

It's all in your hands: Preventing hand dermatitis

Monica Herrera MHA, CDMP

Introduction

Hand hygiene is a cornerstone of effective infection control, but...

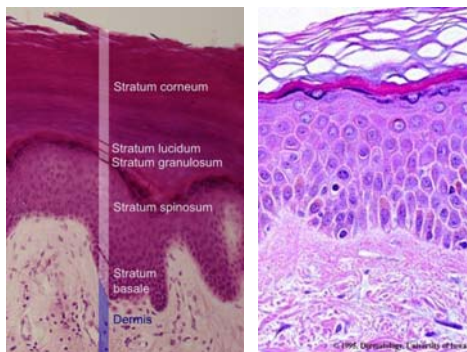
- "Hand sanitization and gloving are essential if we are to stop the transmission of infection from body substances and contaminated articles into the environment. However, the frequent use of water, cleansing agents and gloves can cause irritation leading to dryness, inflammation, discomfort or unsightly appearance. Complicating the situation is the fact that health care workers are less likely to comply with hand hygiene policies when their hands are irritated. But, abraded skin can harbor more bacteria than normal hands. Understanding the nature and prevention of this condition can help healthcare workers take care of their skin while maintaining safe practices."

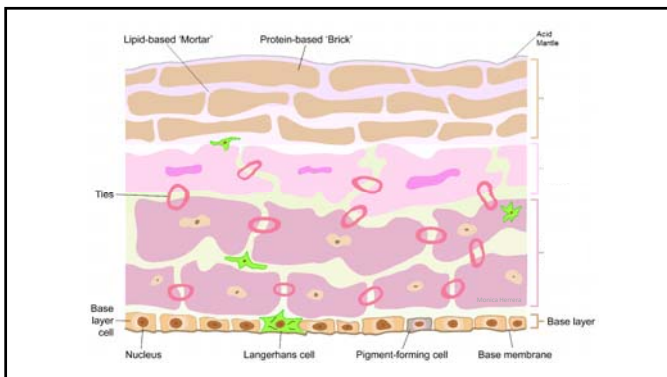
From: University of Michigan 2016

Health Authorities have

- 115,000 employees
- 83% female
- Average age in mid 40's

Skin





Hand dermatitis

Hand dermatitis

1. Atopic
2. Nummular
3. Dyshidrotic
4. Contact – Allergic and Irritant
5. Hyperkeratotic

Atopic

- 85% starts before 5 years of age
- >50% will grow out of it
- Prevalence has increased three fold since 1960's

- Predisposes to other dermatitis

- "Atopic disease" asthma, eczema, allergic rhinitis do tend to cluster in families

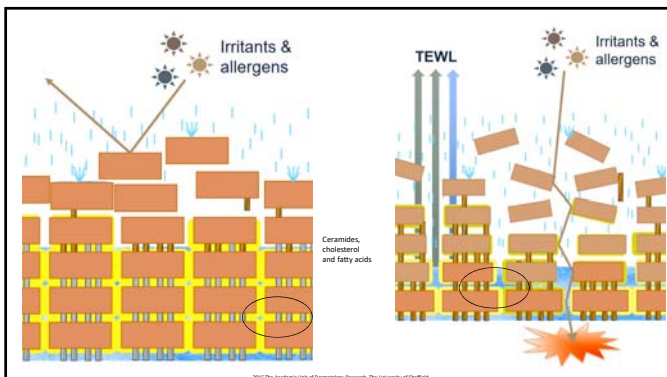
Contact – allergic and irritant

Contact dermatitis (80% of all Dermatitis)

- a) Irritant Contact Dermatitis ICD (almost 90% of all Contact dermatitis)
 - Acute
 - Chronic
- b) Allergic Contact Dermatitis ACD

Pathogenesis of eczema

- Two hypotheses:
 - 1) Inside – out
 - Immunological disturbance causes IgE - mediated sensitisation, epithelial barrier dysfunction is secondary
 - 2) Outside-in
 - Epidermal barrier dysfunction allows irritants and allergens into the skin, with immunological disturbance secondary



Acid Mantle

- The combination of **sebum** and **sweat** forms an acidic film known as the **acid mantle**.
- A physical and chemical barrier that provides protection, it is the skin's first defense mechanism.
- If it is disrupted or removed, skin becomes more **permeable** to microorganisms and water escapes from skin faster too.
- The Acid mantle has a **strong antimicrobial** effect (repels pathogens,) decreases skin colonization by pathogenic bacteria, and favours the adhesion of non-pathogenic bacteria to the skin.

Irritant Contact Dermatitis

- Skin **barrier disruption**, cellular changes in epidermis, and **inflammation**.
- No test can predict the risk of developing irritant contact dermatitis.
- It is a **multifactorial, non specific** reaction of the skin to a direct damage (concentration or duration of exposure.)
- Initial development can be triggered by a combination of **occupational exposure** and **individual susceptibility** to disease.

