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Understanding Skin Physiology and Management After Total Laryngectomy

Julie Bishop-Leone, MA, CCC-SLP
Director of Clinical Education

Moderated by:
Amy Natho, MS, CCC-SLP, CEU Administrator, SpeechPathology.com



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Disclosures

- Deanna Cohen-Mardekian, MS, CCC-SLP is the Director of Clinical Education at Atos Medical.
- Financial relationship disclosure: She is employed by Atos Medical.
- Relevant nonfinancial relationships: None

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Learning Outcomes

As a result of this course, participants will be able to:

- Identify the various layers of the skin, their function and importance.
- Identify patients at risk for skin reactions and breakdown.
- Describe the different types of skin reactions and the practical strategies to reduce frequency of occurrence.
- Describe the impact of skin issues on heat moisture exchanger compliance and quality of life.

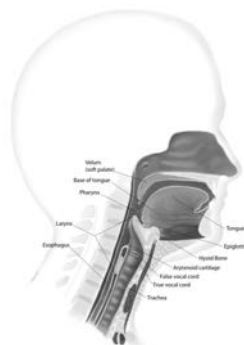
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Neck Breather: Anatomy and Physiology

continued

Respiratory Changes Following Total Laryngectomy



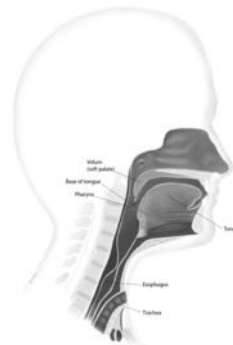
Pre-Surgery

At The Nose

- Air Temp = 72°F
- RH = 45%
- Ambient / Dirty

At The Bronchioles

- Air Temp = 98.6°F
- RH = 99%
- Filtered / Pristine



Post Surgery

At the Trachea

- Air Temp = 72°F
- RH = 45%
- Ambient / Dirty

Consequences

- Loss of heat
- Loss of moisture
- No filtration

7

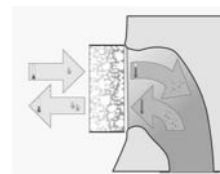
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Standard of Care: Post Operative Use of an HME

- HME stands for **H**eat **M**oisture **E**xchanger
- HME captures the natural heat and moisture from the airway upon exhalation
- Heat and moisturizes the air upon inhalation
- Heat and humidity consistently maintained
- Logical barrier to gross airborne matter
- Covers the stoma, more hygienic
- Helps adapt to having a stoma



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24/7 HME Compliance May Result in...

- **Significantly reduced in hospital complications like mucus plugging** Foreman *et al*, 2016
- **Reduced need for chest PT immediately post-op** Foreman *et al*, 2016
- **Reduced tracheobronchitis and/or pneumonia infections** van den Boer *et al*, 2014
- **More cost-effective care** Retèl *et al*, 2015
- **No need to use external humidifiers and vaporizers, and have better pulmonary status and lower health-care costs** Brook *et al*, 2013

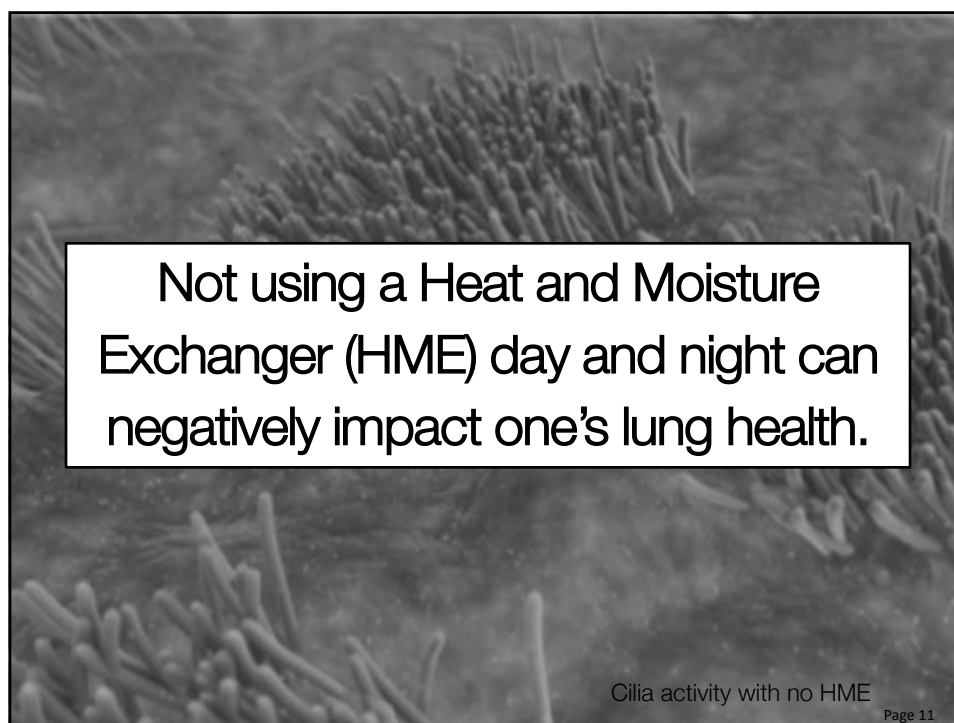
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24/7 HME Compliance May Result in...

