

Wound Management & Prevention

At-Risk Skin: 21 Consensus Statements From the Coalition for At-Risk Skin

Melissa Morgan (Co-Chair), MSN, RN, CWCN¹; Catherine Milne (Co-Chair), APRN, MSN, ANP/ACNS-BC, CWOCN-AP²; Edna Atwater, BSN, RN³; Martha R. Kelso, RN, HBOT⁴; Diane L. Krasner, PhD, RN, FAAN, FAWC, MAPWCA⁵; Joanne M. Labiak, MSN, CRNP, CWOCN, CWS, DAPWCA⁶; Jeanine Maguire, MPT, CWS⁷; Noreen Heer Nicol, PhD, RN, FNP, NEA-BC⁸; and Monica Timko-Progar, BSN, RN, ET, CWS, FACCWS⁹

Facilitator: Thomas Clopp, BSEd, MSED

AT-RISK SKIN CONSENSUS STATEMENTS

Melissa Morgan (Co-Chair), MSN, RN, CWCN¹; Catherine Milne (Co-Chair), APRN, MSN, ANP/ACNS-BC, CWOCN-AP²; Edna Atwater, BSN, RN³; Martha R. Kelso, RN, HBOT⁴; Diane L. Krasner, PhD, RN, FAAN, FAAWC, MAPWCA⁵; Joanne M. Labiak, MSN, CRNP, CWOCN, CWS, DAPWCA⁶; Jeanine Maguire, MPT, CWS⁷; Noreen Heer Nicol, PhD, RN, FNP, NEA-BC⁸; and Monica Timko-Progar, BSN, RN, ET, CWS, FACCWS⁹

Facilitator: Thomas Clopp, BSEd, MSED

¹Senior Director of Training, Clinical Implementations & Wound Care, ScionHealth, Louisville, KY

²Co-Owner, Connecticut Clinical Nursing Associates, Bristol, CT

³Administrative Director Emerita, Duke Dermatology, Skin Health Consultant, Indian Beach, NC

⁴Chief Executive Officer, Wound Care Plus, LLC, Blue Springs, MO

⁵Wound and Skin Care Consultant, York, PA

⁶Owner, Certified Wound Care Specialists, LLC, Northampton, PA

⁷Vice President, Skin Integrity & Wound Management, Genesis HealthCare, Kennett Square, PA

⁸Associate Professor Emerita, Former Associate Dean of Academic Programs, University of Colorado, College of Nursing, Anschutz Medical Campus, Aurora, CO

⁹Corporate Sr. Director of Wound Care Practice, Amedisys Home Health, Baton Rouge, LA

Address all correspondence to: Melissa Morgan, MSN, RN, CWCN, 680 S. 4th Street, Louisville, KY 40202; email: Melissa.morgan@kindred.com

ACKNOWLEDGMENTS

The Coalition for At-Risk Skin gratefully acknowledges the financial support of Medline Industries, LP via in-kind services and medical writing support from Stephen Smith, PhD, and Anitta Thomas, MS.

The CARS panel members received no honoraria for their participation in this consensus document.

This supplement was not subject to the *Wound Management & Prevention* or *WOUNDS*[®] peer-review process.

Sponsored by Medline Industries, LP

Glossary. Abbreviations and Definitions of Skin Terminology and Skincare Products^a

SKIN TERM	DEFINITION
ABHR	Alcohol-based hand rub
AD	Atopic dermatitis. A form of dermatitis/eczema that is characterized by itchy, inflamed skin and associated with a personal or family history of asthma, allergic rhinitis, or eczema.
CARS	Coalition for At-Risk Skin
CDC	US Centers for Disease Control and Prevention
Cleansing agents	Agents and products that aim to remove dirt, debris, and microorganisms on the skin surface, usually with water
Cosmetic	A beautifying substance or a preparation that tends to preserve or restore the skin. A cosmetic is a product (excluding pure soap) that is intended to be applied to the human body for cleansing, beautifying, promoting attractiveness, or altering the appearance.
Creams	Vehicle for topical agents and products including moisturizers and medications. Consistency is viscous and nongreasy as there is a concentration of similar parts of oil and water.
Dermatitis	Dermatitis and eczema are terms that can be used interchangeably. They describe inflammation of the skin characterized by itching and reddish lesions appearing in various phases including acute, subacute, and chronic. There are many types of dermatitis or eczema.
Dermatology	Branch of medicine that studies and treats disorders of the skin.
Dermatoporosis	Loss of the structural integrity of the skin that occurs with aging. Affected skin is more easily lacerated and ulcerated and bleeds more readily and heals more slowly than healthier, younger skin.
Eczema	Dermatitis and eczema are terms that can be used interchangeably. They describe inflammation of the skin characterized by itching and reddish lesions appearing in various phases including acute, subacute, and chronic. There are many types of dermatitis or eczema.
Emollient	Any agent, such as a cream or ointment, that soothes or softens the skin by reducing or restoring moisture to the skin.
FDA	US Food and Drug Administration
HCP	Health care provider/professional

Glossary. Abbreviations and Definitions of Skin Terminology and Skincare Products^a

SKIN TERM	DEFINITION
HCW	Health care worker
Hospice	A program of medical and emotional care for the terminally ill.
Humectant	An emollient that promotes retention of moisture in the skin.
Hydration	The process of combining with water; usually reversible.
Incontinence	A condition in which urination or defecation cannot be voluntarily controlled.
IAD	Incontinence-associated dermatitis
ISTAP	International Skin Tear Advisory Panel
ITD	Intertriginous dermatitis
Lotion	Vehicle for topical agents and products including moisturizers and medications. Consistency is light and nongreasy as there is a high concentration of water.
MASD	Moisture-associated skin damage
MARSI	Medical adhesive-related skin injury
MDRPI	Medical device-related pressure injury
Microbiome	The content of all microorganisms that typically inhabit a particular environment, especially a site on or in the body, such as the skin or gastrointestinal tract.
Microclimate and micro-environment	Interchangeable terms referring to a very small area that differs from the climate or environment of the surrounding area.
Moisturizer	The purpose of skin moisturizers is to repair the skin's barrier, restore the skin barrier, reduce transepidermal water loss, and maintain the lipid structure of the stratum corneum. ³ Moisturizers are known to improve skin barrier integrity when used as humectants, emollients, and occlusives. ⁶
NPIAP	National Pressure Injury Advisory Panel
Occlusive	An emollient that creates a hydrophobic barrier over the skin.
Ointments	Vehicle for topical agents and products including moisturizers and medications. Consistency is thick and greasy as there is a high concentration of oil to water. Fall into 4 general base categories including: hydrocarbons, absorption bases, water-removable, and water-soluble.
OTC	Over-the-counter (referring to skincare products)
Palliative	Referring to treatment to relieve or ameliorate the symptoms of a painful condition.
Polypharmacy	The administration of many drugs together or administration of excessive medication.
PPE	Personal protective equipment
Pressure injuries	Localized damage to the skin and/or underlying tissue as a result of pressure or in combination with shear. ²
Protectant	Prevents skin breakdown by providing an impermeable or semipermeable barrier on the skin. ²
Purpura	A hemorrhagic disease characterized by extravasation of blood into the tissues under the skin, producing spontaneous bruises, ecchymosis, and petechiae (small hemorrhagic spots) on the skin. Also called traumatic purpura.
Senile purpura	A condition that commonly affects aging skin; also known as Bateman's purpura, actinic purpura, or solar purpura.
Skin	Largest and most visible organ of the body that consists of 3 main layers: an outer layer, the epidermis; an inner layer, the dermis; and the subcutaneous layer.
Skin barrier	The outer layer of the skin that protects against penetration of irritants and allergens, decreases moisture loss, promotes healthy microbiome, and maintains stratum corneum acidification. ¹⁵
Skin tears	Traumatic skin wounds caused by mechanical forces, including removal of adhesives. ²
TEWL	Transepidermal water loss
WHO	World Health Organization

^aReferences: <https://medical-dictionary.thefreedictionary.com> unless otherwise noted.

ABSTRACT

BACKGROUND: There are many conditions and circumstances that place human skin at risk of impairment. However, there is a lack of substantial literature that documents the best practices and clinical benefits of moisturization and barrier utilization.

PURPOSE: To develop consensus statements that reflect a review of the current literature and expert opinions.

METHODS: The Coalition for At-Risk Skin panel was assembled to address the status of skin care and the definition of at-risk skin. Current and existing strategies for at-risk skin care were discussed, including preventive skin care measures, types of skin care products, moisturizers, barriers, ingredients, intended use of products, and data comparing skin care product purchasing patterns to the number of patients or residents. The panel members also reviewed organizational approaches and educational resources related to at-risk skin practices.

RESULTS: The document presented here provides a framework of skin health information with which health care providers/professionals can deliver skin care to individuals with at-risk skin. This document reports on 21 evidence-based consensus statements related to at-risk skin, which are divided into 7 categories.

CONCLUSION: These consensus statements will help to provide clarity and direction for health care providers/professionals who treat at-risk skin conditions and for individuals who have at-risk skin.

The Coalition for At-Risk Skin (CARS) panel is composed of clinicians from multiple disciplines, including nursing, physical therapy, advanced practice nursing, nutrition, and academia. These experts, each with no less than 15 years of experience, practice across the continuum in acute care, long-term care, home health, and outpatient wound centers and have expertise in various subspecialties, including education, expert witness testimony, research, and quality management.

The CARS panel was assembled on November 11, 2021, in Charlotte, North Carolina, to address the status of skin care and the definition of at-risk skin. Nine expert panel members from across the continuum of care in the United States made up this inaugural panel. The CARS panel members received no honoraria for their participation in this consensus document. The at-risk skin concerns were a result of the clinical practice experiences of the CARS experts and a lack of substantial literature that speaks to the specifics of moisturization, barrier utilization, and application.

The panel discussed current and existing strategies for at-risk skin care, including preventive skin care measures, types of skin care products, moisturizers, barriers, ingredients, intended use of products, and data comparing skin care product purchasing patterns to the number

of patients or residents. The panel also reviewed organizational approaches and educational resources related to at-risk skin practices.

Individual members of CARS submitted 24 consensus statements for review by the group. In the first round of voting, 7 of 9 nine votes (80%) were required to approve each consensus statement before the statement could move to the second round of voting. Each statement was reviewed independently until a 100% consensus was reached during the second round of voting by all 9 panel members. Three of the 24 original statements did not qualify as consensus statements. The expert panel unanimously approved 21 consensus statements during the working session.

