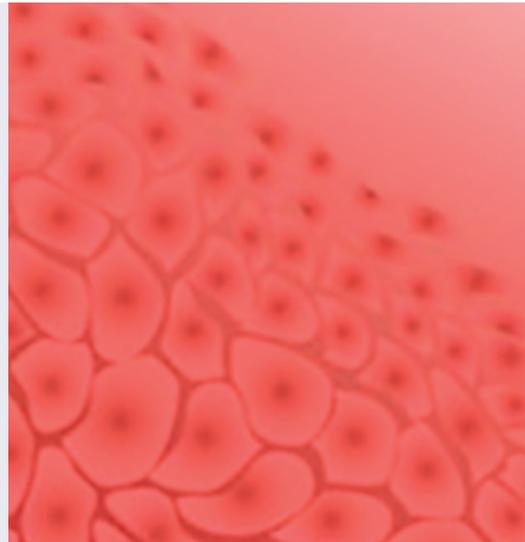


Best Practice Statement

Maintaining Skin Integrity



Changes in skin barrier
function

Assessing skin integrity
in at-risk groups

Pressure ulcer
prevention

Role of emollients

Implementing a skin
integrity protocol

**BEST PRACTICE STATEMENT:
MAINTAINING SKIN
INTEGRITY**

PUBLISHED BY:

Wounds UK
A division of Omniamed,
Ground Floor, 108 Cannon Street,
London, EC4N 6EU, UK
Tel: +44 (0)20 7627 1510
Web: www.wounds-uk.com

Wounds UK

© Wounds UK, 2018

This document has been developed
by Wounds UK and supported by
schülke

schülke 

This views expressed are those of
the authors and do not necessarily
reflect those of schülke

How to cite this document:
Wounds UK (2018) *Best Practice
Statement Maintaining skin
integrity*. London: Wounds UK.
Available to download from:
www.wounds-uk.com

EXPERT WORKING GROUP:

Rosie Callaghan, Tissue Viability Specialist Nurse,
Worcestershire Health and Care Trust

Fiona Cowdell, Professor of Nursing and
Health Research, Faculty of Health, Education
and Life Sciences, Birmingham City University

Simon Danby, Research Fellow in Dermatology,
Academic Unit of Dermatology Research,
Department of Infection and Immunology,
University of Sheffield Medical School

Sarah Gardner, Clinical Lead, Tissue Viability
Service, Oxford Health NHS Foundation Trust

George Moncrieff, Chair, Dermatology Council
for England

Matthew Pilcher, Vascular Specialist Nurse
Practitioner, Bradford Teaching Hospitals NHS
Foundation Trust

Karen Ousey, Professor of Skin Integrity,
School of Human and Health Sciences,
Director Institute of Skin Integrity and
Infection Prevention, University of
Huddersfield; Clinical Professor, Queensland
University of Technology

Anne Williams, Lymphoedema Nurse
Consultant, The Haven, Blantyre; Lecturer
in Nursing/Admissions Tutor, School of
Health Sciences, Queen Margaret University,
Edinburgh

Trudie Young, Tissue Viability Nurse (Hon),
Aneurin Bevan Health Board, Wales; Trustee,
The Lindsay Leg Club Foundation

Developing best practice for maintaining skin integrity

This Best Practice Statement is aimed at healthcare practitioners who are caring for patients at risk of compromised skin integrity, in particular older and very young people, and critically ill or hospitalised patients.

Many patients may have compromised skin healing ability, particularly older people. The integrity of the skin barrier gradually diminishes with age and by 60 years has typically become vulnerable (White et al, 2012). Common skin conditions that affect skin integrity, such as eczema, are also increasing (Nutten, 2015). It is therefore essential that emollient therapy should be used as a key component to a structured skincare protocol (Moncrieff et al, 2015).

A proactive approach needs to be taken to protect skin and prevent damage (including hospital-acquired damage), and for patients, families and carers to benefit from education that allows them to help maintain their own skin integrity. It is particularly important that multidisciplinary teams combine the skills of dermatology and tissue viability nurses.

The aim of this best practice statement is to provide relevant and useful information to guide those active in the clinical area, who are responsible for the management of skin care in patients who may be at risk of compromised skin integrity. This document aims to help ensure consistent clinical practices in relation to skin care, and managing the risk of skin breakdown. It will provide clear guidance based on relevant evidence and the experiences and opinions of clinicians, with a focus on the development of preventive strategies incorporating a structured skincare programme.