- **Significantly more ciliated cells** van den Boer *et al*, 2015
- **Reduced stomal crusting and better handling of secretions** Icuspit *et al*, 2014
- **Decreased frequency of coughing, forced expectoration, and stoma cleaning** Bien *et al*, 2010
- **TE speech users report more fluent speech** Bien *et al*, 2010
- **Better sleep as one is not coughing and getting up frequently throughout the night** Bien *et al*, 2010; Retèl *et al*, 2015

continued



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n = 80 (68 males, 12 females, mean age 62)

RCT: n=40 HME, n=40 no HME

Recorded frequency coughing, forced expectorations
12 weeks

Data recorded according to HME compliance

Excellent HME Compliance 24/7

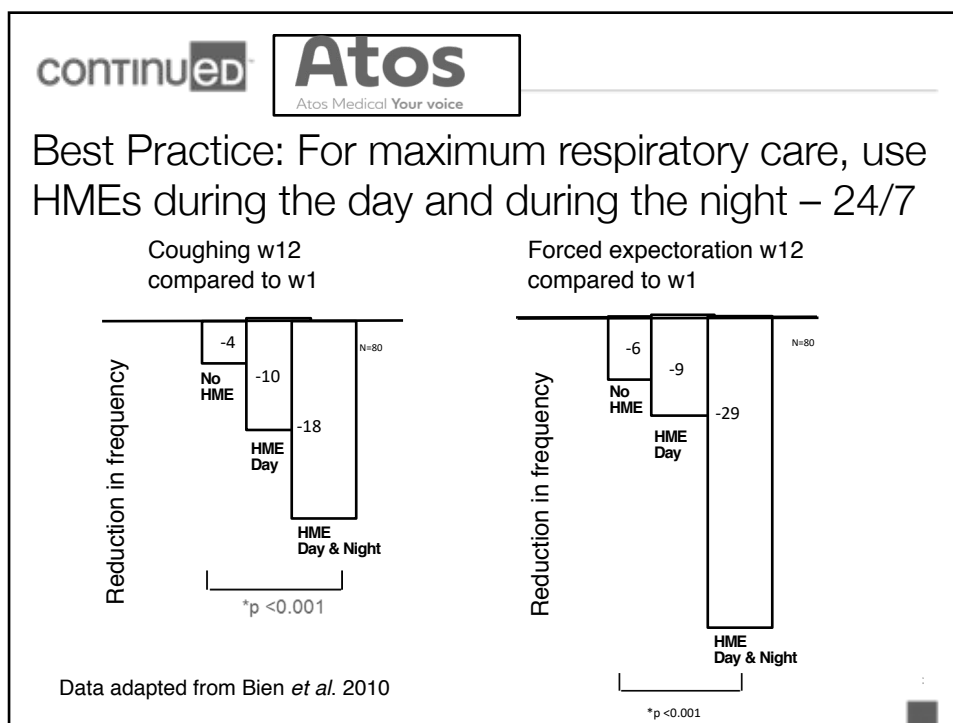
Variable HME Compliance

No HME

Q: Was there a difference between perfect 24/7 compliance and variable compliance?

Bien, S., Okla, S., van As-Brooks, C. J., & Ackerstaff, A. H. (2010). The effect of a Heat and Moisture Exchanger (Provox HME) on pulmonary protection after total laryngectomy: a randomized controlled study. *Eur. Arch. Otorhinolaryngol*, 267(3), 429-435.
doi:10.1007/s00405-009-1018-4 [doi]

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HME Usage Patterns:
Is There a Trend?

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What Does the Red Associates Data Tell Us About HME Use?

Night-time logic: Today, the majority of patients are reluctant to use adhesives and HMEs 24/7

Most are uncomfortable and are perceived not have any tangible benefits.

Up to 80% of users don't use HME at night

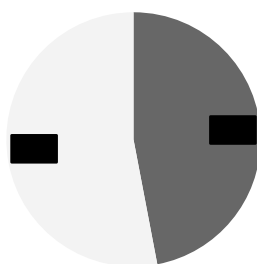
Yet they are concerned about covering their stoma, humidity and bugs entering their stoma



Instead, people use alternative solutions such as scarves, humidifiers, or nothing at all.

