Occupational dermatoses due to COVID-19 measures: pandemic within a pandemic

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Occupational dermatoses during COVID-19

'A different type of second wave'

'A pandemic within a pandemic'

'Second pandemic: a pandemic of dermatitis'

- HCW in China pre-covid 20-50% *versus* after the first wave 71-97%
- Due to ↑ hand hygiene and use of personal protective equipment (PPE)
- Irritant contact dermatitis, allergic contact dermatitis, pressure urticaria, friction dermatitis, aggravation of pre-existing dermatoses (e.g. Koebner phenomenon in psoriasis patients),…

Rangel et al. Different Type of Second Wave: Predicted increase in PPE-related ACD as a Result of COVID19. Dermatitis 2020:31:e54-5; Bhatia et al. Iatrogenic dermatitis in times of COVID19: pandemic within a pandemic. JEADV 2020:34:e563-6.

Table I. Clinical features of skin damage among first-line health care workers

Clinical features*	Participants with skin damage (N = 526), No. (%)
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.

Lan et al. Skin damage among health care workers managing coronavirus disease-19. J Am Acad Dermatol 2020:82:1215-16

Hand dermatitis

- Mostly irritant contact dermatitis (ICD) from irritants in soaps, antiseptic foams (also detergents), and desinfectants with quaternary ammonium compounds (‘*quats*’, e.g. benzalkonium chloride and didecyl dimethyl ammonium chloride)
- More rarely allergic contact dermatitis (ACD) from allergens in soaps and moisturizers (e.g. formaldehyde-releasers, fragrances) and gloves (e.g. rubber additives)

Hand hygiene during Covid-19

Proper hand hygiene: 24-31% likelihood of decreasing virus transmission

- Natural soaps: natural fats reacting with lye/alkali, resulting in a fatty acid salt with cleansing properties; inactivates viruses by disrupting the lipid membrane and intracellular lipids

  Use of water, 20'' = physically washing away dirt and pathogens

  Removal of intracellular lipids and skin proteins in the stratum corneum

  → increases skin sensitivity and irritation

Rundle et al. Hand hygiene during covid-19: recommendations from American Contact Dermatitis Society. J Am Acad Dermatol 2020

- Synthetic detergents (syndets): surfactants such as sodium lauryl sulfate, cocamide diethanolamine, decyl glucoside

  Not effective against non-enveloped virusses

  Possible to add lipophilic or other moisturizing ingredients

  (petrolatum, glycerin, vegetable oils, shea butter)

- Antiseptic handwashes: soaps or syndets + antimicrobial ingredient

  Risk of (contact) allergic reactions

Table I. Activity of antimicrobial ingredients against enveloped viruses such as coronaviruses

Ingredient	Virucidal activity against enveloped viruses[11,43,*]	Allergenicity[†]
Chloroxylenol	High	+
Ethanol	High	-
Povidone iodine	High	+/-
Sodium hypochlorite (bleach) (0.21%)	High	-
Triclosan/triclocarban	High	+/-
Benzalkonium chloride	Moderate	+
Chlorhexidine digluconate	Moderate	+
Benzethonium chloride	Low	-
Phenolic compounds	Low	-
Quaternary ammonium compounds	Low	-

Rundle et al. J Am Acad Dermatol 2020

- Alcohol-based hand sanitizers: >60% ethanol or >70% isopropanol

  Less lipid-dissolving effects → less ICD

  Longer contact-time needed: 60''

  Dehydrating → add emollients or moisturizers (e.g. glycerin)

!! Disinfectant wipes (e.g. Clinell®, Trionic®) only for surface cleaning

→ handle with gloves (often quaternary ammonium compounds….)

ICD due to hand hygiene measures

- Depends on concentration, duration and intensity of skin contact with irritant ingredients
- Combination of chemical and physical irritation (e.g. detergents and hot water) → pro-inflammatory cytokines → skin barrier disruption
- = 80% of occupational contact dermatoses!
- Study in China: 66% of HCW washed their hands >10 times per day during the first outbreak, only 22% applied a moisturizer

Lan et al. Skin damage among health care workers managing coronavirus disease-19. J Am Acad Dermatol 2020:82:1215-16

Prevention of ICD

= Maintain integrity of the skin barrier

A. Gentle cleansing

- Use lukewarm water
- Do not wash AND only use alcohol-based hand solutions
- Preferably use alcohol-based hand solutions containing glycerin
- Preferably use a hand wash oil
- Avoid friction (e.g. rough paper towels, rubbing)
- Make sure hands are dry before putting on gloves