The goal was to develop consensus statements that reflect a review of the current literature and the opinions of the expert panel. We acknowledge the work of the International Skin Tear Advisory Panel (ISTAP) group and other national and international cited sources. CARS built on their efforts throughout this document.

In this document, we succinctly provide a framework of skin health information with which health care providers/professionals (HCPs) can deliver skin care to individuals with at-risk skin. This document reports on the 21 evidence-based consensus statements related to at-risk skin, which are divided into the following 7 categories.

- **Category 1.** Definition of at-risk skin
- **Category 2.** Practice considerations for skin health or at-risk skin
- **Category 3.** Moisturizers and their role in skin health
- **Category 4.** Practice considerations for moisturizers and skin barriers
- **Category 5.** Special population considerations to promote skin health
- **Category 6.** Organization perspectives or considerations
- **Category 7.** Skin health is important for everyone

Here we report the findings of the working panel of skin health experts who developed and approved the consensus statements regarding at-risk skin. We believe that these consensus statements will help to provide clarity and direction for HCPs who treat at-risk skin conditions and for individuals who have at-risk skin.

CATEGORY 1. DEFINITION OF AT-RISK SKIN (STATEMENT 1)

Statement 1. At-risk skin is defined as the potential for impaired barrier function of the skin due to associated intrinsic or extrinsic risk factors, conditions, and comorbidities.

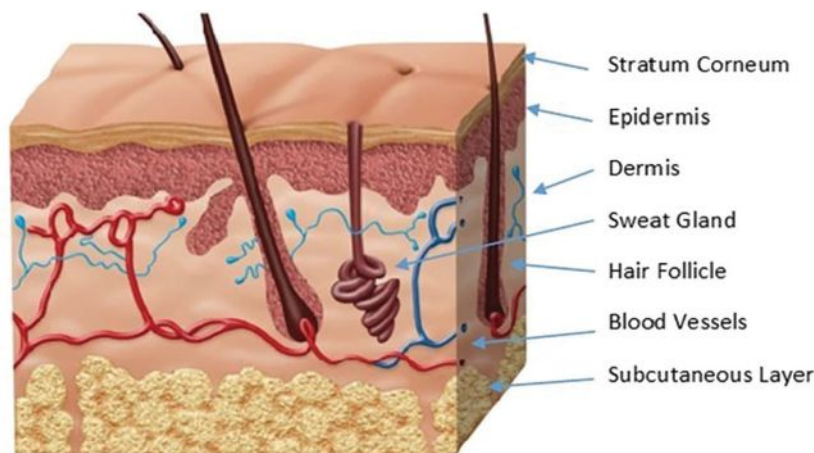


Figure 1. Human Skin Layers

The North American Nursing Diagnosis Association defines at-risk skin as the “state in which the individual’s skin is in danger of being altered.”¹ Many risk factors put the “skin in danger of being altered,” including but not limited to irritating chemicals, body excretions, mechanical factors, radiation, physical immobilization, humidity, nutritional status, and metabolic disorders.

The ISTAP initially focused on preventing and managing skin tears but acknowledged other conditions and circumstances that may also place human skin at risk of impairment. International experts met in 2019 to further elucidate these ideas. The Best Practice Recommendations for Holistic Strategies to Promote and Maintain Skin Integrity document published by ISTAP in 2020 provides practicing clinicians with guidance regarding the “appropriate care to at-risk individuals with fragile skin.”²

This ISTAP consensus document refers to skin frailty to define the “at-risk skin” phenomena and encompasses several other well-defined clinical entities, including skin tears, medical adhesive-related skin damage, moisture-associated skin damage (MASD), incontinence-associated dermatitis (IAD), pressure injury (PI), and changes in the skin at the end of life. Within this CARS consensus document, skin frailty is used interchangeably with the term “at-risk skin.” Risk factors that define at-risk skin also include changes to

the skin microclimate, skin disease, and stages of life.²

This document expands on some of the areas addressed by the ISTAP and provides additional insights, guidance, and practice considerations. The CARS panel endeavored to build on the work of the ISTAP and the current literature to provide additional strength to the body of evidence. We acknowledge the importance of the work of the ISTAP and provide additional insight for at-risk skin through skin care awareness, education, skincare products, usage, ingredients, and moisturization properties.

The human skin functions to protect against mechanical, thermal, physical, and hazardous elements in the environment.^{3,4} It is also a sensory organ that helps regulate body temperature. The human skin consists of 3 primary layers: an outer layer called the epidermis, an inner layer called the dermis, and the subcutaneous layer made of fat and connective tissue.³ The epidermis lacks blood vessels and receives oxygen and nutrients from capillaries in the dermis.

Changes to the skin epidermis or dermis can result in impaired skin integrity that may compromise health. Exposure to excessive moisture can also compromise barrier skin function integrity, which renders the epidermis and dermis more susceptible to damage.⁵ One of the skin’s primary functions is to provide skin barrier

protection. However, when the skin barrier is compromised in at-risk skin, transepidermal water loss (TEWL) will increase, thus leaving the skin vulnerable to diseases and infections.²

The stratum corneum is the outermost layer of the epidermis and provides a natural lipid skin barrier that protects against extrinsic insults, including bacteria and viruses. The stratum corneum prevents TEWL in healthy skin. The cells in the stratum corneum remain for about 2 weeks before being shed or washed away. The dermis lies between the epidermis and the subcutaneous layer and receives both nerve and blood supply. The dermis contains hyaluronic acid, collagen, elastic fibers, and secondary structures such as sweat glands, hair follicles, and blood vessels (Figure 1).

The epidermis provides a barrier to water loss, ultraviolet light, and infection; allows excretion and secretion; and acts as a sensory organ for pain and touch. The dermis regulates body temperature, immune response, and vitamin D production; it also provides strength and elastic tone. The subcutaneous fat layer provides insulation, shock absorption, an energy source, and body topography.³

The skin barrier protects against desiccation, infection, mechanical stress, and chemical irritation.⁶ The maintenance of healthy skin and prevention of at-risk skin requires not only protection of the epidermis and dermis, but also maintenance of the protective components found on the skin surface.⁷ Impaired skin barrier function can be caused by exposure to intrinsic or extrinsic risk factors. Some risk factors that define at-risk skin include disruption of the changes to the skin microclimate, skin frailty, skin disease, and stages of life.²

It is also essential to consider an individual’s history of comorbid conditions affecting at-risk skin, such as obesity, urinary or fecal incontinence, diabetes mellitus, advanced age, immobility, or functional limitations.⁸ Table 1 lists some common risk factors associated with at-risk skin.

Risk factors for MASD include excessive perspiration, increased dermal metabolism,

Table 1. Risk Factors Associated With At-Risk Skin^a

Age > 65 years
Anticoagulant use
Atopic dermatitis or atopic eczema
Cognitive impairment
Contact dermatitis, allergic or irritant
Drug, alcohol, or tobacco use
Emotional stress
Endocrine disease (eg, diabetes or thyroid disorders)
Frequent handwashing
Genetic and inherited skin conditions
History of or current steroid use
Immunocompromised or malabsorption disease
Impaired mobility
Incontinence and incontinence-associated dermatitis
Lack of quality sleep
Malnutrition and dehydration
Moisture-associated skin damage
Open wounds or fistula with drainage
Physical stress
Polypharmacy
Sequela of medical and/or surgery treatments
Social determinants (affordability, accessibility, literacy)
Stasis dermatitis
Ultraviolet light or radiation exposure
Use of a medical device in contact with the skin
Use of personal protective equipment (gloves, masks, and other types)
Xerosis

^aThis list may not be inclusive of all risk factors associated with at-risk skin.

elevated local temperature, abnormal skin pH, history of atopy, genetic susceptibility to contaminants, irritants, deep body folds, dermal atrophy, and inadequate sebum production, incontinence, chemical/biological irritants, or pressure related injuries.²

CATEGORY 2. PRACTICE CONSIDERATIONS FOR SKIN HEALTH OR AT-RISK SKIN (STATEMENTS 2 TO 6)

Statement 2. All persons should have an evaluation to determine if they have at-risk skin.

A skin assessment by a qualified HCP who can identify at-risk skin conditions and any deficiencies in an individual's skin care regimen is a vital step in at-risk skin care. An initial skin evaluation should assess the skin for color, turgor, temperature, moisture level, and integrity. A preventive skin care approach for at-risk skin is preferred rather than treatment after at-risk skin devolves into a more serious skin malady. Individuals who are immobile and chronically ill may be susceptible to developing at-risk skin conditions such as PIs, IAD, skin tears, or intertriginous dermatitis (ITD).⁸ A thorough skin assessment needs to be completed regardless of the health care setting.

A literature search was performed using Google search engine, Google Scholar, UpToDate, Embase, and PubMed to look for an at-risk skin evaluation or assessment tool. The following key words were used: skin at-risk, at-risk skin, skin evaluation, skin evaluation tool, skin assessment, skin assessment tool, and skin breakdown. The only tools found were the Braden Scale for Predicting Pressure Sore Risk and various skin cancer/dermatology screening tools. No general at-risk skin evaluation or assessment tools were found, demonstrating an urgent need for developing at-risk skin evaluation or assessment tools that have similar diagnostic utility to the Braden Scale.

Statement 3. Persons identified with at-risk skin should have initial comprehensive and ongoing assessments to develop care strategies that include prevention and risk mitigation.

A complete skin assessment should be conducted at the first visit or on admission. The plan of care should include a regular, documented regimen of skin care and diligent notations of any changes in skin health.⁹ Persons identified with at-risk skin should have a comprehensive assessment of the skin condition, with special attention paid to dermatologic history and presence of any skin barrier defects. A skin examination should be performed with natural lighting to detect skin color and changes.¹⁰

The visual inspection of the skin should be done in an orderly manner. Primary and secondary lesions appear different from the surrounding area. The presence of skin lesions should be recorded during the physical examination. Primary skin lesions may develop without skin changes. Secondary skin lesions can occur due to natural progression, rubbing, or scratching. Documentation is recommended to describe the characteristics of the type of skin lesions, number, color, configuration, and distribution.

Normal skin variations may exist in healthy skin due to age, genetic factors, and environmental influences. Repeated skin evaluation and documentation are recommended to observe for changes that may occur over time.¹⁰ Any abnormal or concerning findings may require a referral and/or a multidisciplinary approach.

Statement 4. Persons with at-risk skin should have individualized care strategies aimed at the maintenance or improvement of skin barrier function and/or the prevention of skin alterations.