Survey involving 729 users (US=122, FR=429, NL=178)

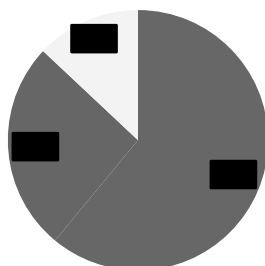
Approximately 50% of all patients take a break from using an HME and adhesive



Do you sometimes take a break from using an adhesive and HME?

■ Yes
□ No

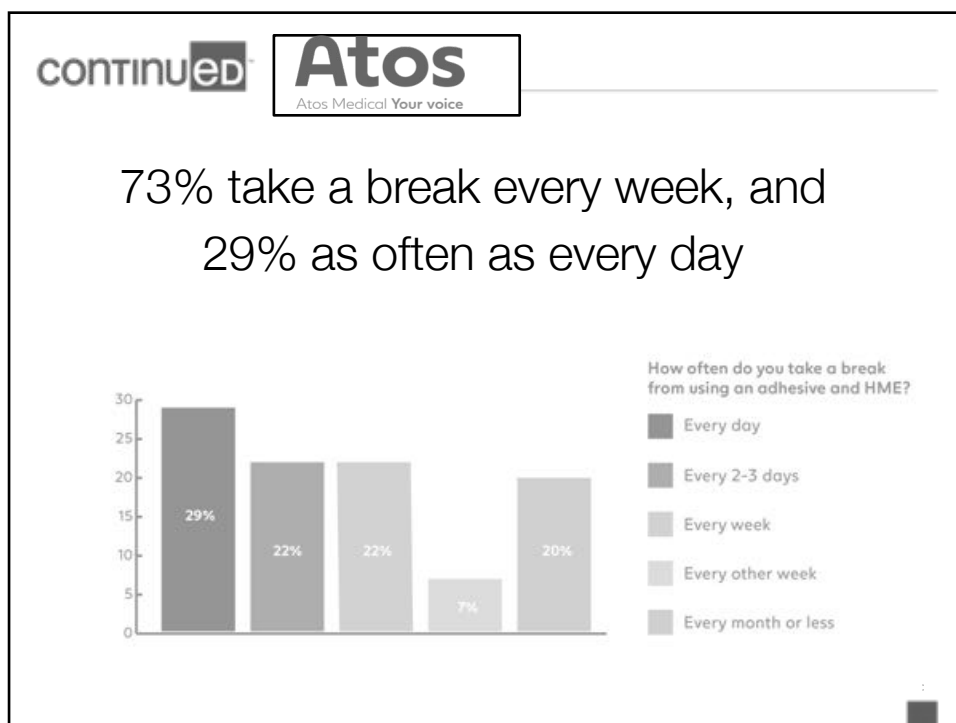
87% take that break at night



When do you take a break from using an adhesive and HME?

