State of the Science of Skin and Skin Care for the Long-Term Care Setting

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Although it is the body's largest organ, skin is often underappreciated. Skin not only provides a protective barrier for the human body, it also plays an active and important role in physiological processes such as thermoregulation and immunological function (Egert & Simmering, 2016). But aging impacts the skin's function, just as it does the function of other organs. Both intrinsic and extrinsic factors can damage the skin, eroding the older adult's quality of life. Skin care is therefore especially important for the older adult. The purpose of this paper is to provide the state of the science on skin and skin care as it relates to residents in long-term care facilities.

Aging Changes in the Skin

The skin has three layers: the epidermis, the dermis, and subcutaneous tissue, which work together to provide protection, prevent infections, and regulate core body temperature (Al-Nuaimi, Sherratt, & Griffiths, 2014). Both structural and biochemical changes in the skin occur in all three layers. Particularly on the face, neck, and upper chest, the epidermis decreases in thickness at the rate of approximately 6.4% per decade, with decreased epidermal turnover (Waller & Maibach, 2005). Melanocytes in the epidermis, which provide skin pigmentation and protection from ultraviolet light, decrease in number at a rate of 8% to 20% per decade, causing the appearance of uneven skin pigmentation in the older adult (Waller & Maibach, 2005). Thinning of the dermis and loss of collagen and elastin result in laxity and wrinkling of the skin. The loss of supporting collagen and elastin fibers also allows bleeding into skin with minor or even no injury, resulting in senile purpura (Kirkup, 2014). With age, reduced water and fat emulsion in the skin result in dryness, and changes in keratinocytes within the epidermis result in

visible exfoliation (scaling or flaking; Al-Nuaimi et al., 2014; Kirkup, 2014). The aging skin is also more likely to develop a variety of benign lesions such as seborrheic keratosis, skin tags, and hemangiomas, which can be unsightly or annoying (e.g., they may cause itching or snagging on clothes).

Collectively, these changes suggest an image of aging skin that the individual can find cosmetically displeasing, with psychosocial sequelae. In a youth-centered society such as ours, the skin's appearance can stimulate ageism and promote stereotypes. It has been demonstrated that stereotypes about age and physical activity result in decreased vitality; stereotypes about aging are linked to older adults's sense of health (Emile, d'Arripe-Longueville, Cheval, Amato, & Chalabaev, 2015). Research has also found that older adults with dermatological conditions such as eczema have higher rates of depression than do those without such conditions (Kim et al., 2013). So the appearance of aging skin can affect both the older adult's sense of self and the older adult's health.

Although changes in aging skin are visible to all, the skin's changes in structure and function are especially relevant to the discussion of care of the skin in patients in long-term care. Body temperature is important as a physiological marker of health, with higher body temperatures reflecting a febrile state of possible illness. The skin participates in thermoregulation by heat dissipation, which occurs through cutaneous vasodilation and sweating, and by heat generation, through shivering (Charkoudian, 2003). As we age, with physiological changes in circulation, decreases in sweat gland function, and neurological changes, the skin functions less efficiently, and through a variety of mechanisms, the core temperature of the aging adult is generally thought to be lower than that of younger adults. However, current research provides conflicting reports on this assumption. Waalen and Buxbaum (2011), in a retrospective

review of body temperature in 18,630 healthy individuals, found that mean temperature decreased with age. Another study found that temperatures did not vary between older and younger adults in the winter, but that in the summer, younger adults did have lower body temperatures (Lu & Dai, 2009). In both of these studies, all groups had lower body temperatures than the accepted normal temperature of 98.6° Fahrenheit or 37° Celsius. Factors like body mass index also affected core temperature. Wallen and Buxbaum proposed that lower body core temperature might provide a survival advantage, but more research is needed to understand the idea of lower core temperature in relation to longevity. With respect to skin and thermoregulation, it is important that the clinician have knowledge of a healthy older person's baseline temperature to be able to identify changes that might indicate illness or a negative change from baseline.

In the skin's role of protection, the thinning of the epidermis and slowing of keratinocyte turnover reduces the skin's integrity as a barrier, resulting in increased susceptibility to bacterial, viral, and fungal infections or conditions such as contact dermatitis (Al-Nuaimi et al., 2014). The thinning of the dermis along with the reduced production of collagen and elastin reduce elasticity and resistance to injury as well. As people age, the skin becomes more vulnerable to skin tears, for example. A critical change occurs through the retraction of structures known as papillae, which connect the epidermis to the dermis (Miller, 2009). This reduction in the integrity of the interdigitation of the epidermis and dermis, which begins in the sixth decade of life, reduces resilience to shearing forces that can lead to skin breakdown (Farage, Miller, Elsner, & Maibach, 2013). This is compounded by reduced nerve endings, which create greater risk for injuries from heat or pressure, and by reduced fat in the subcutaneous layer, which can contribute to the reduced resilience to shearing forces and skin tears. Vascular atrophy in the skin reduces blood

and nutrient supply, which results in vulnerability to bruising and slow wound healing. In fact, many structural changes in the skin contribute to slow wound healing (Al-Nuaimi et al., 2014). Finally, reduction in immune functioning cells known as Langerhans cells and in the action of cell-mediated immunity leads to increased incidence of cutaneous infections and dermatitis.

