care staff has pointed toward pressure injury, moisture-associated skin damage, and skin tears. Chinese experts have hypothesized that the virus could be spread by the hands or by touching the eyes, and so hand washing should be performed frequently.

References

1. Yi Z, Muscatello DJ, Quan-yi W, et al. Hospitalizations for influenza-associated severe acute respiratory infection, Beijing, China, 2014-2016. Emerg Infect Dis. 2018;24:2098–2102.
2. Xian-biao Z. The importance of infection control in clinical practice of dermatology from the ongoing Wuhan outbreak of the novel coronavirus pneumonia. Chin J Dermatovenereol. 2020. Epub ahead of print.
3. Dawei W, Bo H, Chang H, et al. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. JAMA. 2020;323:1061–1069.
4. Zheng F, Tang W, Li H, et al. Clinical characteristics of 161 cases of coronavirus disease 2019 (COVID-19) in Changsha. Eur Rev Med Pharmacol Sci. 2020;24:3404–3410.
5. Widi B, Raap U, Wieczorek D, et al. Urticaria and infection. Allergy Asthma Clin Immunol. 2009;5:10.
6. Mattos KP, Lloret GR, Cintra M, et al. Acquired skin hyperpigmentation following intravenous polymyxin B treatment: A cohort study. Pigment Cell Melanoma Res. 2016;29:388–390.
7. Guanhao Z, Li C, Zaiqian C, et al. Polymyxin B-induced skin hyperpigmentation: A rare case report and literature review. BMC Pharmacol Toxicol. 2018;19:41.
8. Schwartz RA, Janniger CK. Generalized postular figurate erythema: A newly delineated severe cutaneous drug reaction linked with hydroxychloroquine. Dermatol Ther. 2020;33:e13380. doi:10.1111/dth.13380.
9. Gu J, Korteweg C. Pathology and pathogenesis of severe acute respiratory syndrome. Am J Pathol. 2007;170:1136–1147.
10. Qi-xia J, Yu-xiu L, Wei W, et al. The Incidence and epidemic characteristics of medical staff’s skin injuries caused by personal protective equipment for fighting against 2019-nCoV infection. Chin Gen Pract. 2020;23:1083–1090.