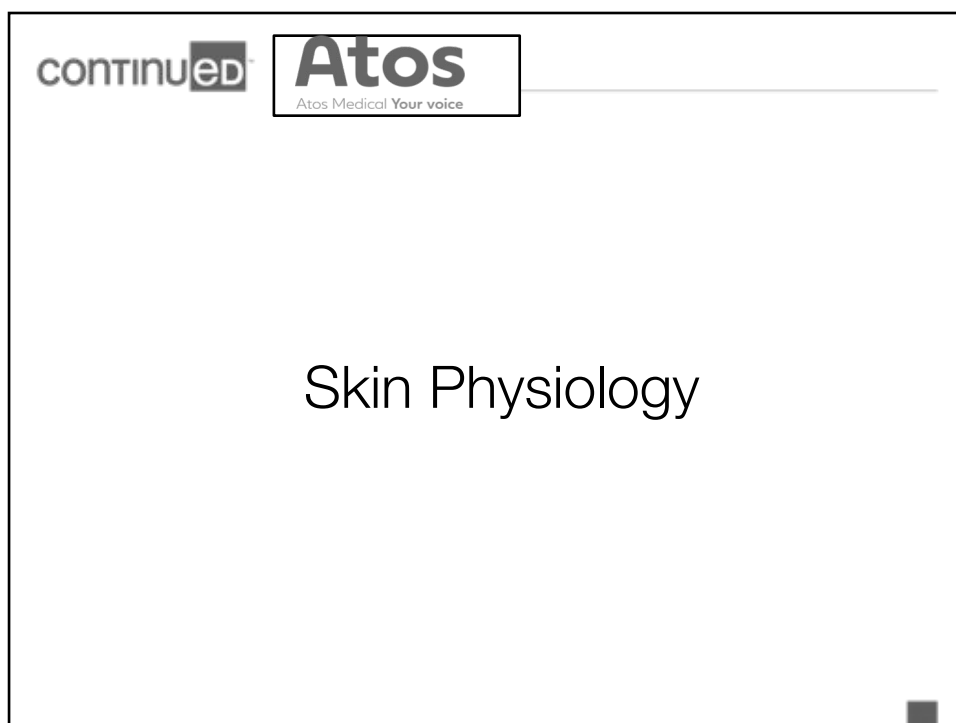
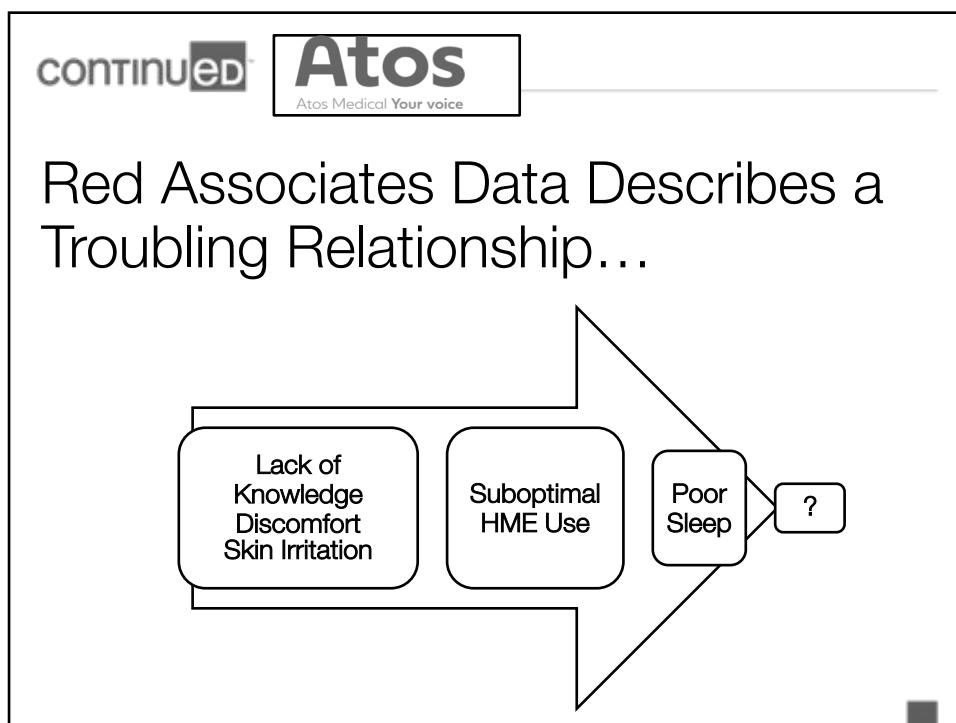
■ Night
■ Sometimes during the day, sometimes during the night
□ Day

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Reasons include
lack of knowledge about the
importance of 24/7 compliant HME
use, discomfort, and skin irritation



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Importance of Skin

- Largest organ in our body
- Comprises total of 20 square feet in area
- Protects us from microbes
- Helps to regulate body temperature
- Permits sensations of touch, heat, and cold



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Importance of Skin



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Layers of Human Skin

Epidermis: protective shield

provides a waterproof barrier;
makes new cells

Dermis: structure & support

composed of collagen & elastin
contains most body's H₂O supply
makes oil & sweat to moisturize
expels toxins
nerve endings for touch
provides blood supply to skin
regulates body temperature

Hypodermis: insulation & padding

Subcutaneous fat
Layer between the skin & organs

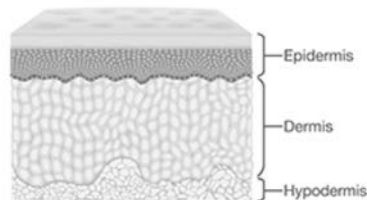


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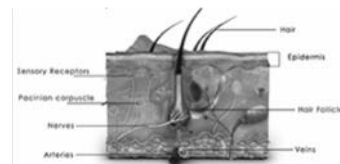


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Epidermis

Cell Regeneration Center

- Completely replaced every 28 days
- Corneocytes:
 - Outer most layer
 - Lost during desquamation/peeling
 - Replaced from the lower layer of the epidermis
- Assists in preventing water loss
- Provides barrier to outside invaders (bacteria/fungus)
- Important to protect this layer

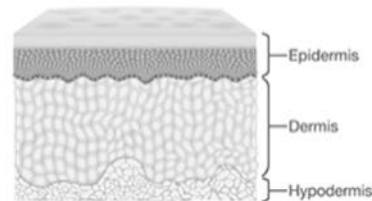


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Interactions Between the Dermis and Epidermis

- In constant contact with one another **to regulate bodily functions**
- Their interaction is what causes the **turnover of cells**
- **Disruption** in this communication is what causes skin conditions