A proactive approach is needed to protect individuals with at-risk skin and prevent additional damage.² Family members and caregivers need to be aware of skin care strategies to help maintain an individual's skin integrity and skin barrier function. The consensus of the ISTAP recommends ongoing assessment and care strategies to protect skin tears.¹¹ These protective measures should be considered and broadened to include all persons with at-risk skin. The skin barrier disruption in its early stages may be invisible to the naked eye, and erythema suggests that

an inflammatory response has already occurred. Proper skin care needs to be initiated before the appearance of erythema.

Patient needs, including skin disorders associated with itching, skin clarity, sleep, and quality of life, should be addressed. Skin disorders that involve >10% of the body surface area may be considered moderate to severe. Quality of life issues can directly impact social, emotional, and professional functioning. Socioeconomic issues include insurance coverage, ability to pay for treatment, daily schedule, and work, school, and family obligations. Table 2 describes patient and caregiver strategies regarding skin care.¹²

In addition to these skin care strategies, milder synthetic soaps with pH of 4 to 5 may help reduce skin barrier breakdown and are more compatible with the acidic microenvironment conditions of the skin. Cleansing and skin care procedures may follow individual preferences as long as no skin problems occur.⁸ Bathing should be based on individual need and preference; it should be performed with either soap-free products or pH-balanced soaps, preferably with limited bathing with warm water and avoiding hot water.¹¹ Basic skin care includes a mild cleanser that is close to the pH of the skin (4.5–5.7) and twice-daily application of moisturizers that have the potential to improve barrier function.⁸

Statement 5. Persons who develop impaired skin barrier function should have ongoing skin assessments and interventions aimed at restoration of skin barrier function and/or prevention of further decline.

Moisturizers improve skin barrier integrity when used as emollients, humectants, and occlusives.⁶ It is necessary to understand ingredients and skin care categories because the mechanism of action is different for each. Emollients trap moisture in the skin and reduce TEWL, whereas humectants draw moisture from the dermis into the epidermis.⁹ Occlusives are oil-based moisturizers that create a hydrophobic barrier over the skin, thereby blocking TEWL in at-risk skin.⁶

Table 2. Skin Care Strategies Based on the Individual’s Needs

Patient and/or caregiver input	What are the patient’s skin care goals and expectations?
	Which current moisturizers and medications are succeeding or failing?
	What treatment options are available?
	What are the risks and benefits of these treatments?
	What is the patient’s socioeconomic status and ability to adhere to treatment?
Nature of the skin disorder	Does the patient understand the recommended treatment?
	What deterioration in the skin has occurred?
	Are there any secondary bacterial or viral infections?
	Is there evidence of a contact allergy?
Severity of the skin disorder	Are there any skin irritants?
	How much body surface area is involved?
	What is the extent or significant impact on quality of life?
	What are the skin maintenance and prevention strategies?
	Is there a daily bathing schedule in place?
Individual treatment plan	Are the appropriate skin cleansers being used?
	Is the correct amount of daily moisturizer being applied to the total body?
	What is the role of proper skin hydration? What is the vehicle preference (lotion, cream, ointment) for moisturizers and topicals?
	How often are bathing and skincare products applied to the skin?
	Have written recommendations regarding skin care been provided?
Education	What other options are available if this treatment is not successful?
	What are the nutritional needs?
	Have skin care educational materials been provided?
	What measures have been taken to avoid skin irritants and allergens?
	Has psychosocial support been suggested or implemented?
	Are key skin care messages being enforced at follow-up visits?

Adapted from Brar et al.¹²

Studies have shown that emollients rich in lipid content can accelerate the regeneration of skin barrier function.¹³ Some lotions and cream emollients contain both humectants and occlusives, in which the humectant will draw the moisture into the epidermis and the occlusive will ensure that it remains there.¹³ Humectants help to trap moisture in the skin and reduce water loss from evaporation.

The terms emollient and moisturizer are often used interchangeably and lack con-

sistency in the literature.^{6,13,14} Technically, an emollient is an ingredient or property of a moisturizer; humectants and occlusives are also common moisturizer ingredients. Moisturizer is the more inclusive term and is used throughout this document. The purpose of skin moisturizers applied to at-risk skin is to repair and restore the skin barrier, reduce TEWL, and maintain the lipid structure of the stratum corneum.²

A variety of skincare products, including skin cleansers, bath additives, lotions,

creams, gels, sprays, mousses, and ointments, can be labeled as moisturizers.¹³ A large variety of moisturizers are available, suggesting no absolute product is recommended for all individuals. Moisturizers can restore skin barrier function in at-risk skin with few side effects. However, side effects such as contact dermatitis depend on the individual's sensitivities. Individuals should test the product on a small area of the skin before applying it to larger areas. Caution should be used when using moisturizers in the bath or shower as slipperiness and injury can occur.^{2,13}

Restoring the skin barrier function and adequate skin hydration is extremely important to prevent the recurrence of skin damage, even when all symptoms have resolved.⁶ Acute and chronic skin changes can occur due to intrinsic factors such as aging, skin disease, or underlying systemic illness. Skin barrier restoration requires reducing or eliminating exposure to extrinsic factors such as regular soap use, sun exposure, and smoking.

A basic strategy of applying a daily moisturizer may be sufficient for protecting the skin barrier and preventing further decline.¹⁵ Replenishing the moisture in at-risk skin restores the protective skin barrier and is recommended to help prevent further skin breakdown.² Basic skin health strategy and interventions also include skin hygiene that should be performed according to the individual's needs, starting with warm water and soap-free skin cleanser followed by a moisturizer applied at least twice per day. Moisturizer should be applied after bathing while the skin is still damp. Some investigators recommend slightly acidic (pH, 4.5–5.7) skin cleansers that are closer to the skin pH along with twice-daily moisturizers to protect at-risk skin.^{2,8,15} In a study of at-risk skin in individuals age 65 or older, twice-daily application of a nonperfumed moisturizer (pH, 4.5–6.5) reduced the incidence of skin tears.³

Individuals with at-risk skin related to incontinence should clean the skin at least once a day and after each episode of fecal or urinary incontinence to prevent IAD.⁸ Skin care recommendations for at-risk

skin, including the prevention of IAD, require daily cleansing with lukewarm water and no-rinse cleansers at a pH of 5.5.⁸ The cleansed skin area should be dried carefully without scrubbing because of the abrasive effects on the skin's moisture barrier. After thorough skin cleansing, a skin protectant product for individuals with IAD that includes zinc oxide, petrolatum, and/or dimethicone should be applied.⁸ Skincare products for IAD at-risk skin provide protection to the skin that is exposed to urine and/or feces and help to restore the skin barrier.^{2,8}

The disruption in the normal skin barrier and pH of the skin must be addressed before additional skin damage occurs.² Best practices include close monitoring and applying moisturizers that do not overhydrate or increase skin pH. Twice-daily application of moisturizers is recommended to prevent PIs and skin tears. Skin rubbing should be avoided to prevent further breakdown of the natural skin barrier for all at-risk skin.^{2,8}

Skin barrier products should also be part of skin care best practices and are necessary to protect and prevent additional skin breakdown, especially for individuals who are immobile. Skin barrier products provide an impermeable layer that protects the at-risk skin from overhydration and irritants, such as urine and fecal matter.¹⁶ Application of skin barrier products, such as ointments, liquid polymers, and cyanoacrylates, creates a protective layer that maintains hydration while blocking the exposure to irritants.⁵

Statement 6. Skin care strategies should be personalized based on product properties and ingredients.

Skin care strategies and management require basic steps that are applicable to at-risk skin, regardless of severity.^{15,17,18} Basic treatments include bathing, daily moisturization, and avoiding irritants. In addition to regular bathing with a pH-balanced soap and twice-daily moisturizer use, moisturizers should be selected that suit the individual's preference and personal needs.^{15,18}

The HCP plays a central role by providing advice on a moisturizer regimen(s) that suits individual needs and preferences. An individual should seek the HCP's recommendation for the most efficacious skincare products and moisturizers for at-risk skin conditions.

At-risk skin may occur at any stage of life, including very early in life, at advanced age, and at the end of life.² Dermatologic conditions such as MASD can be caused by excessive moisture that compromises barrier skin function integrity, which makes the epidermis and dermis more susceptible to damage.⁵ Protection from MASD can be accomplished by applying natural moisturizers that contain pyrrolidone carboxylic acid, urocanic acid, propylene glycol, lactic acid, urea, dimethicone, and petrolatum.^{2,5}

The input of the HCP, family, and caregivers is essential; however, involving the individual in their own skin care is key to the success of any skin care regimen.² Individual choice and acceptability are crucial in moisturizer product selection. The properties and benefits of moisturizers can vary and be suitable in some cases but not in others.

CATEGORY 3. MOISTURIZERS AND THEIR ROLE IN SKIN HEALTH (STATEMENTS 7 TO 9)

Statement 7. The properties, ingredients, utilization, and intended use of skincare products impact their efficacy. This includes moisturizers and skin barriers.

Natural moisturizers that contain lactic acid, pyrrolidone carboxylic acid, and amino acids are significant contributors to stratum corneum hydration. The moisturizers used to treat at-risk skin should be non-comedogenic (do not clog pores), non-irritative, and compatible with concomitant therapeutic regimens. Humectants, consisting of hygroscopic substances such as urea, help hydrate the skin and provide humidity to the epidermis.⁶ Urea also contributes to exfoliation and the removal of flaking skin. Petrolatum is one of the most effective occlusive moisturizers.⁶ A skincare product formulated

with 5% petroleum may reduce TEWL by 98%. Beware of carbomer ingredients in moisturizers. They work as a thickener that may make a product appear more like a cream although it may not effectively decrease TEWL.

Woo et al⁵ discussed the advantages and disadvantages of skin barrier formulations used to treat MASD. These include petroleum-based barrier ointments, zinc oxide-thickened petroleum-containing barrier ointments, silicone-based barrier ointments (dimethicone), film-forming polymers, and cyanoacrylates. Petroleum-based ointments are used most often; however, they can leave a greasy residue and interfere with dressing adherence. Polymers that contain organic solvents and cyanoacrylates may cause skin irritation but are resistant to washing off. Protein rejuvenators are small molecular weight proteins that replenish essential skin proteins.⁶

Table 3^{6,15,18-31} provides a summary of ingredients in over-the-counter (OTC) moisturizers used to treat atopic dermatitis (AD). The table lists the therapeutic properties associated with each of the OTC moisturizer ingredients that have been approved by the US Food and Drug Administration (FDA) for use in eczema associated with AD.

Statement 8. Many skincare products fall under the Federal Food, Drug, and Cosmetic Act of 1938. Product claims should be evaluated carefully before selection because therapeutic claims may not be clinically validated or relevant.