Principles of best practice

Sharing best practice among multidisciplinary teams (including tissue viability, dermatology, clinical nurse specialists, non-specialist nurses and health care support workers) is essential to ensure optimal care and to advance clinical practice.

The key principles of best practice (listed below) ensure that clinicians have an increased awareness, allowing them to exercise due care and process to promote the delivery of the highest standards of practice across all care settings, and by all healthcare professionals.

- Best Practice Statements (BPS) are intended to guide practice and promote a consistent and cohesive approach to care
- BPS are primarily intended for use by registered nurses, midwives and the staff who support them, but they may also contribute to multidisciplinary working and be of guidance to other members of the healthcare team
- Statements are derived from the best available evidence, including expert opinion at the time they are produced, recognising that levels and types of evidence vary
- Information is gathered from a broad range of sources to identify existing or previous initiatives at local and national level, incorporate work of a qualitative and quantitative nature, and establish consensus
- Statements are targeted at practitioners, using language that is both accessible and meaningful.

GUIDE TO USING THIS DOCUMENT

Each section offers advice on maintaining skin integrity in patients at risk of skin breakdown.

Tables are included to guide best practice and each section identifies key points. All statements are supported by key references where possible.

Introduction: Maintaining skin integrity

Skin health is integral to both physical and psychosocial health (ISTAP, 2018), which can have an effect on patients' quality of life, and can in turn affect partners, family, friends and even carers (ISTAP, 2018; Wounds UK, 2015).

In healthy individuals, the skin is strong, resilient and has a remarkable capacity for repair.

However, skin becomes vulnerable to external and internal injury due to ageing and altered physiology (Moncrieff et al, 2015). Skin changes can be *extrinsic*, such as environmental damage (e.g. regular detergent use or sun exposure) or pressure; or *intrinsic*, such as the effects of skin conditions (e.g. psoriasis or atopic eczema) or an underlying illness (ISTAP, 2018).

As such, maintaining skin integrity is crucial. Skin integrity is defined as the skin being 'whole, intact and undamaged' (Department of Health Australia, 2015). Compromised skin integrity is associated with complications such as pressure ulcers, moisture lesions, skin tears, and infections, which can lead to pain, reduced mobility, poor quality of life, further health complications and increased healthcare costs (Moncrieff et al, 2013).

Ageing is an intrinsic process that has a significant effect on the skin (Moncrieff, 2015). As skin ages, its physiology changes; it becomes thinner and loses its elasticity. There is reduced blood supply and there is a decrease in the amount of fat under the skin. This results in the skin becoming more fragile and more vulnerable to damage, with a loss of natural moisturising factors in the skin; the skin can become dry and fragile (Kottner et al, 2013), causing the wound healing process to be extended.

The skin

The skin is the largest organ of the body and accounts for 15% of body weight (Wingerd, 2013). For the average adult, the skin has a total surface area of approximately 1.5–2.0

square metres (Wingerd, 2013) and receives one third of the body's blood circulation.

The primary function of healthy skin is to act as a barrier against chemical, physical and mechanical hazards, and invasion from micro-organisms and allergens (Proksch et al, 2008).

The epidermal cells in healthy skin have the capacity for self-renewal and for generating differentiated cells, which help to form a barrier against external stress and micro-organisms.

The skin consists of three main layers: the epidermis, the dermis and the subcutaneous layer (Figure 1).

- The epidermis is the outermost layer of the skin, which provides a waterproof barrier
- The dermis is beneath the epidermis. It has a rich blood supply and contains tough connective tissue, hair follicles, sweat glands and sensory nerve endings
- The deeper subcutaneous tissue (hypodermis) is made of fat and connective tissue.

Combined, these three layers of tissue perform the following functions:

- **Protection:** the skin acts as a protective barrier, preventing damage to internal tissues from trauma, ultraviolet (UV) light, temperature, toxins and pathogens and allergens (Butcher and White, 2005)
- **Barrier to infection:** part of this function consists of the physical barrier of intact skin; the other is the presence of sebum, natural antibiotic chemicals in the epidermis (antimicrobial peptides) and a well-preserved surface acidic environment (Günnewicht and Dunford, 2004)
- **Sensory perception:** nerve endings within the skin respond to painful stimuli. Other sensory modalities, such as temperature, vibration, touch and itch are also important
- **Temperature regulation:** the rich blood

supply can serve as a 'heat dump' to enable body cooling, along with eccrine sweat roles. Similarly, surface vascular plexus can be restricted to conserve heat; hairs also play a role here, standing on end in the cold. The subcutaneous fat also acts as a heat source, as well as heat insulation (Timmons, 2006)

- **Production of vitamin D in response to sunlight:** this is important in bone development (Butcher and White, 2005)
- **Production of melanin:** this is responsible for skin colouring and protection from sunlight radiation damage
- **Communication, through touch and physical appearance:** this gives clues to the individual's state of physical wellbeing (Flanagan and Fletcher, 2003).

