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Skin damage among healthcare workers managing coronavirus disease-2019

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Since the outbreak of coronavirus disease-2019 (COVID-19) in December 2019, over 200,000 healthcare workers from all over China have been participating in the fight against this highly contagious disease in Hubei province, which is the infected center of China. The skin damages caused by enhanced infection-prevention measures among them, which could reduce their enthusiasm for overloaded work and make them anxious, have been reported frequently.

Previous studies have revealed that hand eczema was quite common in healthcare workers [1,2], and the risk factors included frequent hand hygiene and long time of gloves wearing. [3,4] Considering the frequent hand hygiene and long-time wearing of tertiary protective devices ((N95 mask, goggles, face shield and double-layers gloves) among healthcare workers during the epidemic period of COVID-19, we aim to estimate the prevalence, clinical features and risk factors of these skin damages among them.

From January to February 2020, self-administered on-line questionnaires were distributed to 700 individuals consisting of physicians and nurses who worked in the designated departments of tertiary hospitals in Hubei, China. The questionnaire included questions about the condition of skin damages and the frequency or duration of several infection-prevention measures (Supplemental Material 1). Finally, 542 individuals (Supplemental Material 2) completed the study (response rate, 77.4%), with 71.4% (387/542) working in isolation wards (IW) and 28.6% (155/542) working in fever clinic (FC).

The general prevalence rate of skin damages caused by enhanced infection-prevention measures was 97.0% (526/542) among first-line healthcare workers. The affected sites included nasal bridge, hands, cheek and forehead, and nasal bridge was the most commonly affected (83.1%). Among a series of symptoms and signs, dryness/tightness and desquamation were the most common symptom (70.3%) and sign (61.6%), respectively (Table 1). The healthcare workers who wore some medical devices over 6 hours had higher risks of skin damages in corresponding sites than those who did less time [(N95 masks: OR, 2.02; 95% CI, 1.35-3.01, $P < 0.01$), Goggles: (OR, 2.32; 95% CI, 1.41-3.83, $P < 0.01$)]. Whereas longer time of face shield wearing was not a significant risk factor in causing forehead skin damages (OR, 1.52; 95% CI, 0.93-2.50, $P = 0.66$). The more frequent (>10 times/d) hand hygiene but longer time of gloves wearing could increase the risk of hands skin damages (OR, 2.17; 95% CI, 1.38-3.43, $P < 0.01$) (Table 2).

There are several limitations to our study. Firstly, we only studied one site with a single exposure factor, but some sites could be related to more than one factor. For example, nasal bridge could be oppressed by N95 mask and goggles simultaneously, though goggles were the main factor. Secondly, possible risk factors like N95 mask-wearing after work in participants' daily life were not included.

In conclusion, our study demonstrated that the prevalence of skin damages of first-line healthcare workers was very high. Moreover, we found that longer exposure time was a significant risk factor, which highlights that the working time of first-line

staff should be arranged reasonably. Besides, prophylactic dressings could be considered to alleviate the device-related pressure injuries, according to a prior study[5].

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Abbreviation List

Coronavirus Diesease-2019: COVID-19

Fever Clinic: FC

Isolation Wards: IW

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Table Legends

Table 1. Clinical features* of skin damages among first-line healthcare workers (healthcare workers with skin damages, n=526)

Table 2. The association between skin damages and related exposure factors

Tables

Table 1. Clinical features* of skin damages among first-line healthcare workers (healthcare workers with skin damages, n=526)

	No. of patients (%)
Symptoms	
Dryness/Tightness	370 (70.3)
Tenderness	299 (56.8)
Itching	276 (52.5)
Burning/Pain	200 (38.0)
Skin lesions	
Desquamation	327 (62.2)
Erythema	260 (49.4)
Maceration	210 (39.9)
Fissure	204 (38.8)
Papule	173 (32.9)
Erosion and ulcer	53 (10.1)
Vesicle	7 (1.3)
Wheal	2 (0.4)
Site	
Nasal bridge	437 (83.1)
Cheek	414 (78.7)
Hands	392 (74.5)
Forehead	301 (57.2)

*with overlaps

Table 2. The association between skin damages and related exposure factors

Infection -preventive measures	No. of participants	Variables	No. of participants (%)	No. of participants with skin damages in related sites (%)	OR	95%CI	P
N95 mask	542	<= 6h/d	225 (41.5)	Cheek: 155 (68.9)	1		
		> 6h/d	317 (58.5)	Cheek: 259 (81.7)	2.02	1.35-3.01	<0.01
Goggles	451	<= 6h/d	186 (41.2)	Nasal bridge: 141 (75.8)	1		
		> 6h/d	265 (58.8)	Nasal bridge: 233 (87.9)	2.32	1.41-3.83	<0.01
Face shield	265	<= 6h/d	108 (40.8)	Forehead: 52 (48.1)	1		
		> 6h/d	157 (59.2)	Forehead: 92 (58.6)	1.52	0.93-2.50	0.66
Gloves	113[a]	<= 6h/d	52 (46.0)	Hands: 29 (55.8)	1		
		> 6h/d	61 (54.0)	Hands: 39 (63.9)	1.41	0.66-3.00	0.44
	321[b]	<= 6h/d	131 (40.8)	Hands: 100 (76.3)	1		
		> 6h/d	190 (59.2)	Hands: 146 (76.8)	1.03	0.61-1.74	1.00
Hand hygiene	434	<=10times/d	113 (26.0)	Hands: 68 (60.2)	1		
		>10 times/d	321 (74.0)	Hands: 246 (76.6)	2.17	1.38-3.43	<0.01

Abbreviation: OR, odds ratio; CI, confidence interval.

[a] These participants are limited in those who wore double-layers gloves and wash hands 1-10 times/day.

[b] These participants are limited in those who wore double-layers gloves and wash hands over 10 times/day.