All of these changes in the skin are intrinsic factors that increase vulnerability to injury in the older adult. Among them, the most problematic are the thinning of the epidermis and the disengagement of the epidermis from the dermis. These changes make the skin more vulnerable to injury, leading to the two most common and undesirable wounds found in long-term care: skin tears and pressure ulcers. But it is not just intrinsic factors that create injury; external factors contribute as well. For example, at least three external factors are implicated in pressure ulcers: the surface that the older adult is subjected to, the temporal length of exposure to pressure, and the way in which the individual is moved in bed, causing shearing that separates the epidermis from the dermis. For patients in long-term care facilities, the risks for insults and injury to the skin are greater because residents usually have higher rates of immobility, need greater assistance in care, have multiple co-morbidities, and have issues with nutrition, all of which contribute to vulnerability to injury.

Common Skin Problems in Long-Term Care

Dry Skin

Dry skin or xerosis is common among the elderly, owing to a multitude of factors. Even though dry skin is a common problem, however, there is little research on dry skin or on treatments for dry skin in the elderly. Estimations of the occurrence of dry skin occur in the literature dating back to the 1980s; Hardy (1990) estimated that 59% to 75% of older people experience dry skin. The causes of dry skin may be found among the changes in aging skin

described earlier. There is a reduction in sweat gland function and a lack of production of sebum, both of which normally keep the skin hydrated. In aging skin, regeneration is less efficient. The resulting dry skin can become scaly, and it is often accompanied by itching (Taylor, 2014). Pathologic conditions can also cause dry skin or exacerbate the dryness of normal aging. For example, thyroid disease, renal failure, iron deficiency, and hypovitaminosis A, B, C, and E can cause dry skin. So too can medications such as statins. Environmental factors that contribute to dry skin include soaps, insufficient rinsing of the skin, vigorous drying with a towel, temperature, and low humidity (Taylor, 2014).

Research to test treatment protocols for dry skin is limited. Hardy's (1990) pilot study was designed to determine contributing factors for dry skin, refine an instrument for measuring dry skin in the elderly (the Skin Condition Data Form), and test the effectiveness of a bathing intervention for a sample of 15 residents in a long-term care setting. The bathing protocol comprised baths twice a week for 6 weeks with a superfatted soap, water temperature of 90°–100°, immersion to chest or in shower for 10 min, patting rather than rubbing skin dry with a cotton towel, and application of mineral oil over the entire body. The small sample size limits interpretation of Hardy's findings; but scaling and flaking were good indicators of dry skin, and the bathing protocol promoted the retention of moisture and reduced dry skin. However, patients who did not use soap before entering the study had lower total dryness scores before the intervention and lower flaking scores than did participants who used soap. Hardy concluded that for patients with flaking skin, bathing without soap might be better. In summary, although dry skin seems to be inherent to the physiological changes of aging, specialized skin care can still promote healthier skin.

Pruritus

Pruritus, or itching skin, can accompany dry skin. Much like dry skin, itching has a multitude of causes, including changes that accompany aging: decreased water content in the stratum corneum (the outermost layer of the epidermis), more alkaline pH, and decreased sebaceous and sweat gland function (Valdes-Rodriguez, Stull, & Yosipovitch, 2015). Other contributing factors to itching include changes in the innate and adaptive immune system. Neuropathic disease processes (e.g., shingles, diabetes) can cause itching, as can other systemic diseases such as hepatobiliary disease or hyperthyroidism. Itching can also be a reaction to medications such as calcium channel blockers, thiazides, and codeine. Psychogenic conditions such as psychosis, obsessive compulsive disorder, anxiety, and somatoform disorder have been related to itching as well (Valdes-Rodriquez et al., 2015).

Management of itching begins with thorough historical documentation and an assessment of whether the condition is acute or chronic (lasting longer than 6 weeks). Standard questions about the intensity and temporal pattern of the itching, as well as about ameliorating and exacerbating factors, should be included along with a full medical and social history. A social history that includes alcohol or drug abuse might indicate liver insufficiency as a source of itching. Furthermore, in the long-term care setting, it is imperative to assess whether or not other residents are experiencing itching, in order to rule out infestations of parasites such as scabies (Valdes-Rodriquez et al., 2015). Physical examination of the entire body is warranted, as well as laboratory tests for complete blood cell count, basic metabolic panel, liver function, thyroid function, and erythrocyte sedimentation rate. For an older adult with an acute onset of chronic itching, cancer must be considered as a possible diagnosis, because cancers such as liver cancer and prostate cancer, as well as myeloproliferative disorders, have been associated with itching (Valdes-Rodriquez et al., 2015). Management of pruritus requires a holistic educational approach