Warts
Blisters
Chafing
Hair loss
Dermatitis
Rashes/hives
Cysts
Sunburn

Bruises
Spider/varicose veins
Cellulitis
Chronic Skin Conditions

- Psoriasis
- Eczema
- Acne
- Rosacea

Diverse Natural Defense Mechanisms of Skin

- Forms a protective shield /buffer between the internal organs and external environment
- Outer layer of skin replaced every 28 days
 - Cells move from bottom layer of the epidermis to the most superficial layers and dead cells then slough off
 - Dead cells are so tightly bonded together with a special adhesive to prevent attack from viruses/bacteria
- Microbes within the skin contribute to immunity impact resistance to pathogens
- Bottom layer of epidermis contains melanin to protect from sun
- When there is a wound, body naturally adds moisture (i.e. blister)

Patients at Risk for Severe Skin Reactions

Treatment Factors

Higher XRT dose, higher risk
 IMRT reduces risk
 Using boost agent/technique
 Concomitant chemo/XRT
 h/o previous XRT, targeted or
 hormonal therapy

Patient Factors

High BMI and smoking were
 highest risks
 Age
 Skin type
 Genes
 Alcohol consumption
 Other comorbidities
 Showed higher levels of pain
 and sleep disturbance

Effect of Aging on Skin

- **Decreased blood supply** and nutrients to outer layer of skin
- **Thinner** and more **fragile** skin
- Dermis becomes thinner with less collagen and elasticity
 → wrinkles and sagging
- Sebaceous glands produce less sebum and sweat
 glands produce less sweat → skin **dryness**
- **Maintaining and Supporting Normal Aging Skin is Critical!!!**

Skin Breakdown

Skin Breakdown & Wounds Are Multifaceted

- Pathophysiology of breakdown varies according to etiology:
 - Normal aging
 - Moisture imbalance
 - Too dry
 - Too moist - maceration
 - Change in pH (i.e. feces, urine, excessive moisture)
 - Pressure
 - Repetitive skin stripping
 - Treatments – radiation, chemoradiation, targeted treatments

continued

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Skin Conditions with H&N Therapies

- Skin reactions during radiation can cause a delay in treatments
 - Erythema, weeping, skin cell production ceases
 - Basal layer of epidermis & dermis exposed, placing patients at higher risk for infections



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Skin Conditions with H&N Therapies

- Skin reactions from targeted therapies
 - Afatinib (Gilotrif), cetuximab (Erbix), erlotinib (Tarceva), gefitinib (Iressa), osimertinib (Tagrisso), and panitumumab (Vectibix).
 - Some target epidermal growth factor receptor (EGFR)
 - Increased sensitivity to sunlight
 - Acne-like rash on face and upper body
 - Inflammation around fingernails
 - Dry, itchy skin

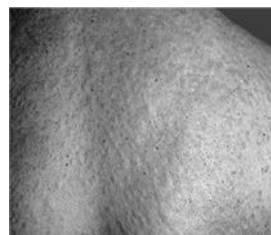


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Skin Conditions with H&N Radiation Therapy

Can cause a delay in treatments

- Skin tolerance was **#1 cause** for treatment disruption
- Improved with fractionated radiation

Week of Radiation	Skin Changes Experienced
Week 2	<ul style="list-style-type: none"> • Skin changes (erythema)
Week 4-5	<ul style="list-style-type: none"> • New skin cell production decreased (dry or moist desquamation/peeling of epidermis)
Week 6 until therapy completion	<ul style="list-style-type: none"> • Skin cells slough off—no cell regeneration • Basal layer of epidermis and dermis can be exposed • Moist desquamation/weeping of fluid • Susceptible to skin breakdown

Process of Skin Breakdown in Laryngectomees

1. Mechanical Skin Stripping

- Strip the skin attached to the adhesive
- Removes the top layer of epidermal cells
- Fissures and cracks form exposing dermis & then risk for infection

2. Maceration (excessive exposure to liquid)

- Oversaturation from excessive mucus sitting on the skin
- Mucus has enzymes that can breakdown the skin

3. Contact Dermatitis

- Outline of baseplate



Patients want to take a break from adhesive and have difficulty breaking the cycle

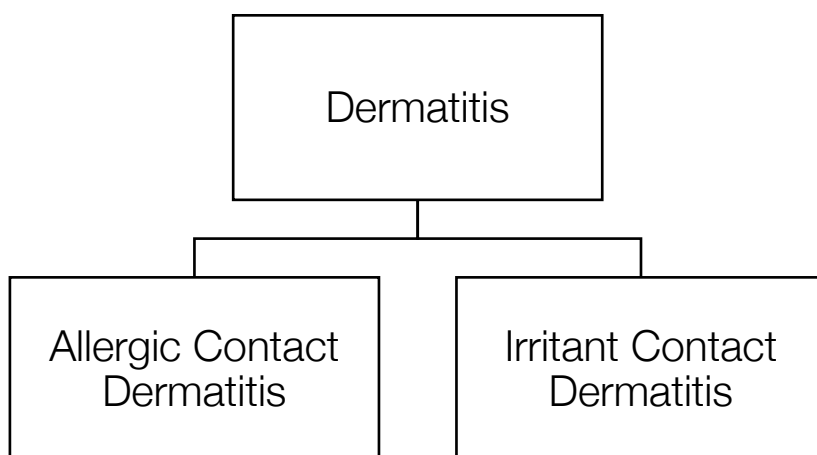
Methods:

