Occupational Dermatitis in Health Care Settings

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IPAC NEO Chapter Conference: If I had a Nickel...
If I had a $^{28}_{12}$(Ni)ckel...

*I might end up with nickel dermatitis*

- **Nickel Sulphate** is a common sensitizer that causes allergic contact dermatitis
- 17% of women and 3% of men will have some degree of nickel sensitivity
- Most jewellery contains nickel
- Also in snaps, buttons, watches, and cell phone batteries

Image Source: Creative Commons Licence [http://www.nickelallergyinformation.com/atom.xml](http://www.nickelallergyinformation.com/atom.xml) and Image Source: [en.wikipedia.org](http://en.wikipedia.org)
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Disclosures

• No Conflicts to disclose
• Views and opinions are those of the presenter and not necessarily those of PHO.
Objectives

By the end of the presentation the participant will be able to:

• State the incidence and prevalence of occupational contact dermatitis by setting/exposures

• Describe how skin functions as a barrier and outline host and environmental factors that affect skin integrity

• Characterize exposure risks for irritant and allergic contact dermatitis and apply the industrial hierarchy of controls to reduce exposure and injury

• Recognize the role of skin colonization and infection in transmission of infection

• Outline prevention and management strategies for contact dermatitis
Occupational skin disease not new

- **Celsus** – 100 AD, skin ulcers in those working with corrosive metals
- **Ramazzini** – 1700, describes skin disorders bath attendants, bakers, gilders, midwives, millers, miners and others
- **Pott** – 1775, scrotal cancer in chimney sweeps

Allowed Lost Time Claims for skin and subcutaneous tissue disorders including dermatitis in Ontario from 2011-2015

WSIB Enterprise Information Warehouse (http://www.wsibstatistics.ca)
Allowed Lost Time Claims for different diseases in Ontario in 2015

WSIB Enterprise Information Warehouse (http://www.wsibstatistics.ca)
Dermatitis in the US Working Population

- Collected from the 2010 National Health Interview Survey
- Approximately 10% of current/recent workers were recorded as having dermatitis
- The highest prevalence rates were found in health care related industries
- Approximately 6% of dermatitis cases were attributed to work by health professionals
- This represents approximately 850,000 cases of work-related dermatitis among US workers in 2010

Occupations affected

- Agricultural Workers
- Beauty Industry Workers
- Construction Workers
- Electricians
- Food Industry Workers
- Health Care Workers
- Mechanics/Machinists
- Metalworkers
Common Allergens

• Cobalt
• Chromates
• Cosmetics/fragrances
• Epoxies
• Nickel
• Plants
• Preservatives
• Resins

• Acrylics
• Rubber/latex
Common Irritants

- Solvents
- Detergents
- Acids
- Bases
- Grease/oils
- Water
We count on our skin for so many things!

• Protection from injury
• Water preservation
• Shock absorption
• Tactile sensation
• Vitamin D synthesis
• Temperature control
• Lubrication
• Waterproofing

List from NIOSH

Image Source: http://www.cdc.gov/niosh/topics/skin/
Skin as an Organ

- Largest organ in the body
- Affected by our genetics
- Physical, chemical, mechanical and biological exposures
- Radiation exposure (UV)
- Occupational
- non-occupational exposures

Image Source: Microsoft Clip Art
Layers of the skin

Image Source: Commons.wikimedia.org
Absorption Through Diffusion—molecules move from areas of high concentration to areas of low concentration

3 Routes of Diffusion

Figure 1: Intercellular lipid pathway

Figure 2: Transcellular permeation

Figure 3: Through the appendages (hair follicles, glands)

Image Source: http://www.cdc.gov/niosh/topics/skin/
Absorption is key to both the risk and benefit to skin health
Contact dermatitis refers to an inflammation of the skin resulting from *direct* contact of a substance with the surface of the skin

**Irritant contact dermatitis (OCD)** *the most common form and is caused when substances such as solvents or other chemicals irritate the skin. The exposure produces red, often more painful than itchy, patches on the involved skin areas*

**Allergic contact dermatitis (OCD)** *occurs when a substance triggers an immune response. Nickel, perfumes, dyes, rubber (latex) products, topical medications and cosmetics frequently cause allergic contact dermatitis*

**Occupational contact urticaria (OCU)** *is a cutaneous (skin) syndrome defined by the appearance of hives within minutes of contact with the responsible substance (latex, flour, modified proteins) *BOHRF; (OCD )occupational contact dermatitis*

https://www.aaaai.org/conditions-and-treatments/conditions-dictionary/contact-dermatitisDefinition
Healthy Skin vs. Dermatitis

Allergens

Irritants

Infection

Physical agents
Wet work causes irritant contact dermatitis

- HCWs clean their hands dozens of times per shift
- 25% of nurses report symptoms of dermatitis
- 85% give a history of skin problems at some point
- Frequent hand washing is a primary cause of chronic irritant contact dermatitis
- Non-intact skin can become infected then pass infection to others
- Detergents (soaps) damage skin
- Hot water
- Low relative humidity (winter)
- Failure to use lotion/cream
- Moisture in gloves
- Powder in gloves
- Friction
- Shear forces
- Traditional surgical scrub brushes
Wet Work
Irritant Contact Dermatitis