for the patient, behavioral and environmental modifications, and medications specific to the individual. Education for the patient should be focused on preventing scratching, which can create cutaneous inflammation and secondary infection. Fingernails should therefore be kept short. Cool or lukewarm water may decrease discomfort during bathing. Medications for itching range from topical emollients, salicylic acid, capsaicin, and corticosteroids to systemic treatments with antihistamines such as hydroxyzine, certirizine, fexofenadine, or loratadine; antidepressants of all classes; the mu-opioid receptor antagonist naltrexone; and even ultraviolet A and ultraviolet B light therapy (Valdes-Rodriquez et al., 2015). Because the etiology of pruritus is complex, research producing evidence-based guidelines for treatment of pruritus is limited. Two reviews were identified for the present study. A 1999 review of the efficacy of antihistamines in the treatment of atopic dermatitis (common pruritic inflammatory skin disorder) found weak evidence (sample size or study design) supporting the use of antihistamines (Klein & Clark, 1999). A more recent review conducted by Hong, Buddenkotte, Berger, and Steinhoff (2011) provides a robust account of the management of pruritus in atopic dermatitis, including topical, systemic, and complementary and alternative therapies as well as evidence supporting each treatment. The significance of this review for long-term care is its holistic approach, including review of pharmacological and non-pharmacological interventions, support of multidisciplinary approaches, the offering of educational material for patients, and a "therapeutic ladder" for treatment. In summary, pruritus is a symptom with complex origins that can effect quality of life in the older adult. Its management requires a comprehensive, holistic approach to diagnosis and management.

Incontinence-Associated Dermatitis

Another type of dermatitis more specific to residents of long-term care facilities is incontinence-associated dermatitis (IAD). IAD occurs with extended exposure to urine or feces. It is estimated that 54.4% of long-term residents and 23.6% of short-term residents in nursing homes have incontinence of both bowel and bladder, and that 75.8% of long-term and 46.1% of short-term residents have incontinence of either bowel or bladder (Gorina, Schappert, Bercovitz, Elgaddal, & Kramarow, 2014). The financial impact of IAD is high—an estimated 5.3 billion dollars annually—and the personal cost to the individual can be significant. Patients with IAD may experience pain, burning, itching, loss of independence, impaired sleep, and reduced quality of life, and they are at risk for secondary infections such as candidiasis (Beeckman et al., 2015). Research and evidence-based practice regarding IAD has grown over the past decade, beginning with the first consensus panel of 6 American nurses meeting in 2005 and continuing on to the international consensus panel made up of 16 nurse clinicians and researchers, 2 physicians, and 2 basic clinical science researchers from 7 countries that produced the most current guidelines in 2015 (Gray, McNichol, & Nix, 2016; http://www.woundsinternational.com/consensus-documents/view/incontinence-associated-dermatitis-moving-prevention-forward).

Highlights from the guidelines for IAD include a detailed explanation of the mechanism of skin breakdown. The increase in skin alkalinity with exposure to urine allows micro-organisms to create skin infection. The lipolytic and proteolytic components of feces damage the stratum corneum of the epidermis, allowing infection, and for patients with incontinence of both bowel and bladder, the effects of these two conditions are combined (Beeckman et al., 2015). The guidelines do not recommend a separate tool for assessing risk for IAD but do list key risk factors that should be assessed, including type and frequency of incontinence, use of occlusive containment products, poor skin condition, decreased mobility, diminished cognitive awareness,

loss of ability to perform personal hygiene, pain, medications (antibiotics, immunosuppressants), poor nutritional status, and critical illness. The panel notes that more focus is being placed on the impact of certain medications such as steroids, antibiotics, and chemotherapies and on how they are excreted in the urine and feces and may increase the risk of IAD (Beeckman et al., 2015). This area has been identified for further research.

Prevention of IAD is preferred. Although there is some racial disparity in occurrence of incontinence (Gorina et al., 2014), research has shown that there is no racial disparity in prevention programs for IAD in long-term care facilities (Bliss et al., 2016). The two key components to prevention are the management of incontinence and the implementation of a structured skin care regimen. To this end, researchers are trying to develop better products to manage incontinence. An optimized adult brief that minimizes occlusion and creates a more optimal pH condition has shown some promise for reducing IAD (Beguin et al., 2010).