- n=7 (4 males, 3 females)
- Two types of adhesive tape worn 4 hours daily during summer and winter
- Measured dermal peeling force, trans-epidermal water loss (TEWL), hydration, skin furrows, amount of stripped corneocytes

Findings:

- Dermal peeling force increases with each subsequent application
- Total amount of stripped corneocytes correlated with degree of skin irritation
- Trans-epidermal water loss (TEWL) increased with repetition
- Dermal peeling force worse in winter vs. summer
- More deep skin furrows in summer

Tokumura, F., Umekage, K., Sado, M., Otsuka, S., Suda, S., Taniguchi, M., Oka, K. (2005). Skin irritation due to repetitive application of adhesive tape: the influence of adhesive strength and seasonal variability. *Skin Res Technol*, 11(2), 102-106. doi:10.1111/j.1600-0846.2005.00088.x



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Dermatitis

- Allergic contact dermatitis:
 - Allergic/immunologic response caused by allergen contact with skin.
 - Common allergies include nickel, latex
- Irritant contact dermatitis:
 - Develops from **substance irritation** skin
- Both may be triggered by baseplates, tapes, mucus, drainage from sutures/wound or XRT reaction, feces, saliva, acid, excessive contact with water, soaps, hair dyes, detergents



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Allergic Contact Dermatitis

- Allergic skin irritation caused by something in contact with skin (i.e. baseplate, clothing, jewelry, tape, poisonous leaf, nickel, latex)
- Symptoms:
 - Itchy skin (often intense)
 - Rash (skin red, swollen, and hot)
 - Excessively dry skin
 - Burning
 - Stinging
 - Hives (round welts on the skin that itch intensely)
 - Fluid-filled blisters
 - Oozing blisters that leave crusts and scales
 - Long term exposure can lead to flaky, scaly or leathery-like skin



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Irritant Contact Dermatitis

- Develops from substance irritation on the skin
- May be from baseplates, tapes, mucus, drainage from sutures/wound or radiation reaction, feces, saliva, acid, excessive contact with water, soaps, hair dyes, detergents



Irritant Contact Dermatitis

- Signs & Symptoms:
 - Dry, chapped or burning skin
 - Erythema
 - Edema
 - Fluid filled blisters which can erupt and cause crusting/scabs
 - Repeated exposure can cause patches of itchy, red, swollen, scaly skin and excessively dry skin



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Sequelae of Skin Conditions

- Chronic Pain
- Loss of work
- Withdrawal from normal activities
- Decreased quality of life
- **Loss of sleep**



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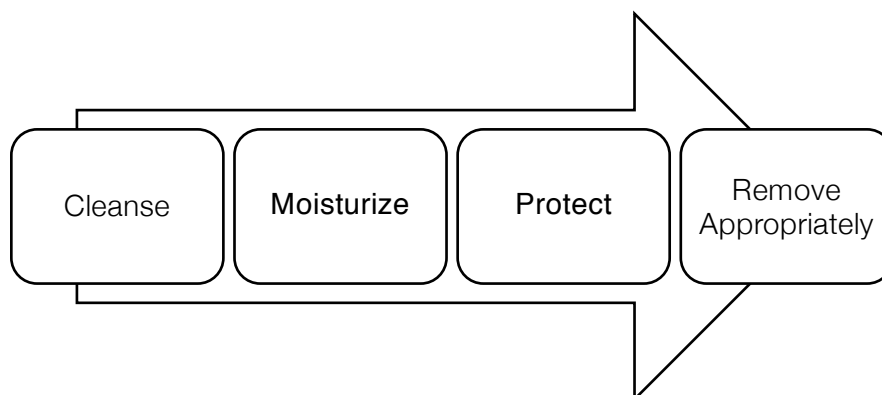
Prevention & Treatment of Skin Conditions

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- Consensus panel to define best practices to reduce Medical Adhesive-related Skin Injury (MARSI)
- Panel developed 25 Consensus Statements including:
 - *“Care of the skin, including prevention of adhesive-related injury, should be a standard of care for all healthcare providers.”*
 - *“Consider application of a skin barrier prior to applying an adhesive product.”*
 - *“Consider use of medical adhesive removers to minimize discomfort and skin damage associated with removal of adhesive products.”*
 - *“Use proper application and removal techniques for adhesive-containing products.”*

McNicol, L., Lund, C., Rosen, T., & Gray, M. (2014). Medical Adhesives and Patient Safety: Consensus Statement for the Assessment, Prevention and Treatment of Adhesive-Related Skin Injuries. *Journal of Wound, Ostomy and Continence Nursing*, 40(4), 365-380.