Balato et al. European Task Force on Contact Dermatitis statement on covid-19 outbreak and the risk of adverse cutaneous reactions. JEADV 2020: e346–e432

B. Regular (re)hydration

- Ointment > cream > lotion > gel

  (night-time *versus* during day-time)

- Ingredients: ‘less is more’, fragrance free
- Pocket-sized, adjusted to individual needs, intolerances and preferences
- Minimum 2 ‘fingertips units’ per hand, wait 1-3 min
- Re-apply after every washing and/or every 3-4 hours

C. Avoid skin-contact with other irritants

Use appropriate gloves (e.g. accelerator-free nitrile)

Wear cotton gloves underneath (↓ occlusion, maceration)

ACD due to hand hygiene measures

- Depends on concentration, duration and intensity of skin contact with sensitizing ingredients
- Combination with irritant contact dermatitis (damaged skin barrier)

Table II. Allergens commonly encountered with regular hand hygiene

Gloves[30,32]	Soaps, synthetic detergents, and antiseptics[33a]		Hand sanitizers[27]
I. Latex	III. Fragrance	V. Preservatives	Fragrance
II. Rubber accelerators	IV. Surfactants	• Dimethyloldimethyl hydantoin	Benzoates
• Thiurams	• Cocamidopropyl betaine	• Diazolidinyl	Cetyl stearyl alcohol
• Carbamates	• Cocamide diethanolamine	• Formaldehyde	Tocopherol
• Diphenylguanidine	• Decyl glucoside	• Iodopropynyl butylcarbamate	
• Mixed dialkyl thioureas	• Dimethylaminopropylamine	• Imidazolidinyl urea	
• Benzothiazoles	• Oleamidopropyl dimethylamine	• Isothiazolinones	
		• Quaternium-15	

Rundle et al. J Am Acad Dermatol 2020

Hand hygiene products	Components	Allergens	Irritants
Alcohol-based hand rub (liquid, gel or foam)	• Contain one or more types of alcohol, humectants, other active ingredients with excipients	• Alcohols - ethanol, isopropanol • Fragrances • Acrylates • Preservative • Benzyl alcohol • Stearyl or isostearyl alcohol • Quaternium ammonium chloride (QAC) • Iodine or iodophors • Chlorhexidine • Triclosan • Chloroxylenol • Phenoxyethanol • Myristyl alcohol • Propylene glycol • Parabens • Benzalkonium chloride	Ethanol, n-propranolol, isopropanolol, chlorhexidine, chlorox-ylenol, triclosan
Waterless/bar soaps Water-based/liquid soaps	• With or without added antiseptic agents	• Fragrances, tocopherol • Polyethylene glycol • Ethylhexylglycerin • Fragrances • Methylchloroisothiazolinone/ methylisothiazolinone (MCI/MI) • Quaternium-15 • Sodium benzoate • Phenoxyethanol • DMDM hydantoin • Iodopropynyl butylcarbamate • Alkyl glucosides • Chloroxylenol • Polyethylene glycol • Cocamidopropyl betaine • Triclosan	SLS – sodium lauryl sulphate
Antiseptic agents	• Dettol (chloroxylenol B.P. 4.8%w/v) • Savlon(cetrimide 3.0% w/v, chlorhexidine gluconate 0.3% w/v)	• Chloroxylenol, terpineol • Chlrohexidine gluconate, benzyl benzoate, cetrimide, isopropyl alcohol, terpineol	Chloroxylenol, alcohol Cetrimide, chlorhexidine, gluconolactone Sodium hydroxide
Antiseptic hand wipe	• Fabric or paper pre-wetted with an antiseptic agent. Not as effective as antiseptic agents or alcohol-based hand rubs	• Methylchloroisothiazolinone/ methylisothiazolinone (MCI/MI) • Propylene glycol • Fragrances • Benzalkonium chloride.	

Bhatia et al. Iatrogenic dermatitis in times of COVID19: pandemic within a pandemic. JEADV 2020:34:e563-6.