One main addition to the most recent consensus guidelines for IAD is the recommendation to use a simple categorization tool: no redness = skin intact; Category 1 = red, but skin intact; and Category 2 = red, with skin breakdown. These categories can be used in the treatment course algorithm provided in the guidelines. The principles for treatment include *cleanse*, *protect*, and *restore* (Beeckman et al., 2015). An important recommendation for cleansing the skin is to use a product with a pH range similar to that for normal skin rather than traditional soaps. The guidelines state the principles of "cleaning daily, using techniques that minimize friction, use soft disposable non-woven cloth and gently dry skin if needed" (p. 13). They also recommend products for skin protection and state principles of protection: "applying the skin protectant at a frequency consistent with its ability to protect the skin and in line with manufacturer's instructions; ensure the skin protectant is compatible with any other skin care

products; apply the skin protectant to all skin that comes into contact with or potentially will contact urine and/or feces" (p. 14). The practice of restoring the skin means to use products designed to be left on the skin, including those that hold water in the stratum corneum (e.g., glycerine products). In the unfortunate event of a secondary infection such as candidias, which is the most common infection, appropriate topical treatments should be applied. Caution is recommended about the judicious use of these products as opposed to routine application, owing to the ever increasing number of antimicrobial-resistant infections (Beeckman et al., 2015). These consensus guidelines are an excellent resource for the prevention and management of IAD, but research and evidence are still needed especially with regard to the differentiation of IAD from pressure ulcers. Developing technologies to assist in differential diagnosis and further research into relationships among pressure ulcer risk, pressure ulcer occurrence, and IAD will move the science and clinical practice forward (Gray et al., 2016).

Pressure Ulcers

Literature on pressure ulcers in nursing homes generally starts with comments such as the following: "pressure ulcers remain a common medical problem" (Abel et al., 2005, p. 181); they are "an indicator of poor-quality care" (Bergstrom et al., 2005, p. 1721); or they are "one of the quality measures used to evaluate care of nursing home residents" (Bergstrom et al., 2008, p. 1252). Pressure ulcers are defined as "a localized injury to the skin and/or underlying tissue, usually over a bony prominence, resulting from a sustained pressure (including pressure associated with sheer)" (National Pressure Ulcer Advisory Panel [NPUAP], 2014, p. 18). Yet despite the fact that from 2000 to 2002 there was a reduction in pressure ulcer incidence rates in Texas nursing homes participating in a program of process improvement for education and prevention (Abel et al., 2005), pressure ulcers are still a target for quality measure and quality

improvement. For example, pressure ulcers remain a part of the preventable adverse reporting system for hospitals and ambulatory surgery centers in Texas (Texas Department of State Health Services, 2015). Pressure ulcers occur across the continuum of care, with prevalence and incidence varying in different settings, but the NPUAP (2014) indicates that in long-term care settings the incidence rate ranges from 3.65% to 59%, with more recent studies having a range of prevalence from 9.5% to 14.5% and incidence rates of 1.9% to 5%. A study of 2,936,146 nursing home residents demonstrated a prevalence of 10.1% (Ahn, Cowan, Garvan, Lyon, & Stechmiller, 2016). Pressure ulcers remain a focus of attention for prevention and improvements in treatment because of the burden to the individual patient as well as the healthcare system.

Different from the rather young stage of research and development of evidence-based clinical practice guidelines developed for IAD, the research and evidence for the prevention and treatment of pressure ulcers is robust. The collaborative effort of three international pressure ulcer advisory panels has resulted in the publication *Prevention and Treatment of Pressure Ulcers: Clinical Practice Guideline* (NPUAP, 2014). This guideline indicates the strength of the evidence supporting its recommendations and includes strengths for the recommendations, ranging from “definitely do it” (2 thumbs up) to “definitely don’t do it” (2 thumbs down). The guideline is available at http://www.internationalguideline.com/guideline. The full guideline is available for purchase, but an abridged quick reference guide can be downloaded at no cost.

NPUAP’s guideline covers the etiology of pressure ulcers, steps for prevention, interventions for prevention and treatment, specific treatment recommendations, and considerations for special populations such as older adults. Highlights for the different topics pertinent to the care of long-term residents will be reviewed here, but they should not be considered as a replacement for the guideline’s recommendations; this is simply an overview.

The guideline's section on the etiology of pressure ulcers expands on the general understanding that pressure ulcers develop as a result of the internal response to external mechanical load, which is defined as the force applied to an individual's soft tissue as the skin contacts a solid surface. This is critical in the older adult, in whom the interdigitation between the epidermis and dermis is compromised by shearing forces. The guideline proceeeds to elaborate on the process of ischemia-induced damage (the amount of time during which soft tissue can endure ischemia before damage) as well as on the concept of microclimate—the environment of humidity and temperature that can make skin weaker and vulnerable to breakdown (NPUAP, 2014).

The guideline provides an update on the International NPUAP/EPUAP Pressure Ulcer Classification system, which expands the system's 4 stages to 6 (see Appendix A) so that they now include "unstageable" and "suspected deep tissue injury" (SDTI). The "unstageable" classification is used when an eschar or slough obscures the depth of a wound until enough has been removed to allow accurate depth measurement (see Figure 1.) An SDTI is a pressure-related injury where the skin is intact but the injury has occurred in the muscle and fat and has progressed outward, forming a localized maroon area or blood-filled blister (see Figure 2).