Skin Care Basics



Skin Care Basics

1. Cleansers:

- Certain soaps can cause skin stripping and change in skin pH
- Overuse can cause more harm

2. Moisturizers:

- Trap moisture into the skin
- Preserve skin hydration
- Critical in hot, dry climates
- Should be applied directly after bathing when skin is damp but not wet
- May contain allergens (perfumes, lanolin, preservatives)

3. Barriers

- Protect the skin when using adhesive baseplate

4. Adhesive Remover

- Reduces effort and potentially skin damage during adhesive removal

Skin Cleansers

Depending on the type of soap, can cause...

- skin stripping
- change in skin pH
- removal of protective sheath
- overuse can cause more harm, common

Best Soaps: Neutrogena®, Dial ®, or Ivory ™

Avoid: Antibacterial and/or abrasive soaps or those w/ moisturizers or lotions

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Moisturizers

- Trap moisture into the skin
- Should be applied directly after bathing when skin damp, NOT WET
- Reserves skin hydration
- Critical in hot, dry climates
- May contain allergens (perfumes, lanolin, preservatives)



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Liquid Skin Barriers

- Provide protection
- Allow for visualization of the wound
- Don't trap contaminants
- Don't interfere with medical adhesives
- Those without alcohol provide clinically significant barrier to skin stripping (Grove & Leyden 2016)



continued

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Solid Skin Barriers

- Provide protection
- Environment to promote skin healing
- Provide moist environment
- Absorb excess moisture
- For Laryngectomees?
 - 2 Products currently available
 - Hydrocolloid
 - Hydrogel



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Protection Includes Proper Baseplate Removal



Skin stripping during removal is no joke!

- Susceptible to fissures & secondary infections
- Critical to remove correctly

continued

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Appropriate Adhesive/Baseplate Removal & Impact on Skin

Problem: Skin stripping when removing baseplate

- Even more important with repetitive adhesive application
- **Critical to remove correctly or can expose dermis, cause breakdown & more susceptible to infection**

3. Removing the adhesive.

Proper skin care is important for your long term success in wearing an adhesive baseplate. It is especially important if you have sensitive skin. The following tips may be helpful:

- Remove the adhesive carefully.
 - For the Provox OptiDerm™ Adhesive, use Provox Adhesive Remover at the edge and then under the adhesive while peeling the adhesive from the skin.
 - For Provox FlexiDerm™, XtraBase® or StabiliBase Adhesives, apply Provox Adhesive Remover on top of the adhesive (the adhesive is porous) and then under the adhesive when peeling the adhesive from the skin.
- Some patients with very sensitive skin can get skin irritation from the use of skin protection products or adhesive removal wipes. If that is the case, discontinue the use of these products and consult your clinician or a dermatologist.



Use a Provox Adhesive Remover wipe on top of a FlexiDerm adhesive to help with removal.

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Treatments for Dermatitis

- Clean with mild soap and water
- Corticosteroids and/or anti-itch creams
- Avoid itching/scratching
- Antihistamines
- Antibiotic only if secondary infection
- If contact dermatitis, eliminate irritant
- Expose skin to natural or artificial light
- Apply cool, wet compresses
- Bleach bath
- Moisturize the skin
- Hydrogels and/or hydrocolloids

continued

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What is a Hydrocolloid?

- Designed for moist wounds – to retain moisture
- Stick to healthy skin around the damaged skin/wound
- Impermeable to bacteria - creates non-breathable environment under the dressing
- Artificial blister
- Intention is to promote healing of uninfected wounds (pressure ulcers, burns)
- Don't typically require frequent changing
- Problems:
 - Lifting on the edges
 - May trap microbes
 - Allergic reactions
- Provox ® Optiderm™ is a hydrocolloid



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What is a Hydrogel?

High water content - designed to deliver moisture and wick away excess moisture from wound.