The FDA classifies topical products as cosmetics, OTC drugs, prescription drugs, or prescription medical devices.¹⁵ Products such as moisturizers, creams, lotions, and ointments are considered cosmetic products, which are regulated under the Federal Food, Drug, and Cosmetic (FDAC) Act of 1938.¹⁵ Cosmetic products are limited by the FDA to only claim effects on the appearance of the skin.

The FDAC, found in Title 21 of the US Code of Federal Regulations, provides additional guidance for labeling and packaging cosmetic products.³² Specifically,

Table 3. Therapeutic Properties of Ingredients in Over-the-Counter Moisturizers for Eczema Associated With Atopic Dermatitis

THERAPEUTIC PROPERTIES	INGREDIENTS
Anti-inflammatory	Hydrocortisone, colloidal oatmeal, licochalcone A, beta-glucan, chamomile, glycyrrhethinic acid and derivatives, oat extracts
Antioxidant	Glycyrrhethinic acid and derivatives, licochalcone A, hydroxyacetophenone
Antipruritic	Hydrocortisone, menthol, pramoxine HCl, menthoxypropanediol, colloidal oatmeal
Emollient (moisturizer)	Fatty acids, fatty alcohols, plant oils, squalene, caprylic, capric triglyceride, lanolin
Essential barrier lipids	Ceramides, plant oils rich in linoleic acid, urea (to upregulate ceramide production), phospholipids
Humectant (skin conditioner)	Glycerin, propanediol, allantoin, lactic acid, urea, sodium lactate, hyaluronic acid
Hygroscopic substances	Urea, hyaluronic acid
Natural moisturizing factor	Lactic acid, soy amino acids, pyrrolidone carboxylic acid, urea, sodium lactate/hyaluronic acid, hydrolyzed soy protein, pyrrolidone carboxylic acid
Occlusives (skin barrier)	Petrolatum, paraffin, silicones, zinc oxide, dimethicone, kaolin
pH buffers	Acidic buffers optimize pH between 4 and 5 (eg, citric acid)
Protein rejuvenators	Collagen, elastin, keratin, soy amino acids, hydrolyzed soy protein, arginine, glycine
Skin protectant	Colloidal oatmeal, zinc oxide, petroleum, kaolin, dimethicone

Adapted from Purnamawati et al⁶; Hebert et al¹⁵; Nicol et al¹⁸; Anderson and Ma¹⁹; Lozano-Grande et al²⁰; Zhong et al²¹; Criquet et al²²; Black et al²³; Correa and Nebus²⁴; Ghadially et al²⁵; Abedi and Sahari²⁶; Harding et al²⁷; Kanlayavattanukul and Lourith²⁸; Ricciotti and FitzGerald²⁹; Araújo et al³⁰; and DuPont Tate & Lyle.³¹

the FDAC states that cosmetic products should not promote false or misleading product claims. Therefore, product claims listed in labeling and packaging information for skincare products must be carefully evaluated and substantiated to provide truthful claims that do not mislead consumers.³²

Statement 9. For individuals with at-risk skin, creams or ointments are preferred to improve skin barrier function by decreasing transepidermal water loss. Lotions may be drying and therefore may not achieve the desired effect.

Different skincare product formulations and viscosities are available and may be

recommended based on the state of the at-risk skin.^{6,33} Moisturizers and other topical products are available in a variety of vehicles including lotions, creams, ointments, foams, solutions, sprays, and gels.³⁴ Skin products contain active and inactive ingredients. In skin care, product vehicles can have therapeutic value and serve as a substrate for the delivery of other ingredients. Creams or ointments may have thicker viscosities and skin-hydrating ingredients to reduce TEWL and improve the skin barrier.⁹ Lotions have higher alcohol content that may dry the skin and require more frequent applications.

Overall, clinical studies have demonstrated that daily moisturization increases

Table 4. Comparison of Different Vehicles Used as Moisturizers for At-Risk Skin

VEHICLE	CONSISTENCY	WATER/LIPID CONTENT	ADVANTAGES FOR AT-RISK SKIN	DISADVANTAGES FOR AT-RISK SKIN
Lotion	Light and nongreasy	High concentration of water	May have a role in end-of-life skin care and very fragile skin	Increases TEWL; may contain more dehydrating ingredients
Cream	Viscous and nongreasy	Similar parts of oil and water	Spreads easily; creams with quality ingredients can decrease TEWL; aesthetically pleasing	Washes off easily; creams with medical-grade silicones may not prevent TEWL as well as ointments
Ointment	Thick and greasy	8 parts oil to 2 parts water	Can hold moisture in the skin for prolonged periods; can protect open skin	More difficult to spread; can stain clothing; feels greasy; nonadherence regarding application is possible

Abbreviations: TEWL, transepidermal water loss.

Adapted from Barnes et al.³⁴

skin hydration and decreases TEWL in children and adults.¹⁵ While most clinical studies evaluated twice-daily application, the once-daily treatment also showed skin barrier improvements.¹⁵ Ointments may be more effective as moisturizers, although they have a high oil content that may be heavier and greasier on the skin (Table 4). Other emollients containing humectants may be more cosmetically acceptable for some individuals.⁹ Lotions are made of an emulsion with >50% water content and spread rapidly on contact, especially in hairy areas.³⁴ Creams are composed of an emulsion with >20% water content, are less greasy, and have better patient adherence than ointments. Ointments are composed of an emulsion with <20% water and have increased skin hydration but are more difficult to spread than creams and lotions.³⁴ Table 4 provides additional information about lotions, creams, and ointments.

A recent randomized controlled study compared the short-term and long-term effects of 4 moisturizer products to an untreated control.³⁵ Twenty-five volunteers aged 32 ± 10 years were randomly assigned to receive different moisturizers on the upper right and left forearms. The right lower forearm served as the control (without moisturizer). Four moisturizer products were evaluated after 1 application for skin hydration and TEWL at 1, 4, and 24 hours and again after 2 weeks of twice-daily application. The 4 moisturizers included a humectant,

an occlusive, a ceramide, and a hydrating moisturizer containing the following active ingredients:

- Humectant: glycerin, sodium lactate, urea, propylene glycol, pyrrolidone carboxylic acid
- Occlusive: petroleum, dimethicone, silica
- Ceramide: coco glycerides, ceramide II, phospholipids, scalene, tocopheryl acetate, vitamin D
- Hydrating hyaluronic acid: zinc gluconate, mimosa extract, aloe vera extract, bisabolol.³⁵

There were no significant changes in TEWL for any of the moisturizer products at 1, 4, and 24 hours with only 1 application. However, the TEWL of the occlusive and ceramide moisturizer products improved significantly at 2 weeks with twice-daily applications ($P < .05$).

In terms of skin hydration, the results showed that 1 application of a humectant had a significant increase in skin hydration at 1, 4, and 24 hours compared to the other moisturizer products and the control ($P < .05$). The humectant and the hydrating moisturizer significantly increased skin hydration at 2 weeks with twice-daily applications compared to the other moisturizer products and the control ($P < .05$).³⁵ These results show the importance of moisturizer product selection to achieve the desired outcomes and further emphasize the importance of consistent twice-daily moisturizer applications for maintaining long-term skin hydration.

CATEGORY 4. PRACTICE CONSIDERATIONS FOR MOISTURIZERS AND SKIN BARRIERS (STATEMENTS 10 TO 14)

Statement 10. For individuals with at-risk skin, a moisturizer should be applied daily at minimum and always after bathing. Twice daily moisturization has been demonstrated to show additional benefits.

A moisturizer should be applied once or twice daily to maintain skin hydration and protect the skin barrier in individuals with healthy or at-risk skin.⁶ Typically, moisturizers are applied to only the hands, arms, legs, and face unless applied after bathing. Moisturizers should typically be applied more than once a day, because only about 50% of applied moisturizers remain on the skin surface after 8 hours.⁶ Individuals with AD should apply moisturizer liberally twice daily, and individuals with xerosis should apply an emollient or occlusive moisturizing product up to 3 times daily, depending on the severity of skin dryness.^{6,15,18,36}

Multiple sources recommend applying moisturizers after bathing while the skin is still moist. This applies to individuals with healthy skin and to patients with at-risk skin.^{2,33,37} Best practice guidelines outlined by the National Pressure Injury Advisory Panel (NPIAP) and ISTAP indicate that the skin should be kept appropriately moisturized twice daily with moisturizers or barrier creams to avoid severe skin dryness for individuals at risk



Figure 2. Everyday items that are approximately 1 oz.

of skin tears, PIs, and complications such as infection.^{2,37}

Frequent use of moisturizers provides protection and strengthens skin barrier function. Restoring skin barrier function in at-risk skin can be achieved using lipid-rich moisturizers. Routine use of lipid-rich moisturizers is particularly recommended for individuals with contact dermatitis.⁶ However, this is not the exclusive treatment for contact dermatitis. Steroids, including hydrocortisone, and other antipruritic creams are also used. Adequate skin hydration and moisturization are important for the prevention of chronic contact dermatitis.

Barrier creams are often water based and recommended as an appropriate secondary emollient to prevent contact dermatitis caused by continuous exposure to irritant fluids such as urine, feces, wound exudate, or stomal contents. Fluid intake, proper hydration, and proper nutrition are necessary to provide optimal skin health.

Statement 11. The approximate amount needed for a single application of moisturizer to the entire standard-sized adult body is 30 g or 1 oz.

There is a limited body of knowledge in the scientific literature regarding the recommended dose(s) for moisturizer application in at-risk skin, and a notable need for further research is warranted. To help

address this need, the CARS skin health experts identified 30 g or 1 oz as the approximate amount of moisturizer required for a single application for total body coverage of the standard-sized adult body. When applied twice daily, as recommended in Consensus Statement 10, the total body moisturizer application dose translates to approximately 60 g or 2 oz per day. Figure 2 shows 5 everyday items that are approximately 1 oz. These items include an average travel-size tube of toothpaste, 1 medicine cup, 4 packets of ketchup, 3 coffee creamers, and 2 tablespoons.

An early clinical study showed that 12.2 to 26.6 g of moisturizer was needed to provide total body coverage for adults.³⁸ Nicol et al¹⁸ stated that 15 to 30 g of moisturizer in a single application was needed for total body coverage of an average-sized adult with AD. Adherence to at-risk skin prevention and skin health treatments is often poor, and studies have shown that adults are using up to 4-fold lower levels than the recommended guidelines of 15 to 30 g twice per day.^{18,39}

The current document uses data from the US Centers for Disease Control and Prevention (CDC) regarding average adult size to define a standard-sized adult body. According to anthropometric reference data obtained by the CDC from 2015 to 2018, the average-sized adult (age 20 and older) is about 5' 7" and 199.9 lb and

5' 3" and 170.8 lb for men and women, respectively.⁴⁰ Clinical discretion should be used in providing total body moisturization coverage according to the individual's total body surface area.