(PLACE PICTURE HERE OF UNSTAGEABLE WOUND)

(PLACE PICTURE HERE OF SDTI WOUND)

The guideline's new categories of wounds have stimulated new research. For example, one study has identified that the prevalence of SDTIs was 2% among nursing home residents and that modifiable risk factors included malnutrition, dehydration, anemia, infection, and incontinence (Ahn et al., 2016). The occurrence of incontinence and IAD is a risk factor for pressure ulcers despite the fact that the etiology of IAD is different from that for pressure ulcers (Beeckman et

al., 2015). The consensus panels on IAD and pressure ulcers have therefore recommended further research to better identify these two events and how they occur, because they require different prevention and management strategies (NPUAP, 2014).

The general recommendations for a structured risk assessment for pressure ulcers have low levels of evidential strength but high confidence in the strength of the recommendations. These recommendations include conducting a structured risk assessment, a full skin assessment, and documentation of the risk assessments. Consideration should be given to individual factors such as skin status and factors that contribute to risk such as perfusion and oxygenation status, nutritional status, and skin moisture. For these factors, the strength of evidence is level "C" (indirect evidence and/or expert opinion), with recommendations of one thumb up. Advanced age is a risk factor because of the changes described earlier: "the mechanical properties of the tissue; the geometry of the tissue; physiology and repair and transport and thermal properties," which increase risk for pressure ulcers (NPUAP, 2014, p. 51). In the older adult, consideration should also be given to the individual's cognitive status when performing assessment and developing treatment plans. The guideline does not recommend a specific tool but does report research done to compare tools. Important reminders in this section include the following: no matter what tool is used, clinical judgment is still essential; "prediction is not destiny"; and "an at-risk individual can often be altered by carefully selected and consistently implemented, risk-based prevention strategies" (NPUAP, 2014, p. 58).

Prevention recommendations for pressure ulcers have commonalities with those for prevention of IAD. They include using pH-balanced skin cleansers, not vigorously rubbing the skin, keeping the skin clean and dry, managing incontinence, and promoting hydration of the skin. The guideline also includes emerging therapies that focus on the microclimate, as

mentioned in the article on a better incontinence brief (Beguin et al., 2010). Other considerations regard prophylactic dressings such as a polyurethane foam dressing on bony prominences (level B strength of evidence, one thumb up), and choices of fabric such as silk instead of cotton or cotton blend (level B strength of evidence, one thumb up). The guideline also covers recommendations for nutrition in prevention and treatment, including hydration, vitamins, and minerals; for repositioning and early mobilization; and for positioning and protection of the heel.

If a pressure ulcer develops, the guideline emphasizes the need to assess and monitor healing. Several tools are described, but a tool developed by the NPUAP and commonly used in research is the PUSH tool, which has been found efficient for monitoring the ulcer's improvement or deterioration (see Appendix B). Pain related to pressure ulcers must also be assessed and managed. Recommendations include using a reliable tool for pain assessment, preventing pain during repositioning, coordinating care with pain medication administration, providing a time out during care, and reducing pain by managing the wound with appropriate dressings. A recent analysis of National Minimum Data Set 3.0 reviewed 41,680 residents in long-term care and found that greater bodily pain intensity was associated with advanced stages of pressure ulcers and SDTIs (Ahn, Stechmiller, Fillingim, Lyon, & Garvan, 2015).

The guideline provides extensive evidence-based recommendations for the treatment of pressure ulcers, including wound bed preparation, cleaning, debridement, assessment and treatment of infection and biofilms, wound dressings, biological dressings, growth factors for the treatment of pressure ulcers and biophysical agents such as electrical stimulation phototherapy, ultrasound, mechanical or kinetic therapy (e.g., whirlpool, pulsatile lavage, and vibration), and hyperbaric oxygen. There is a section on surgical intervention, with recommendations for preoperative, intraoperative, and postoperative care.

The guideline's recommendations apply across the lifespan. But specific recommendations are included for older adults as well. Recommendations are made to set treatment goals consistent with the values and goals of the individual and to educate the individual and his or her significant others regarding skin changes in aging and at end of life. These recommendations reflect expert opinion, but they embrace patient-centered care and an appreciation for understanding end-of-life processes. It is recommended that care for the older adult include protecting the skin from pressure and shear forces especially during manual handling along with the use of manual handling devices. The panel also recommends, again based on expert opinion, choosing atraumatic dressings to reduce further injury. Certain dressings may separate dermal layers. The recommendation for repositioning the older adult who is unable to reposition independently comes with level A strength of evidence (highest level of evidence, supported by randomized control trials; two thumbs up): Repositioning should be done to reduce the duration and magnitude of pressure over vulnerable areas such as bony prominences and to promote "comfort, hygiene, dignity, and functional ability" (NPUAP, 2014, p. 221). Finally, for patients who use medical devices that include any type of mobilizer, casts, Foley catheter, fecal containment devices, feeding tubes, nasal cannulas, compression stockings, or restraints, there is an increased risk for pressure ulcers, and it is incumbent on healthcare providers to ensure correct size and fit and to avoid excessive pressure. Using a prophylactic dressing has been studied in trauma and pediatric populations, and, again based on expert opinion, this should be considered for older adults.