Supports healing process of dermis and epidermis

Contain hydrophilic polymers -soluble in water and swell with water/fluid

High glycerin content

Cool, comfortable and soothing



Tips:

- Prep skin by cleaning with mild soap and water
- Avoid using alcohol as it breaks down the matrix

Good for the following types of wounds

Dry or dehydrated wounds	Abrasions or severe scraps
Partial or full-thickness skin lesions	Minor burns
Wounds with granulated tissue	Radiation skin damage

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Difference Between Hydrocolloid and Hydrogels

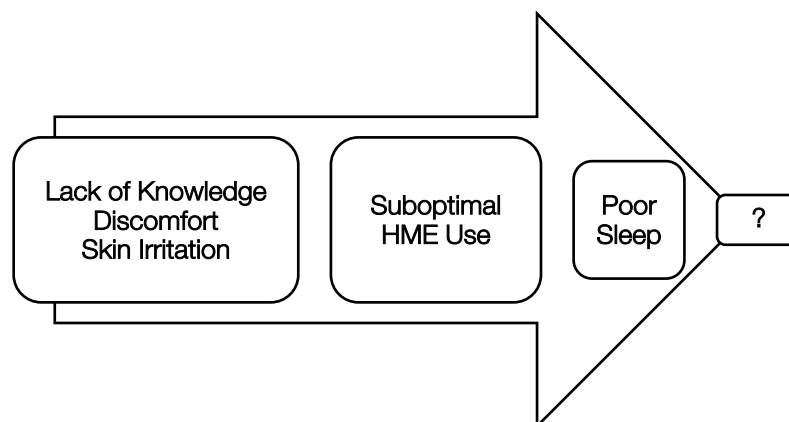
Hydrocolloid

- Moist wounds
- Can stay in place for up to 7 days
- Occlusive & impermeable to bacteria
- Slight debridement
- Form a gel with water

Hydrogel

- Not appropriate for a weeping wound
- Must be changed daily
- Moisturizing and cooling to promote healing
- Not able to debride
- Comprised of ~80% water

Red Associates Data Describes a Troubling Relationship...



continued

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Provox® Luna –Night-time Solution

- Comfortable
- Soothing/cooling to the skin
- Superior lung humidification
- No prep – apply to clean skin

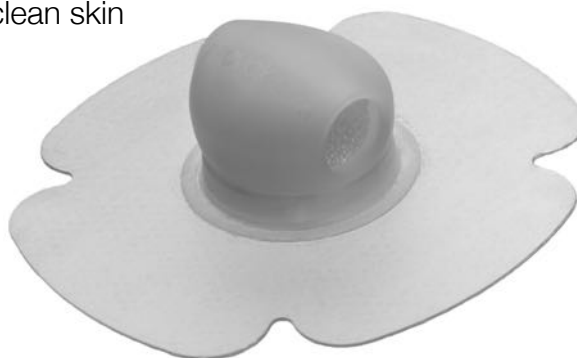


reddot award 2018
winner

HME optimized for
humidification



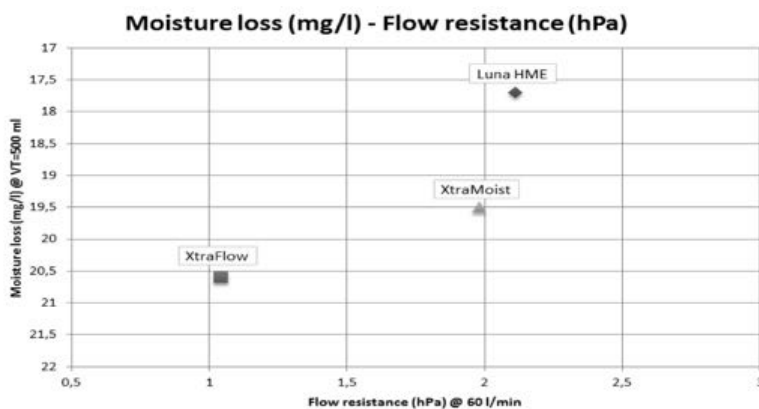
Hydrogel
baseplate



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External Data Shows Superior Humidification with Provox Luna



Performed by Technologie Institut Medizin GmbH (TIM), Germany according to ISO 9360-2:2009. Moisture loss and flow resistance recorded after 24 hours. Tidal volume 500 ml with 15 cycles per minute. Stated accuracy of moisture loss data is $\pm 10\%$. Data on file.

continued

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Every Patient Can Use Luna EXCEPT.....



- Those patients that require the use of a Larytube or Larybutton
- When contraindicated by plan of care determined by HCP

continued

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- Randomized crossover trial; n=53 patients
- Participants recorded data for two 28-day intervals. (Luna vs. usual care)
- The primary outcome: HME compliance.
- During the Luna interval two patterns stood out:
 - Participants used HMEs more hours per day (p=0.003)
 - Participants noted more frequent overnight skin improvement (p = 0.012)

Ratnayake, C. B. B., Fles, R., Tan, I. B., Baijens, L. W. J., Pilz, W., Meeuwis, C. A., . . . Van den Brekel, M. W. M. (2019). Multicenter randomized crossover trial evaluating the provox luna in laryngectomized subjects. *Laryngoscope*. doi:10.1002/lary.27839

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Thank you!

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