Best practice guidelines generally recommend applying moisturizer according to the manufacturer's instructions due to the variability in application and dosing recommendations among products.^{41,42} Several sources cite differences in moisturizer product viscosities among lotions, creams, and ointments, which may factor into dosing recommendations.^{33,41} Poor adherence to skin care regimens also contributes to a lack of consistent dosing for moisturizers.⁴²

Application of a moisturizer at the right time and with the right method and right amount are key to optimal benefits.^{6,13} A moisturizer should be applied in the direction of the hair follicles.⁶ For optimal efficiency, moisturizers should be applied immediately after bathing and at least once daily.^{2,6} An additional application is necessary for enhanced barrier function. For those with AD, twice-daily application of a moisturizer significantly improved skin barrier function.¹⁵

Studies provide more specific ranges in the amount of moisturizer needed for a single application for specific at-risk skin populations. For example, a single application of 18 to 36 g is recommended

Table 5. Analysis of Moisturizer Utilization in Post-Acute Facilities

Total number of facilities	615
Beds/facility	25–486
Resident days/facility	9249–177,568
Total resident days	23,590,802
Average moisturizer utilized per resident/day	0.09 ± 0.05 oz ^a

^a4.6 ± 2.2% of the recommended 2-oz moisturizer per day.

to treat eczema.^{14,43} These amounts for a single application agree with the consensus of the expert panel of 30 g or 1 oz per application.

The consensus among the panel members is that most facilities fall far short of the 2 oz recommendation for daily (ie, 2 applications of 1 oz per day) moisturization. This assertion is supported by an analysis of moisturizer purchasing patterns and utilization in a study of 615 post-acute facilities with a total cohort of 23,590,802 resident days (Table 5).⁴⁴ In that study, the average maximum amount of moisturizer utilized per resident per day was 0.09 oz, or 0.045 oz per application. Figure 3 illustrates how the amount of moisturizer recommended by CARS (1 oz/application twice per day or 2 oz total per day) might be applied to the average-sized adult. From this analysis, the average amount purchased would have allowed 0.045 oz of moisturizer per patient per application, slightly less than the amount needed to treat half the arm of an average individual. This shortfall of moisturizer per patient per day highlights the lack of awareness of the appropriate amounts required for effective patient skin moisturization.

Statement 12. Skin barrier products are recommended when moisture, microclimate, friction, and shear are contributing factors to at-risk skin.

The skin microclimate is composed of many or hundreds of commensal microbial species such as *Staphylococcus*

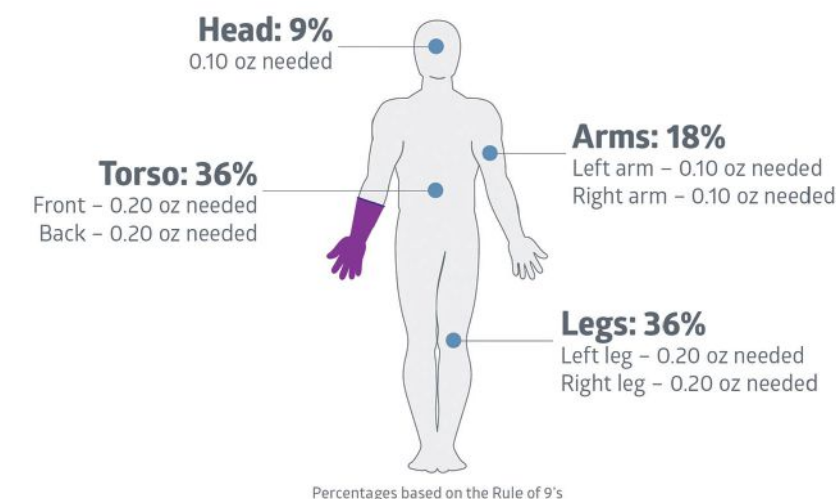


Figure 3. CARS-recommended moisturizer amount per body area. All quantities are estimations based on averages of total body surface areas.⁴⁰ Purple area demonstrates that 0.045 oz of moisturizer is sufficient to treat only half of one arm. This only accounts for 4.6 ± 2.2% of the recommended 2 oz of moisturizer per day.

epidermidis, which inhibit bacterial colonization by pathogenic microorganisms.⁴⁵ The skin microclimate also promotes immune responses, tissue repair, and barrier functions. The skin microclimate is affected by sebaceous gland secretion and the skin's lipid composition. Breakdown of fatty acids from the lipid naturally lowers the skin pH, creating a microenvironment that maintains the skin at a slightly acidic pH of 4.5 to 5.7.^{5,45}

Skin barrier products assist in repairing the skin's natural barrier and help protect against further damage. Skin barrier products are critical for individuals who are exposed to excessive moisture, such as those with MASD and IAD. Moisture-associated skin damage occurs when the skin is exposed to excessive moisture and skin damage is caused by disrupting the skin barrier function, leaving the skin vulnerable to irritants and contaminants.⁵ Preventing MASD requires a protective layer to block external moisture and irritants and includes the use of barrier ointments, liquid polymers, and cyanoacrylates.⁵ Preventing MASD by using barrier ointments and cyanoacrylates is key for at-risk skin and managing alterations to skin integrity such as IAD, ITD, and periwound skin damage.^{2,5}

Moisture-associated skin damage most commonly occurs in body areas such as

the skin folds, perineum, and around wound sites.⁵ Additionally, damage to the skin barrier occurs in individuals with skin at risk for PIs, that is, those who experience constant friction and shear forces at commonly affected areas such as the sacrum and heel.³⁷ Preventing MASD requires replenishing the natural moisture of the skin with moisturizing products such as skin barrier ointments.² The skin should be kept clean and free of excess moisture, and a moisturizer or skin barrier cream should be applied daily.³⁷

Statement 13. Skin barrier ingredients and individual risk factors, comorbidities, and conditions may vary and therefore impact selection and frequency of application.

The formulations, ingredients, and viscosities of skin barrier cream or ointment products vary considerably. Additionally, risk factors such as the use of soaps that dry the skin and skin conditions such as severe AD and IAD may call for increased frequency of application of skin barrier products than other at-risk skin populations.⁴⁶ The choice of a skin barrier product should be personalized to fit the individual's skin care needs. For example, an HCP may consider an ointment to be the best treatment, but if the patient does

Table 6. Skincare Product Indications and Contraindications^a

SKINCARE PRODUCT TYPE	INDICATION	CONTRAINDICATION
Moisture barriers Protect the skin from excessive moisture	Used on stage 1 PIs, periwound skin to prevent skin maceration, pressure points, bony prominences, at-risk skin, and to prevent skin breakdown	Not for use on deep or puncture wounds, infections, or lacerations
Therapeutic moisturizers Soothe, soften, and moisturize the skin	Used for general purpose moisturizing and on skin at risk of breakdown due to age, dryness, friction, or diabetes	Not for use on deep or puncture wounds
Skin cleansers Remove urine, feces, contaminants, foreign debris, and exudate	Used for full-body cleansing, for perineal care, to maintain healthy skin, and to prevent skin breakdown	Not for use on deep or puncture wounds
Liquid skin protectants/sealants Protect against mechanical or chemical injury and excessive moisture	Used on stage 1 and low-exudating stage 2 PIs, periwound and peristomal skin, pressure points, bony prominences, and under adhesives to protect the skin	Not for use on open wounds or in deep puncture wounds

Abbreviations: PI, pressure injury.

^aRead the manufacturer's recommendations and instructions for use before using any skincare product.

Adapted from *WoundSource*.⁶⁴

not like the greasy feeling of the ointment and will not use it, a cream or lotion should be considered. Alternately, a cream or lotion may be used during daytime application, but an ointment may be an acceptable evening or bedtime choice.

Skincare products that have protective and restorative skin barrier properties are recommended to prevent additional damage to at-risk skin.¹⁶ Emollients, in particular, help to restore skin barrier function and have few side effects.¹³ However, not all emollients act as skin barriers.¹³ Additionally, water-based skin barrier creams or ointments formulated with skin sealant ingredients such as dimethicone, zinc oxide, or petrolatum effectively protect the skin from irritant bodily fluids.⁴⁶

Dimethicone is a common active ingredient in skin barrier products due to its non-comedogenic, non-acneogenic, and hypoallergenic nature. Silicone polymer-based barrier films, in various forms such as sprays, foams, and wipes, are also available and provide a water-proof, transparent, protective barrier.⁴⁶ Skincare product ingredients should be reviewed carefully before application, especially for individuals with skin sensitivities and allergies.⁴⁶

Statement 14. Moisturizers and skin barrier products may have a positive impact on reducing medical device-related pressure injury and medical adhesive-related skin injury. More study is warranted.

Skin damage or injury can result from medical adhesive products or devices such as tapes, dressings, electrodes, stoma pouches and accessories, medication patches, wound closure strips, and catheters.¹⁶ Repetitive removal of adhesives also results in the removal of epithelial cells, which weakens and compromises the stratum corneum over time. Risk factors for medical device-related pressure injury (MDRPI) or medical adhesive-related skin injury (MARS) include dry skin and use of harsh cleaning agents. The use of moisturizers and skin barrier products helps mitigate the risk of skin damage caused by intrinsic and extrinsic factors.¹⁶

Bernatchez et al⁴⁷ demonstrated that a cyanoacrylate barrier film can protect at-risk skin from MDRPI caused by friction. When applied to hydrated skin, a cyanoacrylate barrier film significantly reduced the coefficient of friction between the skin and a simulated bed linen. Other studies have shown that cyanoacrylates can protect against additional skin injury and aid in healing skin tears caused by MARS.⁴⁸

CATEGORY 5. SPECIAL POPULATION CONSIDERATIONS TO PROMOTE SKIN HEALTH (STATEMENTS 15 AND 16)

Statement 15. Persons who use personal protective equipment (PPE) and/or perform hand hygiene may experience at-risk skin and require preventive skin care.

Health care providers/professionals and health care workers (HCWs) are required to perform regular hand hygiene and use personal protective equipment (PPE) as indicated. The CDC states that HCWs should use an alcohol-based hand rub (ABHR), such as a hand sanitizer, or wash their hands with soap and water immediately before and after patient contact; during aseptic tasks; after contact with blood, bodily fluids, or contaminated surfaces; and immediately after glove removal.⁴⁹ The CDC also states that HCWs may benefit from a daily skincare regimen that includes skin emollients or barrier creams as long as the product is carefully assessed for compatibility with any topical antimicrobial products being used and for any physiologic effects on the skin.