The acid mantle

The acid mantle forms a physiological barrier. It has an acidic pH and is important for antimicrobial defense and helping to form a barrier against permeability.

Endogenous and exogenous influences determine the acidity of the skin such as age, anatomic site, eccrine function and the use of soaps and cosmetic products (Moncrieff et al, 2015).

Changes in the pH of the skin can play a significant role in the pathogenesis, prevention and treatment of wounds and their healing, dermatitis, and infections (Moncrieff et al, 2013).

Skin integrity

Impaired skin integrity is defined as an 'altered epidermis and/or dermis, destruction of skin layers (dermis) and disruption of skin surface (epidermis)' (North American Nursing Diagnosis Association, 2018).

When the skin becomes impaired, it is no longer able to withstand mechanical stress, balance homeostasis, or maintain its immunological function (Moncrieff et al, 2015).

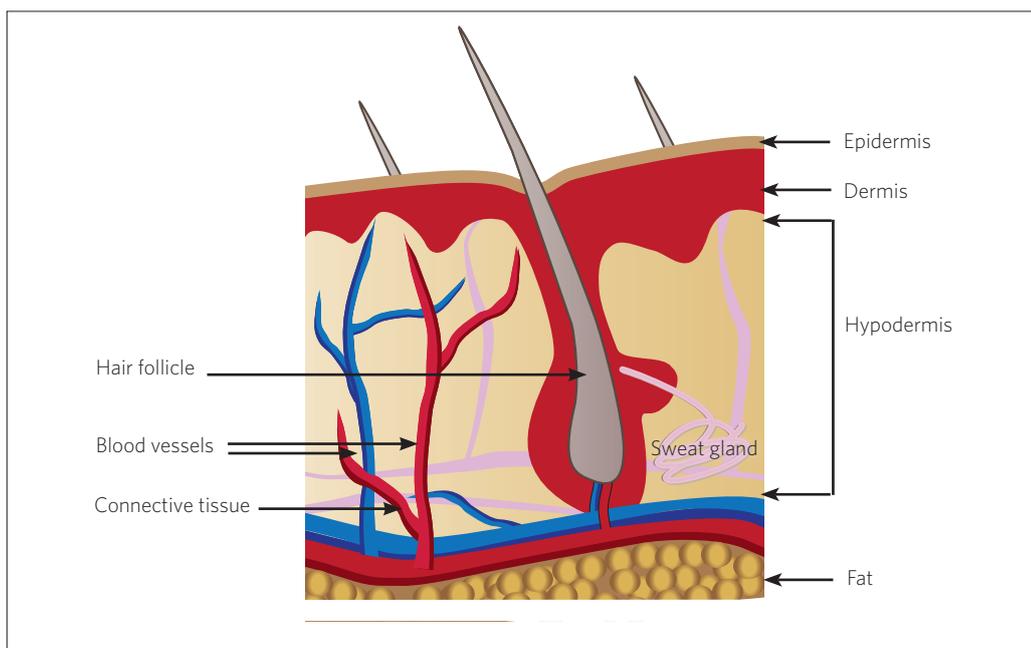


Figure 1: Main layers of the skin

SECTION 1: CHANGES IN SKIN BARRIER FUNCTION

Impaired skin barrier function can be caused by a number of factors, including:

