Contact dermatitis in healthcare workers

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Making a diagnosis of contact dermatitis

- History
- Exposure assessment
- Clinical examination
- Patch testing
- Blood tests: RASTs especially for latex; total IgE as an indicator of atopy
- Prick testing, especially for foods contacted by chefs
- Other-skin biopsy, fungal scrapings etc
History

- History of dermatitis: duration, practitioners consulted, treatments used and the response to treatments, including prescribed and over-the-counter; work relatedness
- Any immediate symptoms? eg burning, redness with skin contact; wheezing, nocturnal cough suggestive of asthma
- Background of any skin conditions, especially atopic eczema; hay fever, asthma; hand eczema
- Allergies: contact, drugs, animals, foods, inhalant
History (ii)

- Other medical history and medications
- Work details and exposures including gloves, hand washes
- What they actually do at work-request photos?
- Hobbies, household activities including childcare (baby wipes!)
- What does the patient think the rash is due to?
Exposure can be assessed in a number of ways

- History given by patient, doctor or workplace
- Information regarding substances contacting the skin eg product labels
- Material safety data sheets
- Information from websites
- Chemical analyses- Malmo
- Occupational hygienist-Toronto
- Workplace visits
- Photos of workplace-taken with patient’s phone
Exposure assessment: the worksite visit, seeing is believing!
Examination

- Morphology of rash is very important - is it eczematous?
- Site of initial rash very important for allergy
- Can differentiate non-eczematous rashes eg psoriasis, tinea, urticaria, granuloma annulare, porphyria cutanea tarda, scabies
- Look for evidence of psoriasis, endogenous eczema and tinea elsewhere, especially on feet
Differential diagnoses of a rash on the hands

- Irritant contact dermatitis
- Allergic contact dermatitis
- Contact urticaria/protein contact dermatitis
- Infection - tinea, bacteria
- Endogenous forms of eczema: Hand eczema, atopic eczema, rarely discoid eczema
- Psoriasis
- Porphyria cutanea tarda; scabies
- Glove-related hand urticaria
Understanding your skin condition

From inside your body
- Eczema
- Psoriasis

From contact with agents on the outside of the skin
- Contact dermatitis
  - Irritant contact dermatitis
  - Allergic contact dermatitis (delayed)
    Diagnosed by patch testing
  - Contact urticaria (immediate)
    Diagnosed by blood test &/or prick tests

Aggravating factors in skin conditions
- Water
- Soap
- Heat
- Sweating
- Friction
- Other:
  
  
Reacted to and now need to avoid:

Diagnosis (in order of importance to your condition):
1.
2.
3.
4.

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Is it related to your work?
☐ Significantly work-related
☐ Partially work-related
☐ Not work-related

Occupational Dermatology
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Skin & Cancer Foundation Victoria
Cannot clinically differentiate causes of contact dermatitis reliably ....

- 390 consecutive patients seen by me in Occupational Dermatology Clinic
- Pre and post patch test diagnoses compared
- Only patients with eczema (various types), contact dermatitis and contact urticaria included
- Accuracy of my clinical diagnosis: 68%
- Therefore we need to patch test!
Diagnosing patients with suspected contact dermatitis

- History
- Exposure assessment
- Clinical examination
- **Patch testing**
- Blood tests: RASTs especially for latex; total IgE as an indicator of atopy
- Prick testing, especially for foods contacted by chefs
- Other-skin biopsy, fungal scrapings etc
Patch testing for delayed hypersensitivity
Tests are applied for 48 hours and then removed
Read reactions according to international guidelines
Positive reactions- what do they mean?!
Positive reactions indicate the presence of allergy (sensitisation)

Positive reactions may be classified:

- Relevant
- Past relevance
- Unknown relevance
  eg nickel commonly of past relevance
To make a diagnosis of allergic contact dermatitis we need:

- Compatible clinical history of dermatitis
- Positive patch test
- Evidence of exposure to allergen

all indicating that the reaction is relevant to the presenting dermatitis

- If there is no history of recent dermatitis or of exposure, we diagnose contact allergy
However, if patch tests are negative and we have excluded the diagnosis of allergy, then often the default diagnosis is often irritant contact dermatitis (or a form of endogenous eczema)