ACD from gloves

- Increased use of gloves
- Increased duration of use

→ Prolonged exposure time to allergens and increased sweating

→ Increase release of allergens from the rubber gloves

(e.g., thiuram and carbamate chemicals, diphenylguanidine)

Gloves	Additional information	Allergens	Irritants
Natural rubber latex (NRL) gloves (powdered or unpowdered)	• Users can be sensitive to either NRL or chemical additives or both. • Can worsen existing hand dermatitis from occlusion and maceration	• Rubber accelerators (thiuram, carba mix/ carbamates, mercaptobenzothiazole,diphenylguanidine) • Antioxidants (diaminodiphenylmethane, paraphenylenediamine, black rubber mix) • Immediate hypersensitivity to latex	Glove powder- cornstarch based Sterilization of gloves by gamma irradiation can increase bacterial endotoxin level, which is water soluble and can be absorbed onto glove powder leading to irritation
Synthetic rubber gloves- Nitrile gloves Vinyl gloves Neoprene gloves	• Manufactured similarly to latex gloves, including use of vulcanization accelerators	• Rubber accelerators (carba mix, carbamates, thiuram mix, 1,3-diphenylguanidine, benzothiazoles, thioureas)	Cetylpyridinium chloride

Also ACD

Bhatia et al. JEADV 2020

(Dendooven E et al. Presence of sulfites in 'natural latex' and 'synthetic' rubber gloves: an experimental pilot study. BJD 2019:182:1054-5)

Prevention of glove ACD

- Avoid ICD by maintaining the skin barrier (‘Barrier creams’ may be helpful, but their use is equivalent to regular moisturizers)
- Accelerator-free neoprene or nitrile gloves

  https://www.bgbau.de/themen/sicherheit-und-gesundheit/gefahrstoffe/gisbau/allergene-in-schutzhandschuhen/allergenliste-nach-hersteller/

Handschuh	Material	TU	DTC	TH	MBT	Sonstige
ACCUTECH	Latex		X			
ACCUTECH COATED	Latex	X	X			
ACCUTECH AMBI	Latex		X			
ACCUTECH GAMMEX	Latex	X	X		X	
ALPHATEC	Nitril		X			

Differential diagnoses of occupational ICD/ACD

- Atopic dermatitis
- Psoriasis
- Dyshidrotic eczema
- Tinea manuum
- Scabies
- Non-occupational ACD/ICD
- …

Facial dermatoses

Table 1. Clinical features and other data of health care workers suffered from dermatoses

Variables	Number (*n*)	Percentage (%)
Type of dermatoses:		
i. Irritant contact dermatitis	17	39.53
ii. Allergic dermatitis	03	6.98
iii. Pressure/friction marks/rhagades	11	25.58
iv. Sweat dermatitis	07	16.28
v. Facial acne	05	11.63
vi. Lip lick dermatitis	04	09.30

Singh M et al. Personal protective equipment induced facial dermatoses in healthcare workers managing COVID-19 cases. J Eur Acad Dermatol Venereol 2020: ***34****: e378*

Irritation (ICD) under face mask/goggles

- Condensation and cosmetic build-up
- Dryness (due to occlussion)
- Mechanical pressure (mostly FFP3)
- Synthetic fibers
- Friction

Singh et al. Personal protective equipment induced facial dermatoses in HCW managing COVID-19. JEADV May 2020

- Prevention during work
  - Regular breaks, teams rotation (restrict duration of wearing)
  - Use (light) moisturizer
  - ↓ room temperature to avoid transpiration
  - Use dimethicone polymers or silicone gels to minimize mechanical friction (e.g. Cavilon® spray/swab)
  - Use tape at friction points (e.g. Microfoam®, Mepitac®)
- Prevention after shift
  - Mild cleansing and lipid-rich moisturizer

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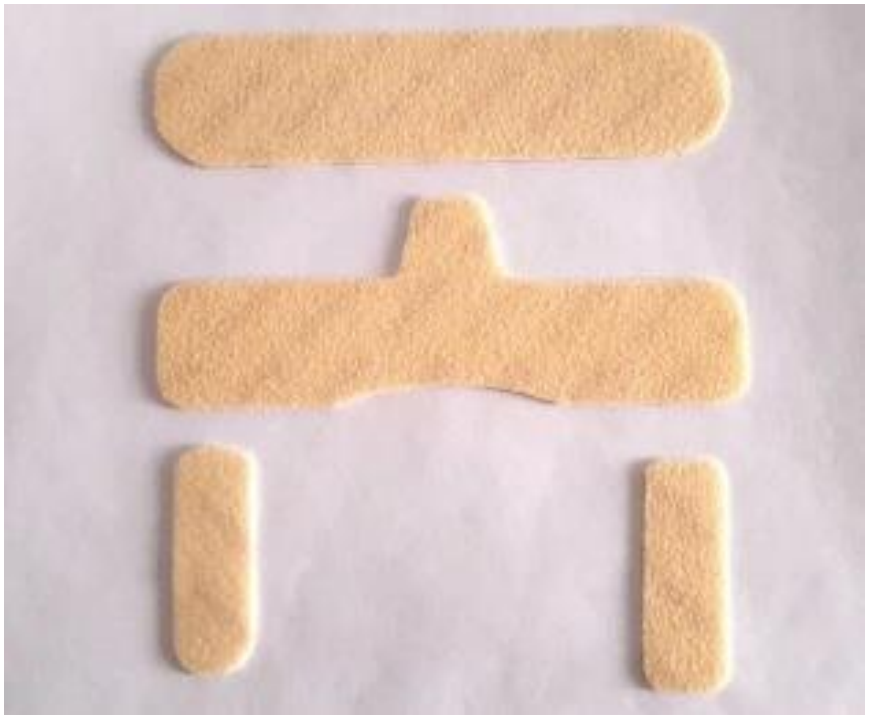
OPTIMISING WORK ENVIRONMENTS