In summary, research and evidence that support the prevention and treatment of pressure ulcers is available. The main resource is the NPUAP, which is working in conjunction with other

similar organizations across the world to improve care. Yet despite the advancement in care for pressure ulcers and evidence-based practice recommendations, pressure ulcers still occur.

Skin Tears

A skin tear is defined as "a wound caused by shear, friction, and/or blunt force resulting in separation of skin layers. A skin tear can be partial-thickness (separation of the epidermis from the dermis) or full-thickness (separation of both the epidermis and dermis from underlying structures)" (LeBlanc & Baranoski, 2011, p. 6). This definition was provided by a consensus panel of experts in wound care convened in 2011 in response to the lack of a universal definition of skin tear as well as the lack of a comprehensive approach to its management and prevention. The panel hoped to model the success of the international pressure ulcer panel by beginning a dialogue about skin tear. The consensus document was developed in three phases, initially by 13 experts and then by 68 international experts who provided additional input for the original 13 experts to finalize. The resulting document consisted of the definition provided above along with 12 statements, some of which are significant for the long-term care setting.

First, both intrinsic and extrinsic factors cause skin tears, but not all factors are known. Intrinsic factors include aging for the reasons mentioned previously: thinning of the epidermis, loss of subcutaneous tissue, decreased skin surface moisture, and decreased elasticity. Dry skin increases the risk for skin tears. People experiencing dehydration and poor nutrition increase the risk for skin tears. The use of anticoagulants increases the risk for bruising, which in turn increases the risk for skin tears. Although age is an intrinsic factor because of physiological changes, people who are critically ill, medically compromised, or at the end of life no matter what age are also at higher risk (LeBlanc & Baranoski, 2011).

The extrinsic factors for skin tears are many, but individuals with impaired mobility, decreased sensation, or decreased cognition have increased risk for exposure to shear, friction, and blunt force trauma because of their need for assistance (LeBlanc & Baranoski, 2011). Unpublished data from a survey conducted by LeBlanc, Baranoski, and Regan (cited in LeBlanc & Baranoski, 2011) showed that the top causes of skin tears included injury from blunt trauma, injury while performing activities of daily living, and injury during dressing treatment and removal. The survey did not describe the mechanism of injury regarding skin tears from dressing treatment and removal, but a known source of injury is medical adhesive use. In fact, medical adhesive-related injury (MARSI) is considered a "prevalent but underrecognized complication" that can lead to skin stripping (removal of epidermal layer), blisters, skin tears, and dermatitis (McNichol, Lund, Rosen, & Gray, 2013, p. 365).

Similar to the consensus panel formed for skin tears, a consensus panel of 23 experts and opinion leaders met to develop a consensus document to increase awareness of MARSI and define best practices (McNichol et al., 2013). The key components of the document include statements on the assessment of the patient and specifically the patient's skin on an ongoing basis; prevention of injury; selection, application, and removal of the appropriate adhesive; and direction for future research regarding MARSI. Similar to the intrinsic factors that contribute to skin tears, extremity of age, race/ethnicity, having other dermatological conditions such as eczema and medical conditions such as diabetes, and being immunosuppressed increase the risk for MARSI. Extrinsic factors include dry skin and prolonged exposure to moisture; medications (e.g., anti-inflammatory agents, anticoagulants, long-term corticosteroid use) also increase the risk for MARSI. Preventable causes of MARSI are identified: using tape with excessive adhesion for the given purpose, wrong choice of tape, improper application technique, leaving the tape on

too long, and improper removal techniques. Best practices for application of the appropriate tape include considering the role of skin tension and the effects of medical adhesives being placed across the tension lines (Langer's lines) or parallel. The consensus panel recognized that clinical evidence is lacking, but if adhesive is to be placed across tension lines, a product that stretches should be considered. If one applies adhesive parallel to the lines, a more rigid product should be used. A recommended practice is to consider using a skin barrier product prior to adhesive application. Liquid barrier films (foams, wipes, or sprays) dry, leaving a breathable protective coating that protects the skin and reduces the chance of skin stripping. Removal of the adhesive should be slow and horizontal rather than rapid and vertical. These practices should reduce the incident of both MARSI and skin tears.

Another extrinsic factor that can result in skin tears or create vulnerability to skin tears is resident-to-resident physical aggression. In a systematic review of literature from 1949 to 2013, 18 studies reported injury from resident-to-resident aggression, although only one reported that resultant injuries were bruises and lacerations most often to the head and face (Ferrah et al., 2015). The common mechanism of injury was pushing, grabbing, or pinching. Characteristic targets of aggression were those who were female, cognitively impaired, impaired in activities of daily living, or with wandering behaviors as well as disruptive or socially inappropriate behaviors. Ferrah et al.'s systematic review was conducted after the consensus document was finalized, but it begins to address a finding of the consensus panel that more research needs to be done to understand the impact of elder abuse and violence on skin tear prevalence.