The World Health Organization guidelines on hand hygiene state that ABHRs effectively reduce harmful microorganisms on the hands.⁵⁰ However, ABHRs also

KEY SUGGESTIONS FOR OPTIMAL SKIN HEALTH INCLUDE THE FOLLOWING:

- Persons with at-risk skin will have improved outcomes and enhanced quality of life when individualized skin care strategies with moisturizers and/or skin barriers are used in appropriate quantities.
- Moisturizing with 1 oz of quality moisturizer (creams preferred) twice daily is recommended.
- Special attention to populations vulnerable to at-risk skin is a patient and resident safety issue.
- Everyone should be empowered to perform or receive care to promote optimal skin health.

remove natural oils and microbiome of the skin. In surveys initially reported by Larson et al⁵¹ and described in the CDC Guideline for Hand Hygiene in Healthcare Settings,⁴⁹ approximately 25% of nurses reported dermatitis symptoms involving their hands and 85% of nurses had a medical history of skin problems.

A primary cause of chronic irritant contact dermatitis among HCWs is the frequent use of hand-hygiene products such as soaps and detergents. However, the potential for detergents to cause skin irritation may vary. The addition of emollients and humectants as ingredients in hand hygiene products, or the separate use of emollients and humectants in addition to hand hygiene practices, may prevent further localized skin damage and irritation.⁵⁰

In a Washington State survey of 106 hospitals conducted by Marino and Cohen, 61% of the hospitals provided moisturizers to the nursing staff that were compatible with latex gloves.⁵² Seventy-four percent were aware of the Occupational Safety and Health Administration recommendation to avoid petroleum-based moisturizers with latex gloves, and 48% were aware of the bactericidal inactivation effect of chlorhexidine gluconate that is associated with anionic moisturizer use. Medical supply companies should provide information on which latex gloves are compatible or noncompatible with moisturizers.

Health care workers are also susceptible to at-risk skin due to the use of PPE such as gloves, surgical and N95 face masks, face shields, and safety goggles.⁵³ Particularly during the COVID-19 pandemic of the early 2020s, HCWs were at increased risk of skin damage associated with wearing PPE for extended periods due to the frequent treatment of patients with COVID-19. PPE-associated skin damage occurs due to pressure and friction forces of PPE against the skin; sweating and moisture are also contributing factors when PPE is worn extensively. In a 2021 survey of 297 HCWs at a university hospital in Turkey, 95.6% reported skin-related problems associated with PPE use.⁵³ In this survey, HCWs ranked surgical and N95 masks and gloves as the highest PPE types contributing to skin-related problems.

Health care workers should engage in preventive measures to minimize PPE-related skin problems. The NPIAP has published preventive measures, including recommendations that HCWs should relieve areas of the skin that are in contact with PPE for at least 5 minutes every 2 hours and use thin prophylactic dressings underneath PPE at susceptible areas such as the nasal bridge and cheekbones.⁵⁴ The NPIAP also recommends applying liquid skin protectants where a mask or other PPE comes into direct contact with the skin and cleansing the face with a pH-balanced cleanser before using PPE to protect the skin on the face.⁵⁴

Key recommendations from the Nurses Specialized in Wound, Ostomy and Continence Canada (NSWOCC)⁵⁵ include the following:

- Perform adequate skin care before and after PPE use
- Ensure that hands are clean and dried before putting on gloves
- Implement regular moisturization and application of barrier protection
- Use dressing materials between the PPE and skin where pressure or friction may occur
- Confirm that the dressing will not diminish the infection control of the PPE or surgical masks

Statement 16. Persons at end of life may experience unavoidable skin changes. Individualized, palliative interventions are recommended to provide comfort and mitigate risks of impaired skin barrier function.

Skin changes at the end of life are the result of many factors such as reduced skin and soft tissue blood perfusion, reduced skin moisture, decreased resistance to external pressure, and an inability to remove metabolic wastes.⁵⁶ Reduced collagen and hyaluronic acid synthesis are common pathologies in aged skin.⁵⁷ Persons at end of life often undergo physiologic changes to the skin that result in changes in skin integrity as well as in skin color and texture.

Palliative care for the skin of persons living with a serious illness and at end of life should prioritize symptom and stress relief, pain management, and maintenance of activities of daily living.^{56,58-60} The goal is to improve the quality of life for the individual and the family. Skin care management for persons at the end of life should include regular comprehensive skin assessments, with special attention paid to any skin changes associated with pain, signs of infection, or causes of concern for the individual, family, or caregiver(s). Routine gentle extremity massage using a moisturizing lotion that spreads easily is a frequently used comfort strategy at the end of life.^{4,58,59}

CATEGORY 6. ORGANIZATION PERSPECTIVES OR CONSIDERATIONS (STATEMENTS 17 TO 20)

Statement 17. Organizations should use comprehensive skin health guidelines with a focus on at-risk skin to improve clinical and operational outcomes. These may reduce negative financial, regulatory, and legal consequences.

Comprehensive skin health guidelines should include products and procedures for preventing and treating at-risk skin.¹⁷ Skincare products are available in multiple formulations,¹³ and both cost and product availability need to be considered for each individual's skin care plan.^{2,13} Only moisturizers that have been shown to be clinically effective in improving skin barrier function should be used on at-risk skin.¹⁵ In a post-acute study, the nursing staff received additional training on skin health assessment and prevention of hospital-acquired pressure injuries (HAPIs).¹⁷ Skincare products were introduced including a skin repair lotion, barrier cream, and foaming cleanser. During the first year of training implementation, there was a significant reduction in the number of PIs that saved the hospital \$247,800.¹⁷

The incidence of HAPIs and IAD is a quality-of-care indicator in a post-acute care facility, and failure to provide preventive care may increase the risk of litigation.^{60,61} The rates of PIs can vary widely across institutions depending on the quality of skin care provided.⁶⁰ A thorough evaluation of the individual's skin is recommended within 12 hours of hospital admission, especially in critically ill patients. In 2019, the NPIAP updated its recommendations for preventing PIs by implementing the following skin care regimen⁶²:

- Keep the skin clean and hydrated
- Cleanse the skin after episodes of incontinence
- Avoid alkaline soaps and cleansers
- Protect the skin from moisture using a barrier product
- Avoid vigorous rubbing of skin that is at risk of PIs
- Use high-absorbency skin care products in individuals with skin

at risk of PIs or who have urinary incontinence

- Use textiles with low friction coefficients for individuals with skin at risk of PIs
- Use a soft silicone, multi-layered foam dressing to protect individuals at risk of PIs

The American Academy of Dermatology estimates that 85 million people in the United States are seen by physicians for at least one type of skin disease.⁶³ Using 2013 insurance claims, it was estimated that the cost of skin care was \$75 billion with indirect lost opportunity costs of \$11 billion. Twenty-four skin diseases were evaluated, with mortality reported in half of all cases.⁶³

Statement 18. Organizations seeking best practices can mitigate risk of at-risk skin through provision and promotion of a quality standardized formulary with access to nonformulary products if individual needs dictate.

It is advised that HCPs recognize the distinction between conventional OTC moisturizers and the moisturizers formulated with added therapeutic ingredients. There are many moisturizers in a health care facility formulary that can be prescribed for specific skin conditions. Many nonformulary OTC skincare products are available for cleansing, moisturizing, and skin protection.⁴⁷ The routine use of non-prescription moisturizers at the appropriate dose can often reduce the need for more aggressive therapy.¹⁸

Nonformulary or OTC skin product labeling must provide guidance on acceptable ingredients and concentrations, disease indications, and dosing. Health care providers can help prevent at-risk skin conditions by recommending clinically proven, OTC skincare products and moisturizers.¹⁵ For example, the FDA requires that any moisturizer that claims to treat AD must contain colloidal oatmeal.¹⁵ A moisturizer skincare product for the treatment of eczema must contain either hydrocortisone or colloidal oatmeal.¹⁵

Statement 19. Organizations seeking best practices should educate staff, individuals, families, and caregivers on indications, contraindications, application, and frequency of product use to mitigate at-risk skin.

In general, skincare products are considered safe if used per the manufacturer's instructions for use. However, possible side effects encountered with moisturizers include skin irritation, allergic contact dermatitis, occlusive folliculitis, photosensitivity eruptions, cosmetic acne, slipperiness in bath or shower, and contact urticaria.^{6,13}

Ointments may be preferred over creams, as creams may contain sensitizing preservatives and irritating emulsifiers. Ointments contain fewer ingredients and are therefore less likely to have adverse reactions than creams, lotions, gels, and mousses.^{6,13} However, ointments are contraindicated for use in intertriginous and moisture-bearing areas.⁶

The indications and contraindications for skincare products, including moisture barriers, therapeutic moisturizers, skin cleansers, and liquid skin protectants/sealants, are shown in Table 6. The contraindications include deep or puncture wounds, infections or lacerations, open wounds, and known allergies to product ingredients.⁶⁴

Health care organizations should educate staff, individuals, families, and caregivers on the proper use of skincare products. Where possible, individuals and their caregivers should be encouraged to apply moisturizers themselves.² Educational materials are available and can be obtained from skincare product vendors to educate nursing staff on skin health products, skin assessment, and proper skin care.¹⁷ Organizations that partner with industry leaders who provide educational materials and skincare product guidelines for usage and care increase their opportunities for quality outcomes and reducing at-risk skin complications. Such educational efforts can produce a tangible return on investment. In one study, which aimed to identify, stage, and prevent PIs, 53 individuals

were evaluated during a 90-day trial period.¹⁷ Staff training was provided to help modify behavior and identify appropriate skincare products. Following implementation, PIs were reduced from an initial rate of 9% to 0%.¹⁷ Personal engagement, time spent with individuals, and skin health education were key for overall treatment adherence.

In another study, repeated nurse-led skin care education and demonstrations on proper skin health were conducted. A major change was a greater than 800% increase in the use of emollient creams and ointment from 54 to 426 g per individual per week.⁴³ This resulted in an 89% reduction in the severity of chronic eczema.⁴³ In a systemic review by Bass et al,³⁹ written eczema action plans, education, new treatments, frequent communication with patients, and a shorter time between office visits were effective in improving HCP and patient adherence.

Statement 20. Organizations should commit to ongoing performance improvement strategies related to at-risk skin.