Irritant Contact Dermatitis

- Common cutaneous irritants include solvents, microtrauma, mechanical irritants (abrasives, friction, occlusion, and pressure) and environmental factors (heat, cold) that can influence or enhance the reaction.
- **Chronic** ICD is produced for multiple sub-threshold trauma to the skin. Usually they are weak irritants that are frequently and **repeatedly present through time** not allowing the skin barrier to recover properly
- Environmental factors such as **humidity, sweating, or friction** exacerbate the condition.

Allergic Contact Dermatitis (ACD)

- Strong allergens may take **less than 15 days** to complete initial sensitization and others may need many **years of low grade** chronic exposure.
- Once an individual is sensitized, allergic reactions take just **minutes to develop**, making SCD a persistent and relapsing entity.
- To diagnose ACD it is required an identification of an **allergen** and a **positive patch test**.
- In approximately **20%** of hand eczema cases, there are **no irritant or allergic exposures** or signs of atopic dermatitis.

ACD can present as:

- Type 1 allergic reactions- is an **IgE-allergic reaction**, with **Erythema and swelling**, the most common example in health care is use of latex gloves. It is **protein-contact dermatitis**.
- Type 4 **T-cell-mediated allergic reaction**. This one is clinically difficult or **impossible to distinguish** from irritant dermatitis. Thus it needs a **patch test**.

Work implications

Wet Work

Defined as:

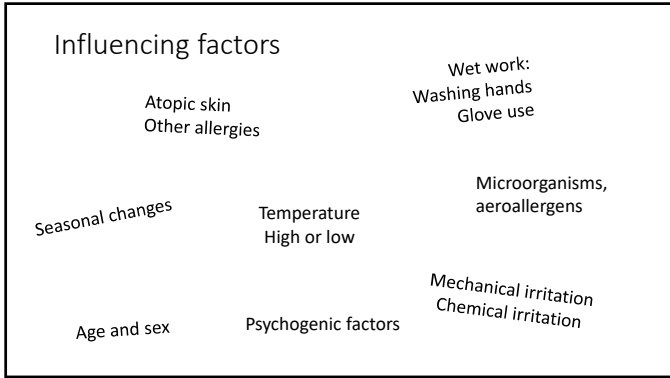
- Having a part of the body submerged in water for more than 2 hours in the course of a working day.
- In waterproof or other occlusive personal protective clothing for longer than 2 hours a shift, such as tight-fitting gloves.
- Handling wet things for more than 2 hours a shift or,
- Washing hands for more than 20 times a shift.

Health Care

- Here we find that the main cause of hand dermatitis is long-term and frequent exposure of the skin to irritating substances, washing hands with water and soap and by wearing gloves for long periods of time.
- Also, the use of gloves can cause an occlusive, humid and warm environment that can boost the irritation produced by heat and sweating. Removing them causes additional friction to the back of the hands.
- Nurses working in two ICU's in US had up to 69.7% prevalence rates.

Other impacting factors

- The **irritancy potential** of products used at work
- Using **hot water** for hand washing
- Low relative humidity (most common in **winter months**)
- Or **excess heat** in summer
- **Failure to use** supplementary hand lotions or creams
- The quality of **paper towels**
- Friction associated with **wearing or removing** gloves



Consequences:

- Breakdown skin means -
- An increased probability of infections
- An a potential decrease in the compliance with hand hygiene.

Prevention

Surveillance

- To provide continuing primary prevention and training to healthy employees in high risk areas, decreasing the impact of wet-work in our organizations.
- To detect early signs of skin disease and offer secondary prevention strategies in order to decrease the probability of reaching severity states that impedes them from work, or to be able to return to their own jobs.
- To provide early skin management plans and to mitigate the effects in the long term.
- Hand dermatitis is often not well controlled

Soap or hand sanitizer?

- Hand sanitizers are made basically from three alcohols:
 - Isopropanol (**IPA**) is **isopropyl alcohol**
 - N- propanolol
 - Ethanol is **ethyl alcohol (EA)**
- Dermal absorption? = minimal = safe.
- Soaps are SLS (Sodium Lauryl sulfate) or SLES (Sodium Laureth sulfate)
- Use of hand sanitizer in irritated skin did not show a further skin barrier disruption than use of soaps with SLS.

Soap

- Soaps and detergents strip the skin of its **protective fat, moisture, and acid content.**
- After a single washing, it usually takes at least a **half hour--sometimes more than two hours--for the skin's pH to return to normal.**
- **A shift will be over** before the skin's natural oils are replaced.
- The result is **dry, cracked skin** that's vulnerable to inflammation and bacterial invasion.