- Cracking
- Peeling
- Dryness
- Itching
- Blisters
- Can become infected
- Can transmit infection

Image Source: Commons.wikimedia.org
Type 1 Allergy (immediate)
Skin Prick Test; hive and redness (wheal and flare)

IgE reaction to specific allergen

Read in minutes

Latex must be under physician care

Food proteins: bananas, kiwi, avocado, cherries, tomatoes, shrimp, flour, modified soy

Pollens, grasses, ragweed

Moulds

Animals: cats, dogs, horses, mice

Dust: mites, cockroach

Image Source: en.wikipedia.org
**Type IV Allergy**

**Skin Patch test: delayed hypersensitivity**
(immune reaction-cell mediated)

- **Rubber accelerators** (sensitizer) benzothiazoles; MBT
- Carbamates; dithiocarbamates, diphenylguanidine
- Thiurams
- Hexamethylenetetramine
- **Metals**: nickel, platinum, chromium
- **Biocides**: formaldehyde, Quaternium 15, OPA, glutaraldehyde, isothiozolinones
- **Bone cement** (methyl methacrylate)
- **Enzymatic Cleaners**

Sensitized T cell migrate to area of allergen
Test read 48 to 72 and up to 96 hours later

Image Source: en.wikipedia.org
Type IV Allergy Poison Ivy

- The resin of the plant is a sensitizer
- The vines and branches contain much more allergen than leaves
- Subsequent exposures result in greater reactions—can be severe
- Of relevance to health care for outdoor workers and can also be misdiagnosed as shingles or herpes

Bacterial Infection: Soft tissue (MRSA)

- HCW can become colonized or infected
- Hand hygiene and proper precautions (PPE) important
- Non-intact skin more likely to colonize
- HCWs have been epidemiologically linked to ongoing outbreaks

Parasitic Infection: Sarcoptes scabiei
skin scraping and clinical rash

- Common cause of outbreaks in hospitals and long term care
- Often simultaneous infection in staff and patients
- Up to 6 weeks to develop symptoms for first exposure
- Prophylaxis and treatment with Nix which is effective but drying to the skin

https://en.wikipedia.org/wiki/Sarcoptes_scabiei
Viral Infection: Herpetic Whitlow

- Most common in dental settings, ICU, anesthesia and other settings where a hand will be in a mouth
- Painful and takes several days to settle
- Direct patient care should not be provided until lesion has completely healed, even if wearing gloves

Image Source: CDC
Host Factors: Underlying Skin Diseases

Eczema

Psoriasis

Fungal infection nails


Image Source: Commons.wikipedia.org

Host Factors: Underlying Skin Diseases

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Fungal infection nails


Image Source: Commons.wikipedia.org

Importance of Hand Hygiene
5 steps to transmission of pathogens
Outbreaks related to artificial nails
4 Moments of Hand Hygiene

1. **Before Initial Patient/Patient Environment Contact**
2. **Before Aseptic Procedure**
3. **After Body Fluid Exposure Risk**
4. **After Patient/Patient Environment Contact**
WHO 5 steps to transmission of pathogens from one patient to another patient via HCW hands

**Step 1**
- Organisms present on patient’s skin AND/OR
- Organisms shed on inanimate objects near patient

**Step 2**
- Organisms must be transferred to the hands of HCW

**Step 3**
- Organisms must be capable of surviving for at least several minutes on HCW’s hands

**Step 4**
- Hand hygiene by the HCW must be inadequate, omitted, or inappropriate cleaning agent

**Step 5**
- Contaminated hands of HCW has direct contact with another patient or inanimate object that will come into direct contact with the patient
Organisms can be recovered from colonized intact skin

Nearly 1,000,000 skin squames containing viable microorganisms are shed daily from normal skin!!
HCW hand imprint after abd exam

MRSA growth

After using ABHR

Image Source: Curtis Donskey, with permission
Jewelry and Artificial Nails
Components for an effective hand care program

- Occupational Health support of “healthy hands” program at time of hire and throughout career
- Occupational history including skin health/exposures
- Product selection matters
- Education
- Technique matters
- Protection of hands a 24 hours 7 days a week commitment
- Protecting Your Hands Fact Sheet
- Your Hand Care Assessment Tool
Product selection matters

- Preferably 70% to 90% ABHR at point of care
- Select ABHR with emollients
- Use hand hygiene products with low irritancy potential
- Get input from HCWs on products
- Get information from manufacturers regarding potential interaction with products
- Provide hand moisturizing skin care products
- Avoid barrier creams (not effective and false sense of security BOHRF)
It’s not just oil and vinegar that don’t mix

• Know the ingredients in your products
• Know any interactions between products
• Label appropriately
• MSDS must be available and up to date