Multiple conditions may co-exist
Understanding your skin condition

Rash

From inside your body

Eczema
Psoriasis

From contact with agents on the outside of the skin

Contact dermatitis

Irritant contact dermatitis

Aggravating factors in skin conditions
Water  Soap  Heat  Sweating  Friction  Other:

Allergic contact dermatitis (delayed)
Diagnosed by patch testing

Contact urticaria (immediate)
Diagnosed by blood test &/or prick tests

Reacted to and now need to avoid:

Diagnosis (in order of importance to your condition):
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skin&canc
Immediate hypersensitivity or Type 1 reactions

- Common causes include natural rubber latex, foods, ammonium persulphate (hairdressing bleach)
- Less commonly, inhalant allergens- house dust mite, animals, malassezia furfur, chlorhexidine
- Present as contact urticaria with immediate burning, redness which usually resolves
- Repeated episodes may cause protein contact dermatitis
- Tested RAST test (radioallergosorbent testing) or prick testing, NOT tested by patch testing
Treatment

• MAKE A DIAGNOSIS: avoidance of allergens and irritants
• Appropriate skin protection-gloves
• SKIN CARE: Soap substitutes and moisturising lotions, creams and ointments
• Topical steroid ointments to areas of dermatitis
• Topical calcineurin inhibitors- tacrolimus, pimecrolimus
• Physical therapies- Grenz ray, UV
• Systemic therapies-oral corticosteroids and steroid-sparing agents
Skin care

- Appropriate gloves for each activity
- Soap substitutes-pH balanced
- Household bar soaps are alkaline and are best for getting the dirt of the knees of toddlers
- Moisturising lotions, creams and ointments-the greasier the better
- Topical steroids to the area of the dermatitis
Case: 51 year old male nurse

- Night shift supervisor
- 20 month history of dermatitis, predominantly dominant hand, which he thought might relate to latex sensitivity
- Improved off work
- Atopic with past asthma and hay fever
My clinical diagnosis

Irritant contact dermatitis
Cumulative element?
Patch testing

1. Coconut diethanolamide
2. Formaldehyde
3. Various samples of diluted Microshield® products
4. Fragrance mix 1, Balsam of Peru-? relevance
5. Chloroacetamide-Redwin® sorbolene lotion-past relevance
6. Compositae- no relevance
Latex RAST-negative IgE 133 (<87)
Final diagnoses

1. Allergic contact dermatitis to coconut diethanolamide in various Microshield ® products
2. Allergic contact dermatitis to formaldehyde in Microshield ® Angel hand gel
3. Irritant contact dermatitis from wet work
4. Contact allergy to fragrance—possible relevance
5. Contact allergy to chloroacetamide—past relevance
This is complicated!

But we do need to list all factors possibly contributing to a skin condition, in order to ensure optimum outcomes for patients.

We are making a diagnosis of our patient’s skin condition using patch testing as one of the techniques in diagnosis.

Other information may be obtained from prick/RAST testing.
Impact of occupational skin disease (OSD)

LARGEST INDUSTRY GROUP
Healthcare and social assistance

PREVENTION IS A PRIORITY

Quality of life
Ability to work

Direct costs

Public health & infection control

Indirect costs
Healthcare workers (HCWs) – a high risk group for occupational skin disease

Lots of exposure to irritants and allergens
• Hand hygiene requirements
• PPE – gloves, sweating
• Cleaning/disinfectants, washing
• Tools of the trade (eg acrylates – dentists)

Prevalence 17-50% worldwide, with rates of up to 65% in ICU/NICU

Hand eczema: prevalence and risk factors of hand eczema in a population of 2274 healthcare workers
First published: 24 May 2012  full publication history
DOI: 10.1111/j.1600-0536.2012.02105.x  View/save citation
Original Article


Claire L. Higgins, Amanda M. Palmer, Jennifer L. Cahill, Rosemary L. Nixon

First published: 20 July 2016   Full publication history

DOI: 10.1111/cod.12616   View/save citation
685 HCWs assessed in our tertiary clinic over 22 years