- **Ageing:** As the skin ages, it loses dermal collagen and elasticity, becoming thinner, and therefore more fragile. With age, the skin becomes flaky and dry and less hydrated, as the production of sebum and natural moisturising factors decreases (Voegeli, 2007). Once the skin becomes dry, it is more vulnerable to splitting and cracking, exposing it to increased water loss through trans-epidermal evaporation and to bacterial invasion, further adding to the likelihood of breakdown from infection (ISTAP, 2018; Wounds UK, 2015). Dry skin can be pruritic, which is more common with advancing age
- **Ultraviolet radiation damage:** In response to UV exposure, the epidermis can thicken as keratinocytes become activated and secrete various growth factors and cytokines. Skin damaged by the sun will be shed (desquamation) while alterations occur in the collagen and elastin, connective tissue is damaged and fewer feeding capillaries are present, leading to impaired healing capacity (Koyano et al, 2016; Moncrieff et al, 2013)
- **Genetic diseases** such as ichthyosis (dry skin) can affect the vulnerability of the skin and impair the skin's natural barrier due to abnormalities in proteins and lipids present in the epidermis, leading to trans-epidermal water loss, and increased vulnerability to infections
- **Inflammation and infection,** the inflammatory reaction (e.g. due to pressure damage) leads to inflammatory cells from surrounding tissues infiltrating the skin, which can have an impact on the epidermis and underlying dermis, disrupting cell turnover, maturation and function, and therefore the skin barrier. Acute and chronic eczema result in vesicular lesions, leading to erosions that

can become infected. Skin barrier function is impaired in seborrhoeic dermatitis, psoriasis and eczema and many less common skin diseases

- **Irritants** from dressings, maceration from incontinence, and repeated skin cleansing all have a negative impact on skin health. Accumulation of debris, sebum, remnants of topical formulations, and of dressing materials can lead to inflammation. Skin may also sweat and/or retain moisture in wet or occluded areas or skin folds, leading to maceration, which in turn can be colonised by bacteria (Moncrieff et al, 2013)
- **Infection:** The skin barrier provides a defense against micro-organisms; however, where the epidermal barrier is disrupted, rapid colonisation by microorganisms, yeasts and fungi can occur, leading to infection and inflammation (Moncrieff et al, 2013)
- **Mechanical injury** such as scratching, pressure, shear and friction, resulting in skin tears and pressure wounds, can impair the skin barrier, alongside the forceful removal of adhesive dressings and tapes, which can strip the uppermost layers of the epidermis, causing medical adhesive-related skin injury, known as MARS (Moncrieff et al, 2013; McNichol and Bianchi, 2016)

Key points:

1. The skin is a dynamic organ that is continuously renewing and altering itself in response to stimuli.
2. Impaired skin integrity is defined as an 'altered epidermis and/or dermis... destruction of skin layers (dermis) and disruption of skin surface (epidermis).'
3. Skin impairment can be due to a number of different factors, some of which can be prevented, such as the use of dressings, maceration, exposure to allergens/irritants and the use of preventative equipment and measures.

SECTION 2: PEOPLE AT RISK OF SKIN IMPAIRMENT

While it is known that older people are vulnerable to skin damage, numerous other patient groups are also at risk of skin breakdown and the ensuing problems associated with it, such as infection, skin tears and pressure damage (see Table 1).

Patients with long-term conditions

Patients with long-term conditions such as renal/ liver disease, diabetes or autoimmune disorders will all be at risk of skin problems and should be monitored.

Critically ill patients

Patients who are critically ill or hospitalised are often immobile for long periods of time, with poor perfusion. In addition, polypharmacy can lead to skin reactions and put the patient at high risk for skin breakdown. The same can be said for critically ill children and newborn babies, who are unable to reposition themselves and thus are at risk from shear and friction wounds, alongside pressure from feeding tubes, continuous positive airway pressure and ventilation.

Patients with paralysis

Patients with spinal cord injury and paralysis are at high risk of skin breakdown due to

an inability or limited ability to reposition themselves, and often have decreased blood flow and lack of pain sensation due to nerve damage. Every step of the wound healing process can be impaired by the physiological issues inherent post-spinal cord injury (Rappl, 2008).

Bariatric patients

People with bariatric needs may be more at risk of factors that increase the risk of impaired skin integrity, including issues concerning dry skin, and moisture and temperature control. Bariatric patients may also be at increased risk of comorbidities (e.g. diabetes, hypertension and cardiovascular disease), which all increase the risk of impaired skin integrity (Shipman and Millington, 2011).

Oncology patients

Patients undergoing radiation treatment for cancer are at high risk of skin integrity impairment, as the biological effect of the radiation can affect the regeneration of the skin, the repair process and reperfusion. In addition, the inflammatory response is activated as the epidermal layer sustains radiation damage (NHS, 2010).

Key points:

1. As well as older people, other patient groups are at risk of skin breakdown.
2. These patients (e.g. critically ill or with long-term conditions) should be monitored closely for potential problems.