Routine use of skin moisturizers improves skin barrier integrity compared with no treatment. For example, in adult individuals with AD, daily application of moisturizers significantly reduced the number of flares compared with untreated skin.³³ In neonates, a proactive approach to skin moisturizer application reduced the occurrence of AD.¹⁵ Best practices using moisturizers can also make a significant improvement in chronic inflammatory skin conditions, such as eczema, and have a positive effect on quality of life.¹³

Documentation is at the discretion of the organization. However, improvement strategies should be implemented for at-risk skin and be considered based on the needs of each person. Health care organizations should partner with industry leaders who support best practice strategies and have clinical data to support skin health guidelines and care that are reviewed periodically for performance improvement.

Implementation of skincare practices for managing at-risk skin in health care facilities has delivered significant clinical benefits. In one observational retrospective and prospective study conducted over 8 months by Cabot et al,⁶⁵ a skincare regimen involving cleansers, moisturizers, and skin protectants was implemented at a skilled nursing facility. The number of HAPIs and skin tears were recorded during preimplementation and postimplementation periods. Results showed a 62% reduction in HAPIs and a nearly 17% reduction in skin tear occurrences.

Studies presented at the 2022 WOC-Next conference evaluated the organizational impact of implementing skincare practices on skin health outcomes. Blanco⁶⁶ conducted a study to evaluate the impact of implementing organizational skin health procedures, including a comprehensive prevention system of products for at-risk skin. The study showed that the implementation of skin health procedures resulted in a 57.1% decline in the rate of HAPIs.

A retrospective and prospective Canadian study was conducted by Hill.⁶⁷ The Provincial Skin and Wound Committee reviewed existing skincare protocols and products used by health care facilities in British Columbia. The retrospective evaluation showed that 57 different skincare products were being used across facilities in the province, and multiple skincare protocols existed. The committee chose to standardize the skincare protocol and reduce the number of skincare products from 57 to 5. Additional skincare education was provided to HCWs in the province. Results showed improved skin care outcomes, a substantial reduction in unnecessary skincare products, and a simplified skincare protocol that resulted in decreased costs.

CATEGORY 7. SKIN HEALTH IS IMPORTANT FOR EVERYONE

Statement 21. Everyone should be empowered to perform or receive care to promote optimal skin health.

Regardless of an individual's skin health status, everyone should be provided with

the necessities required for optimal skin health. This is especially true for individuals with at-risk skin conditions that may require additional skin care. Individual training on proper skin care and the use of skincare products are essential to promote optimal skin health care. Key suggestions for optimal skin health include the following:

- Persons with at-risk skin will have improved outcomes and enhanced quality of life when individualized skin care strategies with moisturizers and/or skin barriers are used in appropriate quantities.
- Moisturizing with 1 oz of quality moisturizer (creams preferred) twice daily is recommended.
- Special attention to populations vulnerable to at-risk skin is a patient and resident safety issue.
- Everyone should be empowered to perform or receive care to promote optimal skin health.

CONCLUSION

Skin health is important for everyone and especially critical for individuals with at-risk skin. Maintaining skin health for at-risk skin can help repair the damaged skin barrier, reduce TEWL, and improve skin integrity to prevent further damage. The findings from the expert skin health panel provide 21 comprehensive consensus statements within 7 categories.

Category 1. Definition of at-risk skin.

At-risk skin is defined as having the potential for impaired barrier function of the skin. Risk factors (intrinsic and extrinsic), conditions, and comorbidities can cause or exacerbate at-risk skin and impair skin integrity.

Category 2. Practice considerations for skin health or at-risk skin.

All persons should have an evaluation for at-risk skin by an HCP. Those with at-risk skin and impaired barrier function require regular comprehensive skin assessments that must be documented. Individualized skin care strategies that target the individual's skin needs should be prioritized and shared with family members and caretakers.

Category 3. Moisturizers and their role in skin health. The properties, ingredients, utilization, and intended use of products impact their efficacy and should be reviewed before use. Skincare products such as moisturizers, skin barrier products, and cleansers should be chosen carefully while taking vehicle type, viscosity, and pH into consideration.

Category 4. Practice considerations for moisturizers and skin barriers.

Moisturizers should be applied at minimum once daily, and ideally twice daily, after bathing in individuals with at-risk skin. Skin barrier products are often recommended for at-risk skin. Moisturizers and skin barrier products may be used to reduce MDRPIs and MARSIs.

Category 5. Special population considerations to promote skin health. Special populations, such as HCWs who regularly use PPE and persons at end of life, are at higher risk of developing at-risk skin due to skin changes.

Category 6. Organizational perspectives or considerations. Organizations should develop comprehensive skin health guidelines regarding skincare products and protocols to support the prevention and treatment of at-risk skin. Best practices for organizations include providing a quality standardized formulary for therapeutic skincare products; educating staff, individuals, and families on skincare product utilization; and committing to performance improvement strategies related to at-risk skin.

Category 7. Skin health is important for everyone. Everyone should be empowered to perform or receive care to promote optimal skin health. Individualized skin care that uses evidence-based practices and recommendations helps prevent at-risk skin. Individual training on proper skincare and products is essential to promote adequate skin health.

The aim of the CARS expert consensus panel is to promote organizational practices and awareness that will improve skin health and quality of care for individuals with at-risk skin conditions. Best practice recommendations maintain skin integrity and empower individuals with at-risk skin

and their caregivers to develop skincare practices and utilize the products required to maintain and improve skin health.

REFERENCES

1. North American Nursing Diagnosis Association. NANDA diagnoses. Risk for impaired skin integrity. 2022. Accessed July 28, 2022. <https://www.nandadiagnoses.com/risk-for-impaired-skin-integrity>
2. Beekman D, Campbell J, LeBlanc K, et al. Best practice recommendations for holistic strategies to promote and maintain skin integrity. February 28, 2020. *Wounds International*. Accessed March 7, 2022. <https://www.woundsinternational.com/resources/details/best-practice-recommendations-holistic-strategies-promote-and-maintain-skin-integrity>
3. Nicol NH. Anatomy and physiology of the integumentary system. In: Nicol NH, ed. *Dermatologic Nursing Essentials: A Core Curriculum*. 3rd ed. Wolters Kluwer; 2016:1-12.
4. Krasner DL. Seven strategies for optimizing end-of-life skin and wound care. *Adv Skin Wound Care*. 2022;35(9):515-519. doi:10.1097/01.ASW.0000852572.29103.61
5. Woo KY, Beekman D, Chakravarthy D. Management of moisture-associated skin damage: a scoping review. *Adv Skin Wound Care*. 2017;30(11):494-501. doi:10.1097/01.ASW.0000525627.54569.da
6. Purnamawati S, Indrastuti N, Danarti R, Saefudin T. The role of moisturizers in addressing various kinds of dermatitis: a review. *Clin Med Res*. 2017;15(3-4):75-87. doi:10.3121/cmr.2017.1363
7. Wells A, Nuschke A, Yates CC. Skin tissue repair: matrix microenvironmental influences. *Matrix Biol*. 2016;49:25-36. doi:10.1016/j.matbio.2015.08.001
8. Lichterfeld A, Hauss A, Surber C, Peters T, Blume-Peytavi U, Kottner J. Evidence-based skin care: a systematic literature review and the development of a basic skin care algorithm. *J Wound Ostomy Continence Nurs*. 2015;42(5):501-24. doi:10.1097/WON.0000000000000162
9. Wounds UK. Prevention and management of skin tears. September 1, 2015. Accessed February 28, 2022. <https://www.wounds-uk.com/resources/details/prevention-and-management-skin-tears>
10. Nicol NH. Skin Assessment. In Nicol NH, ed. *Dermatologic Nursing Essentials: A Core Curriculum*. 3rd ed. Wolters Kluwer; 2016:13-25.
11. LeBlanc K, Baranoski S, Skin Tear Consensus Panel Members. Skin tears: state of the science: consensus statements for the prevention, prediction, assessment, and treatment of skin tears. *Adv Skin Wound Care*. 2011;24(suppl 9):2-15. doi:10.1097/01.ASW.0000405316.99011.95
12. Brar KK, Nicol NH, Boguniewicz M. Strategies for successful management of severe atopic dermatitis. *J Allergy Clin Immunol Pract*. 2019;7(1):1-16. doi:10.1016/j.jaip.2018.10.021
13. Ersser SJ, Maguire S, Nicol N, Penzer R, Peters J. Best practice in emollient therapy: a statement for healthcare professionals. *Dermatol Nurs*. 2012;11(4):S1-S19.
14. van Zuuren EJ, Fedorowicz Z, Christensen R, Lavrijsen A, Arents BMW. Emollients and moisturizers for eczema. *Cochrane Database Syst Rev*. 2017 Feb 6;2(2):CD012119. doi:10.1002/14651858.CD012119.pub2
15. Hebert AA, Rippke F, Weber TM, Nicol NH. Efficacy of nonprescription moisturizers for atopic dermatitis: an updated review of clinical evidence. *Am J Clin Dermatol*. 2020;21(5):641-655. doi:10.1007/s40257-020-00529-9
16. Fumarola S, Allaway R, Callaghan R, et al. Overlooked and underestimated-medical adhesive-related skin injuries. *J Wound Care*. 2020;29(suppl 3c):S1-S24. doi:10.12968/jowc.2020.29.Sup3c.S1
17. Edwards BL. 225-Bed Community Hospital in Council Bluffs, Iowa Reduces Pressure Ulcers from 9% To 0% In 90 Days. *True Stories*. 2010. Accessed February 28, 2022. <https://www.medline.com/media/assets/pdf/pupp/EdmundsonCaseStudy.pdf>
18. Nicol NH, Rippke F, Weber TM, Hebert AA. Daily moisturization for atopic dermatitis: importance, recommendations, and moisturizer choices. *J Nurse Pract*. 2021;17(8):920-925. <https://doi.org/10.1016/j.nurpra.2021.06.003>
19. Anderson BM, Ma DWL. Are all n-3 polyunsaturated fatty acids created equal? *Lipids Health Dis*. 2009;8:33. doi:10.1186/1476-511X-8-33
20. Lozano-Grande MA, Gorinstein S, Espitia-Rangel E, Dávila-Ortiz G, Leticia Martínez-Ayala AL. Plant sources, extraction methods, and uses of squalene. *Int J Agronomy*. 2018;1829160. <https://doi.org/10.1155/2018/1829160>
21. Zhong Y, Hu H, Min N, Wei Y, Li X, Li X. Application and outlook of topical hemostatic materials: a narrative review. *Ann Transl Med*. 2021;9(7):577. doi:10.21037/atm-20-7160
22. Criquet M, Roure R, Dayan L, Nollent V, Bertin C. Safety and efficacy of personal care products containing colloidal oatmeal. *Clin Cosmet Investig Dermatol*. 2012;5:183-193. doi:10.2147/CCID.S31375
23. Black JM, Gray M, Bliss DZ, et al. MASD part 2: incontinence-associated dermatitis and intertriginous dermatitis: a consensus. *J Wound Ostomy Continence Nurs*. 2011;38(4):359-370; quiz 371-2. doi:10.1097/WON.0b013e31822272d9
24. Mack Correa MC, Nebus J. Management of patients with atopic dermatitis: the role of emollient therapy. *Dermatol Res Pract*. 2012;2012:836931. doi:10.1155/2012/836931
25. Ghadially R, Halkier-Sorensen L, Elias PM. Effects of petrolatum on stratum corneum structure and function. *J Am Acad Dermatol*. 1992;26(3 Pt 2):387-396. doi:10.1016/0190-9622(92)70060-s
26. Abedi E, Sahari MA. Long-chain polyunsaturated fatty acid sources and evaluation of their nutritional and functional properties. *Food Sci Nutr*. 2014;2(5):443-463. doi:10.1002/fsn.121
27. Harding CR, Watkinson A, Rawlings AV, Scott IR. Dry skin, moisturization and corneodesmolysis. *Int J Cosmet Sci*. 2000;22(1):21-52. doi:10.1046/j.1467-2494.2000.00001.x
28. Kanlayavattanukul M, Lourith N. Therapeutic agents and herbs in topical application for acne treatment. *Int J Cosmet Sci*. 2011;33(4):289-297. doi:10.1111/j.1468-2494.2011.00647.x
29. Ricciotti E, FitzGerald GA. Prostaglandins and inflammation. *Arterioscler Thromb Vasc Biol*. 2011 May;31(5):986-1000. doi:10.1161/ATVBAHA.110.207449
30. Araújo LU, Grabe-Guimarães A, Mosqueira VC, Carneiro CM, Silva-Barcellos NM. Profile of wound healing process induced by allantoin. *Acta Cir Bras*. 2010;25(5):460-466. doi:10.1590/s0102-86502010000500014
31. DuPont Tate & Lyle. Zemea® propanediol: consumer sensory and moisturization study. *Technical Bulletin*. 2016. Accessed February 28, 2022. [https://api.duponttateandlyle.com/sites/default/files/Zemea Moisturization and Consumer Sensory Technical Bulletin_0.pdf](https://api.duponttateandlyle.com/sites/default/files/Zemea%20Moisturization%20and%20Consumer%20Sensory%20Technical%20Bulletin_0.pdf)
32. Cosmetics, 21 USC §361-362 (1938). 21 USC