555 HCWs diagnosed with a work-related skin disorder ("study group")
- 72.0% nurses
- 11.2% doctors / medical scientists
- 8.1% dental practitioners and assistants
## Primary site of dermatitis

<table>
<thead>
<tr>
<th>Primary site of dermatitis on examination</th>
<th>n (%)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hands</td>
<td>497 (89.5)</td>
</tr>
<tr>
<td>Arms</td>
<td>72 (13.0)</td>
</tr>
<tr>
<td>Face</td>
<td>55 (9.9)</td>
</tr>
<tr>
<td>Legs</td>
<td>18 (3.2)</td>
</tr>
<tr>
<td>Eyelids</td>
<td>17 (3.1)</td>
</tr>
<tr>
<td>Neck</td>
<td>14 (2.5)</td>
</tr>
<tr>
<td>Feet</td>
<td>9 (1.6)</td>
</tr>
<tr>
<td>Chest</td>
<td>7 (1.3)</td>
</tr>
<tr>
<td>Back</td>
<td>5 (0.9)</td>
</tr>
<tr>
<td>Oral/lips</td>
<td>4 (0.7)</td>
</tr>
<tr>
<td>Abdomen</td>
<td>3 (0.5)</td>
</tr>
<tr>
<td>Generalized</td>
<td>2 (0.4)</td>
</tr>
</tbody>
</table>

* Patients could have multiple primary sites of dermatitis, therefore total exceeds number of patients.
Most frequent diagnoses in 555 HCWs with a work-related skin disorder (>1)

- 79 % Irritant contact dermatitis
- 50 % Allergic contact dermatitis
- 37 % Endogenous eczema
- 13 % Latex allergy
- 4 % Contact urticaria (excluding latex allergy)
- 65 % Multiple diagnoses
- 27 % Had lost time from work
Major occupational irritants

Among 439 HCWs with ICD...

- Water and wet work 60%
- Hand cleansers/soaps 39%
- Heat and sweating 14%

(the diagnosis of ICD is subjective, no testing is available)
### Major occupational allergens (237 ACD)

<table>
<thead>
<tr>
<th>ALLERGEN</th>
<th>Relevant reactions</th>
<th>Total tested</th>
<th>Proportion of total tested</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thiuram mix</td>
<td>49</td>
<td>537</td>
<td>9.1</td>
</tr>
<tr>
<td>Tetraethylthiuram disulfide</td>
<td>42</td>
<td>502</td>
<td>8.4</td>
</tr>
<tr>
<td>Formaldehyde</td>
<td>28</td>
<td>534</td>
<td>5.2</td>
</tr>
<tr>
<td>Coconut diethanolamide</td>
<td>26</td>
<td>492</td>
<td>5.3</td>
</tr>
<tr>
<td>Dipentamethylenethiuram disulfide</td>
<td>23</td>
<td>502</td>
<td>4.6</td>
</tr>
<tr>
<td>Dowicil™ 200 (quaternium 15)</td>
<td>18</td>
<td>534</td>
<td>3.4</td>
</tr>
<tr>
<td>Tetramethylthiuram monosulfide</td>
<td>16</td>
<td>502</td>
<td>3.2</td>
</tr>
<tr>
<td>Tetramethylthiuram disulfide</td>
<td>13</td>
<td>502</td>
<td>2.6</td>
</tr>
<tr>
<td>Methylchloroisothiazolinone</td>
<td>13</td>
<td>536</td>
<td>2.4</td>
</tr>
<tr>
<td>Fragrance mix</td>
<td>12</td>
<td>534</td>
<td>2.2</td>
</tr>
<tr>
<td>Chlorhexidine diacetate</td>
<td>11</td>
<td>496</td>
<td>2.2</td>
</tr>
<tr>
<td>Chlorhexidine digluconate</td>
<td>11</td>
<td>497</td>
<td>2.2</td>
</tr>
<tr>
<td>Methylisothiazolinone</td>
<td>10</td>
<td>101</td>
<td>9.9</td>
</tr>
<tr>
<td>Amerchol® L-101</td>
<td>10</td>
<td>513</td>
<td>1.9</td>
</tr>
<tr>
<td>Lanolin alcohol</td>
<td>9</td>
<td>538</td>
<td>1.7</td>
</tr>
<tr>
<td>Germall 115 (imidazolidinylurea)</td>
<td>8</td>
<td>535</td>
<td>1.5</td>
</tr>
<tr>
<td>Germall II (diazolidinylurea)</td>
<td>7</td>
<td>514</td>
<td>1.4</td>
</tr>
<tr>
<td>2-Hydroxyethyl methacrylate</td>
<td>6</td>
<td>100</td>
<td>6</td>
</tr>
<tr>
<td>Glutaraldehyde</td>
<td>6</td>
<td>52</td>
<td>11.5</td>
</tr>
<tr>
<td>Zinc diethyldithiocarbamate</td>
<td>6</td>
<td>491</td>
<td>1.2</td>
</tr>
<tr>
<td>DMDM Hydantoin</td>
<td>5</td>
<td>442</td>
<td>1.1</td>
</tr>
<tr>
<td>Methyl methacrylate</td>
<td>5</td>
<td>35</td>
<td>14.3</td>
</tr>
<tr>
<td>Nickel sulfate</td>
<td>5</td>
<td>534</td>
<td>0.9</td>
</tr>
<tr>
<td>Myroxolon pereriae</td>
<td>4</td>
<td>534</td>
<td>0.7</td>
</tr>
<tr>
<td>Carba mix</td>
<td>7</td>
<td>159</td>
<td>4.4</td>
</tr>
</tbody>
</table>