Table 1: Patient groups at risk of skin breakdown

Patient group	Skin changes	Potential problems
Older adults	Becomes thinner, loses elasticity, reduced blood supply, subcutaneous fat decreases, skin hydration decreases	Skin tears, pressure damage, infection, inflammation, dryness/flaking; possible related issues with nutrition/patients with dementia, cellulitis
Spinal cord injury/ paralysis	Alterations to vascular supply, temperature control, maceration/moisture, loss of collagen, lack of muscle/atrophy, impaired sensation due to damaged nerves in the skin (Rappl, 2008)	Skin tears, pressure damage, infection, inflammation
Critically ill and injured children	Intrinsic changes due to pressure duration, shear and friction, poor perfusion and maceration (Inamadara and Palit, 2013)	Nappy dermatitis, skin tears, pressure damage
Patients with spina bifida and cerebral palsy	Decreased skin perfusion, cutaneous reaction to drugs, perineal dermatitis and inflammation due to incontinence (Inamadara and Palit, 2013)	Pressure damage
Bariatric patients	Altered epidermal cells, increased water loss, dry skin, maceration, increased skin temperature, and reduced lymphatic flow and perfusion (Shipman and Millington, 2011).	Pressure damage, skin tears, diabetic ulcers, psoriasis, moisture lesions
Oncology patients	Radiation leads to inflammation, epidermis damage, decreased perfusion (NHS, 2010)	Pressure damage, reduced wound healing, skin infections, cellulitis

SECTION 3: DERMATOLOGICAL CONDITIONS THAT AFFECT SKIN INTEGRITY

Recent decades have seen a large increase in the prevalence of atopic diseases (atopic eczema, asthma and hay fever). In the early 1950s, the prevalence of eczema in children in the UK was under 5%; it now affects around one fifth of pre-school age children and continues to rise (Nutten, 2015).

Eczema is also increasingly common in older people, and up to 75% of older people

are diagnosed with clinically significant ichthyosis senilis (dry skin) (Nutten, 2015).

In addition to the risk factors previously discussed, there are a range of common dermatological conditions that can cause complications and affect skin integrity (Table 2), and therefore should be considered in assessment and management.

Key points:

1. Eczema is increasing in prevalence and up to 75% of older people are diagnosed with clinically significant dry skin.
2. A range of common dermatological conditions can affect skin integrity.

Table 2. Common skin conditions that affect skin integrity

Skin condition	Description
Rash	Any change in the skin appearance. Mainly due to simple skin irritation, or from a medical condition
Dermatitis / Eczema	Inflammation of the skin, causing an itchy rash. Atopic dermatitis, a type of eczema, is the most common form
Psoriasis	A genetic condition that can cause a variety of skin rashes. Silver, scaly plaques on the skin are the most common form
Pruritus	Pruritus, or itch, is often associated with dry skin and the incidence of it increases with age. It can cause discomfort, as well as disturbed sleep, anxiety and depression. In turn these can make the itching worse, leading to increased scratching and resulting damage to the skin barrier
Cellulitis	A serious infection of the dermis and subcutaneous tissues, which can progress into sepsis
Malignant melanoma/basal cell carcinoma/squamous cell carcinoma/secondary deposits	Malignant melanoma and basal cell carcinoma both result from sun damage; however, malignant melanoma is the most dangerous due to its propensity to spread and metastasise rapidly
Lipodermatosclerosis	Areas of painful, tight skin with hardened subcutaneous tissue just above the ankle, due to the infiltration of fibrin and inflammation and resulting in the leg shape resembling an inverted champagne bottle (Harding et al, 2015)

SECTION 4: ASSESSING AND MAINTAINING SKIN INTEGRITY

Excellent skin care is an attribute of quality health care that is often neglected. The patient's skin should be assessed to identify risks for problems such as pressure ulcers, skin tears, itch/scratch trauma, moisture lesions and other issues that may affect skin integrity.

The key principles of skin assessment should be applied to all patients. A thorough skin assessment should include a detailed history on presentation (Box 1). Holistic assessment of the patient is also vital (Wounds UK, 2015).

Although physiological changes in the skin contribute to the predisposition of skin breakdown, such as tears and pressure ulcers, it is also important to recognise altered mobility and certain medical conditions, such as diabetes and thyroid disorders, that increase the risk of skin damage with minimal friction and shear forces (Carville et al, 2007; LeBlanc et al, 2008).