- 362, misbranded cosmetics.
33. Sethi A, Kaur T, Malhotra SK, Gambhir ML. Moisturizers: the slippery road. *Indian J Dermatol*. 2016;61(3):279-287. doi:10.4103/0019-5154.182427
34. Barnes TM, Mijalica D, Townley JP, Spada F, Harrison IP. Vehicles for drug delivery and cosmetic moisturizers: review and comparison. *Pharmaceutics*. 2021;13(12):2012. doi:10.3390/pharmaceutics13122012
35. Samadi A, Ahmad Nasrollahi S, Maghsoudi Ashtiani M, Abels C, Firooz A. Changes in skin barrier function following single and repeated applications of 4 types of moisturizers: a randomized controlled trial. *J Eur Acad Dermatol Venerol*. 2020;34(6):e288-e290. doi:10.1111/jdv.16288
36. Idensohn P, Beekman D, Campbell KE, et al. Skin tears: a case-based and practical overview of prevention, assessment and management. *J Commun Nurs*. 2019;33(2):32.
37. European Pressure Ulcer Advisory Panel, National Pressure Injury Advisory Panel, Pan Pacific Pressure Injury Alliance. *Prevention and Treatment of Pressure Ulcers/Injuries: Clinical Practice Guideline*. Haesler E, ed. EPUAP/NPIAP/PPPIA; 2019.
38. Schlagel CA, Sanborn EC. The weights of topical preparations required for total and partial body inunction *J Invest Dermatol*. 1964;42:253-256. doi:10.1038/jid.1964.57
39. Bass AM, Anderson KL, Feldman SR. Interventions to increase treatment adherence in pediatric atopic dermatitis: a systematic review. *J Clin Med*. 2015;4(2):231-342. doi:10.3390/jcm4020231
40. Fryar CD, Carroll MD, Gu Q, Afful J, Ogden CL. Anthropometric reference data for children and adults: United States, 2015-2018. *Vital Health Stat 3*. 2021;(36):1-44.
41. Loden M. The clinical benefit of moisturizers. *J Eur Acad Dermatol Venerol*. 2005;19(6):672-688. doi:10.1111/j.1468-3083.2005.01326.x
42. Emollients: drug information. www.uptodate.com. Accessed July 28, 2022. <https://www.uptodate.com/contents/emollients-drug-information>
43. Cork MJ, Britton J, Butler L, Young S, Murphy R, Keohane SG. Comparison of parent knowledge, therapy utilization and severity of atopic eczema before and after explanation and demonstration of topical therapies by a specialist dermatology nurse. *Br J Dermatol*. 2003;149(3):582-589. doi:10.1046/j.1365-2133.2003.05595.x
44. Clopp T, Rogers C, Koshy T. Moisturizers and barriers in the post-acute setting: we're not using enough! Poster presented at: Wild on Wounds Conference; September 7-10, 2022; Hollywood, FL.
45. Flowers L, Grice EA. The skin microbiota: balancing risk and reward. *Cell Host Microbe*. 2020;28(2):190-200. doi:10.1016/j.chom.2020.06.017
46. Fletcher J. Appropriate selection and use of barrier creams and films. *Wound Essentials*. 2015;10(2):64-68.
47. Bernatchez SF, Mengistu GE, Ekholm BP, Sanghi S, Theiss SD. Reducing friction on skin at risk: the use of 3M™ Cavilon™ No Sting Barrier Film. *Adv Wound Care (New Rochelle)*. 2015;4(12):705-710. doi:10.1089/wound.2015.0628
48. LeBlanc K, Beeckman D, Campbell K, et al. Best practice recommendations for prevention and management of periwound skin complications. *Wounds Int*. June 15, 2021. Accessed February 28, 2022. <https://www.woundinternational.com/resources/details/best-practice-recommendations-prevention-and-management-periwound-skin-complications>
49. Centers for Disease Control and Prevention. Guideline for hand hygiene in health-care settings: recommendations of the Healthcare Infection Control Practices Advisory Committee and the HICPAC/SHEA/APIC/IDSA Hand Hygiene Task Force. *MMWR Recomm Rep*. 2002;51(No. RR-16):11, 13.
50. World Health Organization. WHO Guidelines on Hand Hygiene in Health Care. Geneva: WHO; 2009.
51. Larson E, Friedman C, Cohran J, Treston-Aurand J, Green S. Prevalence and correlates of skin damage on the hands of nurses. *Heart Lung*. 1997;26(5):404-412. doi:10.1016/s0147-9563(97)90027-3
52. Marino C, Cohen M. Washington State hospital survey 2000: gloves, handwashing agents, and moisturizers. *Am J Infect Control*. 2001;29(6):422-424. doi:10.1067/mic.2001.117298
53. Gürlek Kısacık Ö, Özyürek P. Skin-related problems associated with the use of personal protective equipment among health care workers during the COVID-19 pandemic: an online survey study. *J Tissue Viability*. 2022;31(1):112-118. doi:10.1016/j.jtv.2022.01.003
54. National Pressure Injury Advisory Panel. NPIAP Position Statements on Preventing Injury with N95 Masks. 2020. Accessed July 28, 2022. https://cdn.ymaws.com/npiap.com/resource/resmgr/position_statements/Mask_Position_Paper_FINAL_fo.pdf
55. LeBlanc K, Heerschap C, Butt B, Bresnai-Harris J, Wiesenfeld, L. Prevention and management of skin damage related to personal protective equipment. Updated 2020. Accessed July 28, 2022. Prevention and management of skin damage related to Personal Protective Equipment (PPE) - Hospital News. www.nswoc.ca
56. Beldon P. Managing skin changes at life's end. *Wound Essentials*. 2011;6:76-79.
57. Papakonstantinou E, Roth M, Karakioulakis G. Hyaluronic acid: a key molecule in skin aging. *Dermatoendocrinology*. 2012;4(3):253-258. doi:10.4161/derm.21923
58. Sibbald RG, Krasner DL, Lutz J. SCALE: skin changes at life's end: final consensus statement: October 1, 2009. *Adv Skin Wound Care*. 2010;23(5):225-236. doi:10.1097/01.ASW.0000363537.75328.36
59. Shah JB, Krasner DL. Wound pain management, palliative wound care, & psychosocial issues. In: Shah JB, Milne CT, eds. *Wound Care Certification Study Guide*. 3rd ed. Best Publishing; 2021.
60. He M, Tang A, Ge X, Zheng J. Pressure ulcers in the intensive care unit: an analysis of skin barrier risk factors. *Adv Skin Wound Care*. 2016;29(11):493-498. doi:10.1097/01.ASW.0000494779.66288.c9
61. Cox J, Edsberg LE, Koloms K, VanGilder CA. Pressure injuries in critical care patients in US hospitals: results of the International Pressure Ulcer Prevalence Survey. *J Wound Ostomy Continence Nurs*. 2022;49(1):21-28. doi:10.1097/WON.0000000000000834
62. Kottner J, Cuddigan J, Carville K, et al. Prevention and treatment of pressure ulcers/injuries: the protocol for the second update of the international Clinical Practice Guideline 2019. *J Tissue Viability*. 2019;28(2):51-58. doi:10.1016/j.jtv.2019.01.001
63. Lim HW, Collins SAB, Resneck JS Jr, et al. The burden of skin disease in the United States. *J Am Acad Dermatol*. 2017;76(5):958-972.e2. doi:10.1016/j.jaad.2016.12.043
64. Skin care. WoundSource. Accessed August 16, 2022. <https://www.woundsource.com/product-category/skin-care>
65. Cabot S, Young DL, Chakravarthy D. A Single-center evaluation of a dermal management product suite to prevent pressure ulcers and skin tears. Presented at: Symposium on Advanced Wound Care Fall; September 26-28, 2015; Las Vegas, NV.
66. Blanco AS. Implementation of skin health procedures to reduce the incidence of hospital acquired pressure injuries (HAPI). Presented at: WOCNext Conference; June 5-8, 2022; Fort Worth, TX.
67. Hill RH. Streamlining provincial skin care practices across the continuum. Presented at: WOCNext Conference; June 5-8, 2022; Fort Worth, TX.