- Treatment in case of lesions
  - Use an antiseptic (and let dry!)
  - Use hydrocolloid or foam dressing (e.g., Mepilex border lite®)



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OPTIMISING WORK ENVIRONMENTS

ACD from face masks

More rarily

Masks	Purpose	Allergens	Irritants
Standard surgical mask or fluid resistant surgical mask	• Single use mask • Loose fitting • Prevents large particles (> 5 microns) expelled by the wearer from reaching the environment. • Fluid resistant • Protects against large droplets and splashes	• Thiuram (in elastic ear strap); • Methyldibromo glutaronitrile; • Cocospropylenediamine-guanidinium diacetate (preservative in disinfectant for cleaning mask); • Dibromodicyanobutane (in adhesive used in mask)	Friction and humidity
N95 respirator or filtering face piece (FFP) FFP 1 FFP 2 FFP 3 (highest level of protection)	• Fit tightly • Fluid resistant • Protects against very small air borne particles, body fluids and splashes • Has a filtration efficiency of 95% against particulate aerosols of size 300 nm and above	• Formaldehyde • Ethylene urea melamine formaldehyde • Quaternium-15 (formaldehyde releasing preservative) • Aluminium (in the nose clip)	Friction, mechanical pressure
Home-made (cloth or paper masks)	• Loose fitting • Not fluid resistant • Prevents large particles expelled by the wearer from reaching the environment	• Formaldehyde textile resins (melamine formaldehyde, urea formaldehyde); • Formaldehyde releasers (quaternium-15, imidazolidinyl urea); • Disperse dyes, p-aminobenzene, • Paraphenylenediamine, • Naphthol AS, 'Black rubber mix' • Lanolin	Friction, humidity

Bhatia et al. Iatrogenic dermatitis in times of COVID19: pandemic within a pandemic. JEADV 2020:34:e563-6; Donovan et al. Allergic Contact Dermatitis from Formaldehyde Textile Resins in Surgical ''Greens'' and Nonwoven Textile Masks. Dermatitis 2006: 18: 40–44

Treatment of ACD/ICD

- Application of a topical corticosteroids (face < hands)
- Identify and avoid irritants and allergens
- If measures fail: refer to dermatologist; evaluation for patch testing

  (Fedris: Snelle diagnose van contactdermatosen

  https://fedris.be/nl/professional/beroepsziekten-privesector/

  snelle-diagnose-van-contactdermatosen)

  → *Baseline series (diphenylguanidine, propylene glycol, formaldehyde- and releasers), rubber additives, textile series, fragrances, masks, gloves and (ingredients of) products used by the patient*

FEDRIS
FEDERAAL AGENTSCHAP VOOR BEROEPSRISICO'S

Referral for patch testing

https://assets.uzleuven.be/files/2019-12/Contactallergie.pdf

- De rug moet vrij zijn van eczeemletsels.
- De rug mag kort voor de testen niet blootgesteld geweest zijn aan zonlicht.
- De rug mag de dagen voor de testen niet met een cortisonezalf behandeld zijn.
- Vanaf twee weken voor de testen mag u geen cortisone via inspuiting of via de mond gekregen hebben.

Tijdens de week waarin u getest wordt, mag u uw rug niet wassen. U mag dus niet baden of douchen en u moet activiteiten waarbij u zweet vermijden.