In addition to medical and functional comorbidities, several other known factors contribute to increasing the risk of skin integrity breakdown, and should be included in all risk assessments (Hampton, 2010; Krasner, 2010; LeBlanc

and Baranoski, 2011; Sussman and Golding, 2011). These include:

- cognitive impairment
- dehydration
- poor nutrition
- obesity
- medications (immunosuppressive, anti-inflammatory, anticoagulant)
- incontinence
- impaired sensation (neuropathy)
- past history of chronic wounds
- compromised circulation and oxygenation
- use of alkaline soaps and antibacterial skin cleaners
- the care setting e.g. perioperative/post operative, intensive care unit (ICU) or care home setting

Maintaining skin integrity in hospitals is particularly important because hospital-acquired pressure ulcers, skin tears and infections not only increase the risk of in-hospital complications, but also increase the length of hospital stay and therefore healthcare costs, as well as being painful and debilitating and potentially leading to increased dependence for the patient. Individualised care plans for all

Key points:

1. Early recognition of people who are at risk of developing skin breakdown is an essential part of prevention
2. All patients should have a thorough holistic skin assessment.
3. Patients found to be at risk need a prevention programme to be implemented before injury occurs.
4. Emollients should be used as a preventative measure to protect dry, vulnerable skin.
5. Where skin breakdown is apparent, individualised care plans should be developed and documented for all patients, including factors such as nutrition/hydration and skin hygiene.

Box 1. Key components of a comprehensive skin assessment

- Patient medical history
- Skin assessment
- Does the patient have intrinsic risk factors for vulnerable skin, such as old age, diabetes, atopy (heightened immune response to allergens) or thin skin?
- Does the patient have wound-related risk factors such as varicose eczema, infection, high exudate levels, oedema or pitting?
- Is there a skin condition present? Is there anything unusual, such as a rash or dryness, or is the skin sore or itchy? How does the skin feel to the patient?
- Assessment of the patient's knowledge about his/her skin condition
- Skin condition history:
 - How long have they had the condition?
 - How often does it occur?
 - Are there seasonal variations?
 - Is there a family history of skin disease?
 - Could the patient's occupation/hobbies affect their skin (e.g. chemical exposure, repeated hand washing)?
 - What medication is the patient taking?
 - Are there any known allergies?
 - Previous and past treatments and effectiveness
 - Are there any treatments, actions or behaviours that influence the condition?
 - Is there any odour present?
- Apply gentle touch/pressure to the skin to gather information about the skin's texture
- Using your fingertips, check the temperature of the skin
- Ensure that the skin examination is carried out in a warm, private room

patients should be developed and documented, including: neonates, infants, children, young people, adults and older people (NICE, 2014). Those patients identified as at-risk or with an existing wound should receive appropriate interventions (Wounds UK, 2012).

Nutrition

Good nutrition is regarded as a major strategy for maintaining the skin barrier, skin integrity and health; and to ensure optimal healing (Kottner et al 2013).

A nutritional assessment should be used, such as the Malnutrition Universal Screening Tool (MUST; Malnutrition Advisory Group, 2003) to ensure the patient’s nutrition and hydration is adequate to maintain skin integrity or promote healing. Protein is essential to skin health to allow optimal keratin production, a structural protein found within the skin. If there is a protein deficiency and a decreased amount of keratin, the risk of skin breakdown is increased. Fatty acids

help to maintain healthy skin – e.g. omega-3 and omega-6 help to moisturise and lubricate the skin, whilst omega-6 is also known to help regulate skin growth. Other essential nutrients are vitamins C and A, which play a role in strengthening the skin tissues and skin regeneration respectively (NHS, 2010).

Skin hygiene

Skin hygiene is essential for skin health and maintenance, as well as for personal wellbeing. Where an older person has dry skin it is important to ensure a balance is achieved between cleanliness and over-washing, which may damage the barrier function (Voegeli, 2008a). The use of appropriate washing products and emollients can contribute to maintaining skin health.

There is a lack of evidence base for bathing practices, meaning it is often guided by ritual and tried-and-tested methods (Voegeli, 2008b). However, many detergents are alkaline and cause an increase in skin pH (Korting et al, 1987; Moncrieff, 2015), which

in turn can alter the bacterial flora on the skin, increasing the likelihood of colonisation with more pathogenic organisms (Cooper and Gray, 2011). It can take healthy skin 48 hours to recover from a change in pH, whilst in infant or older skin, or with inflammatory skin conditions such as eczema, it can take considerably longer (Moncrieff et al, 2015). Although in neonates, a study by Lavender et al (2013) found that some wash products for babies may be as safe to use as water.