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    graph TD
      A[Consequences of elevated pH] --> B[↑ Inflammation]
      B --> C[↓ Stratum Corneum Cohesion]
      C --> D[↓ Permeability Barrier]
  
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Novotny L, Hrabak A, Vavrova K. Curr Med Chem. 2010

Cleansers

Synthetic soap has the ability to maintain proper hydration of the stratum corneum.

- Products with a pH of 5.5 are the most effective for your skin and also the most compatible.
- In addition, they do not interfere with the cutaneous microflora.

Liquid cleansers

- Synthetic detergents, can be ionic or non-anionic, lotion, oil, cream or gel forms.

Lipid free cleansers

- Contain no soap or detergent, do not need water to cleanse

Abbas, et al. Dermatol Ther.

Tips:

Are you allergic to hand sanitizer?

- Try it in your arm

Wash your hands:

- Find a nice lukewarm temperature.
- Wet your hands first.
- Pat dry your hands including between fingers.

Moisturizers

Water

- Water is absolutely **essential** for the normal functioning of the skin and, especially, its outer layer of the epidermis (stratum corneous)
- The water content is **necessary for proper skin maturation and desquamation**. Increased water loss impairs enzymatic functions required for normal desquamation **resulting in dry, flaky skin**.

Cream Terms

Humectants

- They are molecules that retain and bind water

Emollient

- Is a particular ingredient inside a finished moisturizer that prevent water loss.

Moisturizer

- A mix of humectants and emollients.

Cream

- Emulsion of oil and water in approximately equal proportions.

Ointment

- Combines oil (80%) and water (20%).

Ceramides

- They are a type of waxy fat, and a great ingredient for helping to **'water-proof'** our skin.
- They only have one work in skin – **improve the barrier function**.
- They **rewind the effects of water loss** and keep the hydration in.
- Many commercial ceramides **are BIO-IDENTICAL** to the ceramides our skin makes. This is an advantage as the skin will not see the ceramides as a foreign invader.
- They are the **'skin-cell glue' (mortar)** that dry skin and eczema are missing.

For the atopic – eczematous person

An ideal moisturizer with ceramides would:

- Repair the skin barrier
- Maintain skin integrity and appearance
- Reduce TEWL (Trans epidermal water loss)
- Restore the lipid barrier's ability to attract, and hold and redistribute water
- Decrease susceptibility to irritants
- Decrease the need of corticoids
- Decrease pruritus, erythema, fissuring, and lichenification
- Prevent recurrence of inflammation

A note on barrier creams

- It is intended to place a **physical barrier** between the skin and contaminants that may irritate the skin.
- A 2010 Cochrane review concluded that there was insufficient evidence to determine whether barrier cream could **prevent** occupational contact dermatitis.
- Barrier creams may fortify the skin surface against microbial penetration
- Based on experience, the potential **protective effects** of barrier creams earn them a place in Health Care.

Tips for creams

- Use your emollient of choice frequently: at least **twice a day** on non-work days, and **every few hours** if at work if the dermatitis is flaring up **every time** the hands are washed or **hand sanitizer** is used.
- Using steroids and creams?
- Using steroids and (ta – pime) crolimus?
- A big pot of cream?
- A pump dispenser for everybody?
- For how long?

Gloves

A love story

- Caroline Hampton Chief nurse of the Operating Room of the newly opened Johns Hopkins Hospital in 1889.
- She married Dr. William Halsted, surgeon.
- She scrubbed for him, immersing her hands in mercuric chloride, and developed hand dermatitis.
- Dr. Halsted asked Goodyear Rubber Company to make some thin rubber gloves strictly for her use in 1890.
- Later in 1896, Dr. Joseph Bloodgood began to wear rubber gloves routinely with the idea of asepsis in mind.

Latex is the standard

- accelerators
- activators
- antidegradants (antioxidants, antiozonants)
- vulcanizing agents
- retarders
- reinforcing agents
- fillers
- pigments
- processing aids
- blowing agents

Vinyl

- Vinyl gloves are made of polyvinyl chloride (PVC) and are the most **neutral** of all the gloves.
- They have one of the lowest indexes of allergenicity.
- They are definitely the best choice for protection against soiling, low hazard chemicals or for food hygiene use.
- Since vinyl gloves are not form-fitting, they fit more loosely than latex and nitrile and cost less.
- They are resistance to abrasions but poor for most organic solvents.

Nitrile

- Nitrile offers excellent physical-hazard resistance to punctures, cuts, snags and abrasion.
- Nitrile has good resistance to oils, fuels and certain organic solvents.
- Their main problem is that they need accelerants to mimic the characteristics of latex.
- Accelerants are the first cause that makes them create allergies.

Gloves should be used as long as necessary, but for as short time as possible.

Resources

- Refer employees to learn more about hand issues and how to prevent them.
- Direct them to Learning Hub and search for "Hand Care" course:
- <https://learninghub.phsa.ca/Courses/15532/hand-care>
- This is a series of video clips that should take less than one hour to complete.

Thank you 😊