Knowing the potential intrinsic and extrinsic risk factors is the starting point for the consensus panel's statement that "A comprehensive assessment of risk factors for skin tears should be conducted for all individuals within the context of their environment" (LeBlanc &

Baranoski, 2011, p. 9). The challenge to this practice is the lack of a universal skin tear assessment tool. In the unpublished international skin tear survey done in 2010, 80.9% of the respondents did not use a formalized method to assess and document skin tears. Tools are available but not widely used. The Payne-Martin Classification system and the STAR classification system (Carville et al., 2007; see Appendix C) provide a way to classify the extent of the wound. The Skin Integrity Risk Assessment Tool developed by White, Karam, and Cowell (1994) categorizes patients in three groups and provides recommendations for implementing a skin tear prevention plan based on the patient's status within those groups. The consensus panel stated that the skin tear prevention and management plan should represent a collaborative and multidisciplinary approach. The multidisciplinary team could include occupational therapists, physical therapists, dieticians, social workers, doctors, and general nurses, as well as a wound care specialty nurse. The panel also stated that policies should be established to guide the ongoing assessment and documentation of skin tears within a facility, and evidence-based wound care principles should guide the treatment of skin tears.

Since the publication of the consensus panel's statements on the state of the science of skin tears, much work has been done by the International Skin Tears Advisory Panel (ISTAP). This group has continued to build consensus statements on best practices for skin tears and has adopted a classification system for assessing skin tears (LeBlanc et al., 2013) that is a modification of the STAR system (Carville et al., 2007). The STAR classification divided skin tears into five categories, which included two for tears where the edges could be realigned and two for tears where the edges could not be aligned. The ISTAP system simplifies the five categories into three: type 1, no skin loss; type 2, partial flap loss; and type 3, total flap loss.

The ISTAP has also developed a tool kit for the prevention, assessment, and treatment of skin tears that can be downloaded at the website http://www.skintears.org/Skin-Tear-Tool-Kit. The tool kit includes not only the ISTAP classification system described above but a skin tear risk assessment pathway (Figure 3), a risk reduction program (Figure 4), a decision algorithm for treatment (Figure 5), and a pathway for assessment and treatment (Figure 6). Although the evidence for the risk assessment and risk reduction is based largely on case studies and expert opinions (LeBlanc et al., 2013), it does provide a holistic approach to identifying residents at high risk for skin tears as well as some evidence with level A or B strength (LeBlanc & Baranoski, 2014). The assessment for risk takes into consideration the resident's general health and experience of chronic or critical illness, which increases risk for altered sensory, visual, auditory, and neuropathic status as well as impaired wound healing. Polypharmacy is assessed, owing to side effects that can increase risk for falls or imbalance resulting in skin tears. Cognitive and mobility status are assessed because of the older adult's increased need for assistance with activities of daily living, which can increase vulnerability to mechanical trauma caused by individuals who provide assistance or by equipment. The tool kit's risk reduction plan offers evidence-based suggestions for healthcare providers to reduce identified risks as well as for changes in the healthcare environment. Nutritional concerns, for example, are a risk factor for residents, so it is recommended that healthcare providers consult a dietician, promote and monitor nutrition and fluid intake, increase fluid intake and monitor for extremes of weight, and protect skin accordingly. The evidence for these recommendations has a high level of strength (LeBlanc & Baranoski, 2014). The strength of evidence for promoting and monitoring intake and increasing fluid intake is supported by randomized controlled studies. With respect to the healthcare environment, it is recommended that the need for a comprehensive skin tear reduction

program must be recognized. Such a program should optimize nutritional support and hydration and should monitor and document the prevalence and incidence of skin tears by maintaining wound audits. An example of a prevalence data collection sheet is included in the tool kit (LeBlanc et al., 2013)

(PLACE FIGURES 3, 4, 5,& 6 ROUGHLY HERE)

The skin tear decision algorithm is an immediate assessment and management tool for treating residents' skin tears. The first step is to control the bleeding and to cleanse the wound. In the consensus statement on the art of dressing selection, the panel recommends that all skin tear wounds be cleaned initially and at each dressing change (LeBlanc et al., 2016). For skin tears without debris, gentle cleaning with a noncytotoxic solution (e.g., normal saline or clean water) is in order. In healing wounds, if a nonionic surfactant cleanser is used, it should be applied with a low pressure in order to protect granulation tissue that has formed. Wounds with debris or nonviable skin flaps must be debrided. Approximating healthy wound edges is appropriate; recommended techniques include using a dampened cotton tip or gloved finger, tweezers, or a silicone strip (Stephen-Haynes & Carville, 2011). The viable flap can be secured with Steri-Strips or moist non-adherent wound dressings (Pennsylvania Patient Safety Authority, 2006). The algorithm treatment guide emphasizes moist wound healing. Wound healing must occur in a moist environment monitored for a balance between the exudate produced by the wound and the optimal level of moisture to produce healing (LeBlanc et al., 2016). This means that a skin barrier to protect the skin surrounding the wound must be applied in addition to the appropriate dressing for the wound (Stephen-Haynes & Carville, 2011).