U komt drie of vier keer langs voor de testen.
Er zijn twee mogelijke schema's:

- ✔ Maandag (voormiddag of namiddag), woensdagvoormiddag en vrijdag-voormiddag *
- ✔ Dinsdagvoormiddag, donderdagvoormiddag en maandagvoormiddag

Het is belangrijk dat u op de eerste dag zelf de producten meebrengt die u heeft gebruikt en die waarschijnlijk de eczeemreactie hebben veroorzaakt of verergerd:

UZ LEUVEN

Tailored advice

UZ LEUVEN | DERMATOLOGIE

https://contactallergie.uzleuven.be/start

Lists of cosmetic products without specific allergens and information about allergens

Applicatie Contactallergie

prof. apr. em. A. Goossens | J. Drieghe | dr. S. Huygens | apr. L. Gilissen | L. Janssens

Geachte

Verwijzend naar de resultaten van uw allergologisch onderzoek is volgende informatie nuttig.

U bent allergisch voor

- FRAGRANCE-PARFUM/PERUBALSEM

Hieronder de (positieve) lijst van toegelaten cosmetische producten, voor zover opgenomen in ons computerbestand. Het blijft evenwel raadzaam om toch steeds de inhoudsstoffen op de verpakking na te gaan en bij twijfel uw apotheker te raadplegen.

Toegelaten cosmetische producten

Haarreiniging (shampoo)

CNK	Product naam	Merk	Producent	Galenische vorm	Datum verwerking
2072-742	BIODERMA NODE K	Laboratoire Dermatologique BIODERMA	Laboratoire Dermatologique BIODERMA	Shampoo	3-8-16
3291-002	DERMOLIN SHAMPOO 200 ML	Dermolin	Santesa B.V.	Shampoo	15-3-17
3291-010	DERMOLIN SHAMPOO 400 ML	Dermolin	Santesa B.V.	Shampoo	15-3-17
2349-991	EUBOS 5% UREA SHAMPOO		EUBOS - Dr. Hobein (Nachf.) GmbH, med. Hautpflege	Shampoo	24-8-16
2914-869	EUCERIN DERMOCAPILLAIRE KALMERENDE UREA SHAMPOO	Eucerin	SA Beiersdorf NV	Shampoo	12-5-14
2914-885	EUCERIN DERMOCAPILLAIRE SHAMPOO HOGE TOLERANTIE	Eucerin	SA Beiersdorf NV	Shampoo	24-1-15
2464-360 2654-630	LOUIS WIDMER ANTIROOSSHAMPOO ZONDER PARFUM		Louis Widmer NV	Shampoo	16-3-15
2164-226	LOUIS WIDMER REMEDERM SHAMPOO		Louis Widmer NV	Shampoo	16-3-15
1384-080 1608-850	LOUIS WIDMER SOFT SHAMPOO ZONDER PARFUM		Louis Widmer NV	Shampoo	17-3-15
2730-711	SENSINOL SHAMPOO	Ducray	SA Pierre Fabre Benelux NV	Gel	12-5-15

Occlusive acne (‘mask acne’, ‘maskne’)

Due to the occlusive effects of face mask use, mostly mild

- Humidity from breathing and sweating creates ideal climate for bacteria
- Build-up of sebum and sweat block pores

Treatment

- Avoid make-up, use gentle cleanser and a non-comedogenic moisturizer
- Regularly switch mask
- Cosmetic treatment (e.g. Effaclar®, Cleanance®)
- Topical benzoylperoxide (e.g. Benzac® gel)

Other acneiform eruptions

- Rosacea, peri-oral dermatitis (‘clown-dermatitis’), folliculitis
- Due to build-up of make-up/liphophilic cosmetic ingredients
- Aggravated by use of (strong) topical corticosteroids
- Cosmetic treatment (e.g., Roséliane®)
- Topical metronidazole (e.g., Rozex crème®)

Seborrheic dermatitis

- Inflammation of the skin associated with yeast *Pityrosporon (Malassezia)*
- Topical medicinal treatment with ketoconazole or miconazole

  (e.g., Nizoral® shampoo, Daktarin® cream)

Cheilitis

- Dry lips, fissures, progression to peri-oral lesions
- Aggravated by lip-lick, ‘picking’ and ‘peeling’
- Dd. contact dermatitis (e.g., toothpaste ingredients)
- Prevention/treatment
  - Stop wet-dry cycle: stop lip-lick, regular breaks
  - Emollients (e.g. paraffin-petrolatum)

Singh et al. Prevalence of cheilitis in HCW treating patients with COVID-19. JAAD 2020: e373-e374

Conclusion

- Occupational dermatoses due to COVID-19 measures: most frequently irritant in nature
- Prevention is paramount
  - Correct hand hygiene
  - Hand and facial moisturizers
  - Adequate glove use