25 most frequent occupational allergens in HCWs with occupational ACD
Major occupational allergens (237) (i)

Rubber accelerators

- Thiurams > carbamates
- 5 thiurams in the top 10 most common allergens
- Thiuram allergy - marked downward trend during the study period

Annual change in occupational ACD to thiuram mix, N=49.

Contact allergy to thiurams: multifactorial analysis of clinical surveillance data collected by the IVDK network.

Uter W\textsuperscript{1}, Hegewald J, Pfahlberg A, Lessmann H, Schnuch A, Gefeller O.
The glove you need to know about!

- Ansell Micro Touch Nitra-free is accelerator free
- PINK
Accelerator-free surgical glove
Ansell Gammex Non-Latex Sensitive
Major occupational allergens (ii)

Latex allergy

- Down trending during the study period
- Peaked in 1999
- Coming down last few years but still occurs

Annual change in occupational latex allergy, N=72


Francesca Larese Filon E1, Letizia Bochdanovits, Chiara Capuzzo, Roberto Cerchi, Francesca Rui


Occupational dermatitis in health care workers evaluated for suspected allergic contact dermatitis.

Kadivar S1, Belsito DV.
Major occupational allergens (iii)
Preservatives

- Formaldehyde
- Formaldehyde-releasers:
  - Imidazolidinyl urea
  - Diazolididnly urea
  - Quaternium 15
  - DMDM hydantoin
- Methylisothiazolinone
- Methylchloroisothenzatinonen (MIT)
New epidemic of contact allergy!

- Methylisothiazolinone (MI) in baby wipes, skin cleansers, sorbolene lotions, shampoos, deodorants, facial wipes, paints
- Methylchloroisothiazolininone (MCI)/MI used formerly 15ppm, 3:1 dilution, MI 3.75ppm
- Since 2005, MI allowable to 100ppm
- Worldwide epidemic
- Mainly non-occupational especially carers of babies, but also in some hand cleaners, paints
Be very suspicious of products containing MI

Percentage of total patients patch tested with a positive reaction at SCF

2011 3.5%
2012 8.2%
2013 15.3%
2014 22.6%
2015 19.1%
2016 18.8%
2017 11.5%

Allergic contact dermatitis to MI in a facial wipe
Major occupational allergens (iv) Excipients in hand cleaners