The importance of choosing the appropriate dressing has resulted in ISTAP's most recent consensus statement on the treatment of skin tears, specifically regarding best practices in the art

of dressing selection (LeBlanc et al., 2016). This document provides recommendations for wound management as well as a product selection guide, with the intent of ultimately including the selection guide in the Skin Tear Tool Kit. Product selection was based on a thorough review of the evidence-based literature from 2003 to 2015, with the findings submitted for further review by 11 key experts in wound care. These ISTAP experts developed the guide using criteria such as how well the dressings provided a moist healing environment; how well they protected the fragile skin, wound bed, and skin flap; and how much pain dressing removal might cause. This product guide was then sent out to 105 reviewers whose feedback was used to compile the final product selection guide; a consensus of 80% or more was required for a product's inclusion. In the consensus statement on choosing wound dressings, 97.15% of respondents agreed that nonadherent mesh dressings were appropriate for all types of skin tears. Such dressings provide a protective barrier while allowing exudate to pass through to a second layer, and they are generally easy to remove. Foam dressings were recommended for type 2 and 3 (LeBlanc et al., 2016). The product guide has not yet been incorporated into the tool kit, however. One key message from the recommendations is that no matter the type of dressing chosen, one should always remove the dressing with the skin flap and not against it; visual marking on the dressing showing the direction of removal is an easy communication tip for the nursing team.

In summary, skin tears are common in nursing homes, with rates of occurrence that range from as low as 3% to as high as 54% worldwide (LeBlanc et al., 2016). Like pressure ulcers, they should be considered avoidable events. Strong evidence-based recommendations are not as readily available for skin tears as for the prevention and management of pressure ulcers, but there is a growing body of expert opinion and guidance that can be used for developing a prevention and management program for skin tears in long-term care.

The Nursing Team

It is clear in the literature that the prevention and management of injury to the skin, especially in the aging adult, is a team effort. Guidelines recommend that physicians, nurses, dieticians, allied health professionals such as physical and occupational therapists, and even environmental services can play a role in the prevention of wounds in long-term care settings. Patients who have decreased mobility, need assistance with activities of daily living, have poor nutrition, and have cognitive deficits need a team. The guidelines for pressure ulcers provide examples in which each of these disciplines can play a role (NPUAP, 2014). In the long-term care setting, nursing can and should take the leadership role in developing a prevention and management program for skin. Nursing management must create an environment in which prevention, screening, assessment, and management of skin injuries is a team effort of those from the nurse aide to the advanced practice nurse in coordination with other healthcare professionals. Leadership should adopt standardized assessment tools such as those recommended in the guidelines, as well as standardized reporting tools. Formal screening should occur routinely, but informal screening for prevention can occur daily if certified nurse assistants understand that a part of their job is to observe and report on any skin changes during daily care. Certified nurse assistants are also critical in the prevention of injury when they follow recommended procedures including skin drying techniques and moisturizing, and most importantly when they follow recommendations for how they assist a patient in moving through transfers, ambulation, and bed mobility.

Prevention is also a coordinated effort between advanced practice nurses and the nursing care team. Advance practice nurses perform the thorough documentation of history, review of medications, physicals, and assessments of pertinent labs recommended in the guidelines. They

must then communicate findings that reflect a risk for potential vulnerability to skin injury or wound healing to the nursing team, and indicate appropriate referrals for additional healthcare (e.g., physical therapy, occupational therapy, speech therapy, or a dietician). The nurse is then responsible for creating a plan of care and delegating appropriate tasks that can range from increasing hydration to schedules for repositioning. When wounds occur, wound care is generally performed by nursing staff, and some facilities have a dedicated nurse who specializes in wound care and is assigned all wound care cases. But wound care can be a team effort in which physical therapy may be a part of wound management for debridement or specialized cleaning, or the team might include a specialist such as a nurse with certification from the Wound, Ostomy and Continence Certification Board. Not all settings have the same resources, whether a dedicated wound care nurse, elaborate tools to provide treatments like hyperbaric oxygen, or even access to the newest and latest wound care dressings. Yet these resources are not necessary to provide evidence-based care of the skin in the older adult. Advancements in evidence-based practice for major injuries such as pressure ulcers and skin tears are being made while acknowledging the diversity of resources in settings across the world. The resources in long-term care settings across Texas can vary dramatically from county to county and from city to city as well. Utilizing available guidelines can be the first step in creating a program of prevention and management in which it is recognized that skin is the largest organ of the body and that it requires a dedicated plan of action to maximize the health, function, and quality of life of Texas' residents in long-term care.

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Appendix A: International NPUAP/EPUAP Pressure Ulcer Classification System

Appendix B: PUSH Tool

Appendix C: STAR Skin Care Classification System