The increased pH can damage the skin barrier and cause irritation (Kirsner and Froelich, 1998), and soap removes lipids from the surface of the skin, resulting in further skin dryness (Peters, 2011). The use of emollients and soap substitutes (Table 4) will help to maintain and promote skin health, reduce clinical signs of dryness, such as roughness or scaling, and improve sensations such as itching and tightness (Loden, 2003).

Table 3: Formal risk assessment scales

Braden Scale	Bergstrom N, Braden BJ, Laguzza A, Holman V (1987) The Braden scale for predicting pressure sore risk. <i>Nurs Res</i> 36(4): 205–10
Knoll Scale	Towey AP, Erland SM (1988) Validity and reliability of an assessment tool for pressure ulcer risk. <i>Decubitus</i> 1(2): 40–8
Norton Scale	Norton D, McLaren R, Exton-Smith AN (1962) An investigation of geriatric nursing problems in hospital. The National Corporation for the Care of Old People, London
Pressure Sore Prediction Score	Lowthian P (1989) Identifying and protecting patients who may get pressure sores. <i>Nurs Standard</i> 4(4): 26–9
Waterlow Risk Assessment Score	Waterlow J (1988) The Waterlow card for the prevention and management of pressure sores: towards a pocket policy. <i>Care Science and Practice</i> 6(1): 8–12
Pressure Ulcer Risk Assessment Tool (PURAT)	Wicks G (2006) PURAT: is clinical judgement an effective alternative? <i>Wounds UK</i> 2(2): 14–24
Pressure ulcer risk assessment scales for children: Bedi, Cockett, Garvin, Braden Q, Pickersgill, the Pattoid pressure scoring system, the paediatric pressure sore/skin damage risk assessment (Waterlow)	Wilcock J (2006) Pressure ulcer risk assessment in children. In: White R, Denyer J (Eds). <i>Paediatric Skin and Wound Care</i> . Wounds UK, Aberdeen: 79–86

Table 4. Summary of the management of dry, vulnerable skin, derived from clinical experience

Best practice statement	Reason for best practice statement	How to demonstrate best practice
All individuals' skin should be assessed at the level appropriate to their needs (e.g. dry*, flaky, excoriated, discoloured, etc)	Assessment enables the correct and suitable preventative measures to be initiated and maintained	Document skin assessment findings in the health records and implement a care plan based on findings
All individuals with dry, vulnerable skin should avoid skin irritants (e.g. soaps). Dry skin conditions require the application of an emollient at least twice daily as part of a therapeutic treatment regimen (or once daily for humectant-containing emollients as instructed)	Application of an emollient rehydrates the skin and reduces the irritant effects from detergents and additives (Moncrieff, 2015). Dry skin is best treated with an ointment, moderately dry skin with a cream or gel, and slightly dry with a lotion (Ersser et al, 2009). Patient preferences and lifestyle should be taken into consideration	Document in the health records which emollient was prescribed and how often it should be applied
Soap substitutes (or skin cleansers) should be used to wash the skin of individuals with dry, vulnerable skin, or skin determined to be vulnerable when washing/cleansing during routine personal hygiene	Washing skin with a soap substitute reduces the drying effects associated with soap and water (Calianno, 2002; Cooper and Gray, 2008). Bath additives leave a layer of oil over the skin after bathing and prevent excessive moisture loss during washing	Document in the health records the skin cleansing regimen used
Skin should be dried gently to prevent further dehydration, before applying a topical 'leave on' emollient. Drying should involve light patting and not rubbing, as rubbing may lead to abrasion and/or weakening of the skin (Moncrieff et al, 2015)	If the skin is left damp, it is at risk from bacterial and fungal contamination. Application of a topical 'leave on' moisturiser after washing will help to maximise its hydrating effect (Ersser et al, 2009)	Ensure staff are trained in the application of emollients and show individuals how to do this properly as part of a self-management education programme
Application of the emollient should follow the direction of the body hair, and be gently smoothed into the skin	Continuously rubbing the emollient into the skin can lead to irritation. Rubbing against the lie of the hair can aggravate the hair follicle, causing folliculitis, particularly if greasy emollients are used (Ersser et al, 2009)	Ensure staff are trained in the application of emollients and show individuals how to do this properly as part of a self-management education programme