- Coconut DEA
- Lanolin

ANTISEPTICS
- Chlorhexidine
- Glutaraldehyde

Microshield® Skin Care Cleanser
Lanolin
Coconut DEA

Microshield Handrub
Lanolin
Chlorhexidine digluconate

“Hard to avoid” allergens”
5 hand cleansers among the top 30 causes of ACD

<table>
<thead>
<tr>
<th>Cleanser Description</th>
<th>Relevant Reactions n</th>
<th>Total Tested n</th>
<th>Proportion of Total Tested %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microshield® Handwash Mild Neutral Formula pH7</td>
<td>22</td>
<td>191</td>
<td>11.5</td>
</tr>
<tr>
<td><strong>Microshield® 4 Chlorhexidine Skin Cleanser</strong></td>
<td>11</td>
<td>173</td>
<td>6.4</td>
</tr>
<tr>
<td>Microshield® 2 Chlorhexidine Skin Cleanser</td>
<td>11</td>
<td>182</td>
<td>6.0</td>
</tr>
<tr>
<td>Ecolab® Glad Hands Concentrated Lotion Skin Cleanser</td>
<td>8</td>
<td>107</td>
<td>7.5</td>
</tr>
<tr>
<td>Microshield® Skincare Cleanser pH5.5</td>
<td>6</td>
<td>76</td>
<td>7.9</td>
</tr>
</tbody>
</table>

NB Microshield most common brand of cleanser used in Australian hospitals
Hand cleansers vs alcohol-based hand rubs (ABHRs)

- ACD caused by hand cleansers 8 x rate from ABHRs (12.4 % vs 1.6 %)
- Hand cleansers major cause of ICD
- Hand cleansers often being used when ABHRs indicated
- ABHRs sting on broken skin – often misinterpreted as “allergy”
Reported previously....

Conclusions

• ABHRs caused substantially less ACD and less ICD than commercial hand cleansers
• Stinging ≠ allergy!
• Appreciable number of reactions to so called “hard-to-avoid” weak allergens present in commercial hand cleaners
• Rubber glove chemicals trending down
• Latex allergy trending down
• High rates of occupational ACD to MI

OSD presents a significant burden of disease in Australian HCWs
SO WHAT CAN WE DO ??
Individual level

- Primary prevention - EDUCATION
  - Early management of symptoms

- Secondary prevention
  - Allergen avoidance and substitution
  - Accelerator-free gloves

Manufacturer level

- Mandatory labelling
- Allergen substitution – responding to the evidence
- Accurate MSDS

Management level and beyond

- Promoting ABHRs instead of hand cleansers where indicated
- Integrating skin care education with hand hygiene training
- Overarching national guidelines
- National OSD

Skin care education and individual counselling versus treatment as usual in healthcare workers with hand eczema: randomised clinical trial.

Safework Australia supported the development of skin care within the hand hygiene module

- Integrating skin care education with hand hygiene training.

- Healthcare workers - Occupational Dermatitis and Skin Care

[Image: safe work australia]
Skin Care

This section of the module has been created by The Occupational Dermatology Research & Education Centre, Skin & Cancer Foundation Inc. Funded by Safe Work Australia.

Occupational contact dermatitis is an inflammatory skin condition which occurs when workplace substances damage the skin. Usually the hands of healthcare workers are affected, although other exposed skin may be involved, such as the arms, face and neck.

There are 3 main types of contact dermatitis: irritant contact dermatitis (ICD), allergic contact dermatitis (ACD) and contact urticaria.

Signs and symptoms of contact dermatitis include:

- Dryness (involvement of the web spaces between the fingers is often the first sign)
- Redness
- Itchiness
- Soreness
- Scaling and flaking
- Splitting and cracking
- Blistering
Conclusions

- Contact dermatitis is not uncommon in HCWs.
- Implement skin care measures, particularly with use of moisturiser after work.
- See Hand Hygiene Module.
- However, if problems persist, need to make a diagnosis.
- Establish referral system: Infection Control; Dermatology Units for initial assessment.
- Referral for patch testing may be indicated.
Thanks for listening!
Special thanks to Amanda Palmer

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