*Image Source: Microsoft Clip Art*
Education

• Education at orientation and ongoing basis
• Document education sessions and attendance
• Know your hands by self-assessment
• Verify hand hygiene technique
• Specific education regarding moisturizing
• Educate regarding correct glove selection and usage
Technique Matters

- Remove hand and arm jewelry when performing hand hygiene
- Use warm running water
- Rinse thoroughly
- Pat hands dry with paper towel
- Apply moisturizer
- Dry hands well before putting on gloves
Moisturizers

- Lotions, creams, ointments
- Oil-based and water-based
- Humectants (attract moisture through stratum corneum)
- Emollients are lipid-based and make the skin softer (aloe, rose oil, glycerin, shea butter, lanolin, eucarin, cocoa butter)
- Replace lipids (fats) which are important for barrier function
Glove Selection

- **Surgical glove**: sterile; consider latex allergy
- **Nitrile glove**: cleaning chemicals
  - Consider cuff length and duration of task
- **Vinyl glove**: satisfactory for shorter task duration
- **Chemotherapy glove**:
  - Specific qualities re drug permeation
- **Sandwich glove**: not for patient care!

ASTM certified

Images Source: All photos courtesy of St. Joseph’s Healthcare, Hamilton
Elimination: remove the hazard

Substitution: replace with a safer alternative

Engineering Controls: enclose or automate the process, ventilation

Administrative Controls: safe work practices, health surveillance

Personal Protective Equipment- gloves, gown, eye protection, mask/respirator
Elimination
- Latex gloves; scented products; antimicrobial soaps (triclosan)
- Spray nozzles for cleaning agents

Substitution
- lower concentrations of cleaning agents that are still effective
- ABHR with emollients; better quality paper towel

Engineering Controls
- Alcohol Based Hand rub at point of use
- Ready to use cleaning agents; automatic mixer at tap

Administrative Controls
- Policies and Procedures
- Education and Training

PPE
- Gloves appropriate to exposure and to task
- Cotton liners can benefit those with dermatitis
Ten Key recommendations from the British Occupational Health Research Foundation (BOHRF) Systematic Review: Occupational Contact Dermatitis and Urticaria

Employers and their health and safety personnel should:

1. Implement programs to remove or reduce exposure to agents that cause OCD and OCU

2. Provide appropriate gloves and cotton liners where the risk of developing OCD or OCU cannot be eliminated by removing exposure to its causes

3. Make after-work (conditioning) creams readily available in the workplace and encourage workers to use them regularly
Top 10 key recommendations from BOHRF

4. Do not promote the use of prework (barrier) creams, as this may confer on workers a false sense of security and encourage them to be complacent in following more effective preventative measures.

5. Provide workers with appropriate health and safety information and training.

6. Ensure that workers who develop OCD or OCU are properly assessed by a physician who has expertise in occupational skin disease for recommendations regarding appropriate workplace adjustments.
7. Ask a worker who has been offered a job that will expose them to causes of OCD if they have a personal history of dermatitis, particularly in adulthood, and advise them of their increased risk, and care for and protect their skin.

8. Ask the worker who has been offered a job that will expose them to causes of OCU if they have a personal history of atopy and advise them of their increased risk, and care for and protect their skin.

9. Take a full occupational history whenever someone of working age presents with a skin rash, asking about their job, the materials with which they work, the location of the rash and any temporal relationship with work.
Final Recommendation from BOHRF

10. Arrange for a diagnosis of OCD or OCU to be confirmed objectively (patch tests and/or skin-prick tests) and not on the basis of a compatible history alone because of the implications for future employment.
Hand Care Program Summary

- Hand Care Program should start at time of hire
- Education and Assessment including review of hand hygiene technique
- Include HCW in selection and placement of products
- Underlying hand condition and allergy important
- Ensure correct glove selection, use and technique
- Don’t forget importance of moisturizer
- Healthy hands are less likely to become infected and less likely to transmit infection
- Remember hand care is a 24/7 operation
Occupational Health support “healthy hands” at Preplacement

• Proactive Program

• Provide all HCPs with “Protecting Your Hands Fact Sheet for Health Care Providers”

• Review HCP correct hand hygiene technique

• Review factors to protect skin integrity

• Encourage early reporting of any skin irritation

• Do self skin assessment:
  • Appearance
  • Intactness
  • Moisture content
  • Sensation
Over the Counter Treatments

• Mild hydrocortisone treatment for minor dermatitis
• Best to apply when skin is still damp
• Use a small amount and rub in well
• Ointments are best for very dry skin
• Creams for normal dryness
• Lotions for weeping areas
• Oral antihistamines can help for itch; use non-drowsy
• If skin does not settle seek medical attention through your family doctor, occupational health and if necessary a dermatological referral can be made
Hand protection
24/7
General Summary

• Healthy intact skin is our primary barrier against occupational and non-occupational skin exposures
• Irritant/allergic contact dermatitis and urticaria are prevalent in health care and community settings
• Wet work is a common occupation
• Potential for infection transmission through HCW hands
• Application of the industrial hierarchy of controls to reduce hazards in the workplace can be effective
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