**It is also noted that dry skin in the older person is different to dry skin in dermatological conditions such as eczema, psoriasis and underlying skin sensitivities, and although these individuals would benefit from this guidance, they should be referred to a specialist for specific and appropriate treatment.*

SECTION 5: PRESSURE ULCER AND SKIN TEAR PREVENTION

Prevalence of skin breakdown and pressure ulcers has become a standard by which hospitals are evaluated and assessed, with pressure ulcers recognised as an international patient safety problem (Wounds International, 2015). Meanwhile evidence for the prevalence of skin tears varies, but strong evidence suggests they are actually more common than pressure injuries (Carville et al, 2014; LeBlanc et al, 2016). Therefore, early recognition of people who are at risk of developing skin breakdown is essential for prevention.

Assessing risk of pressure ulcers

Assessment for pressure ulcers should take into account any pain or discomfort reported by the patient, and the skin should be checked for:

- Skin integrity in areas of pressure
- Colour changes or discolouration
- Variations in heat, firmness and moisture (for example, due to incontinence, oedema, dry or inflamed skin)
- Use finger palpation (or diascopy if applicable) to determine whether erythema or discolouration (identified by skin assessment) is blanchable
- Start appropriate prevention in adults who have non-blanching erythema and consider repeating the skin assessment at least every 2 hours until resolved

A patient's pressure ulcer risk status should be assessed using a validated pressure ulcer risk assessment tool, such as the Braden Scale

(Bergstrom et al, 1987) or the Waterlow Scale (Waterlow, 1985), and reassessed if there is a change in clinical status – for example, after surgery, on worsening of an underlying condition or with a change in mobility. Many practitioners are also using the National Health Service (NHS) SSKIN Care Bundle, a structured skin inspection protocol for checking and identifying skin, and risk of pressure damage. The simple acronym spells out the fundamental stages of inspection (SSKIN: **S**urface; **S**kin inspection; **K**eeP moving; **I**ncontinence/moisture; **N**utrition/hydration).

Implementing pressure ulcer prevention protocols

When an assessment identifies a patient at risk of pressure ulcers, interventions should be implemented immediately, and should always include:

- Skin inspection
- Effective pressure-redistributing surfaces
- Mobility
- Management of incontinence/body moisture
- Management of nutrition and hydration

All patients should be encouraged to reposition themselves regularly when able to do so. For those who require help, repositioning should ensure that, while pressure is being redistributed, it also allows the patient to be functional – e.g. take adequate nutrition and fluids in that position. The risk of tissue damage

Key points:

1. All patients should be assessed using a valid pressure ulcer risk assessment tool and equivalent for skin tears
2. All patients are potentially at risk of developing pressure ulcers
3. All patients admitted to a healthcare setting, hospital, or nursing home should have an appropriate pressure ulcer risk assessment performed within 6 hours of admission to the acute setting (NICE, 2015) and thereafter daily
4. All older patients are at high risk for skin tears
5. All individuals should have a full holistic assessment for skin tears on admission to the clinical setting
6. Assessments should determine the condition of a person's skin and a skin care prevention plan should be implemented

Table 5. Pressure ulcer risk assessment tools

Specific population	Appropriate risk assessment tool
Paediatric patients	Braden Q Scale (Curley et al, 2003)
Orthopaedic patients	Pressure Sore Prevention Score (Lowthian, 1989)
Older people	Pressure Ulcer Risk Assessment (Norton, 1962) Braden Scale (Bergstrom et al, 1987)
Adults	Acute: Waterlow (Waterlow, 1985) Community: Walsall Community Pressure Sore Risk Calculator (Chaloner and Franks, 2000)

through shear and friction should be avoided with the use of manual handling aids to prevent dragging along mattresses, and an individual positioning regimen should be implemented for patients confined to bed, with attention paid to prolonged pressure over bony prominences (Wounds UK, 2012); local protocols should always be followed.

The use of pressure-redistributing equipment should be used for all patients 'at risk' or with a pressure ulcer, and appropriate seating is also essential.

Assessing risk of skin tears

Skin tears can be painful wounds affecting quality of life and may increase the likelihood of hospitalisation or prolong hospitalisation (Wounds International, 2018). Elderly patients are at the greatest risk of skin tear injury, as the skin becomes thinner, loses elasticity and moisture, develops folds and wrinkles and loses the subcutaneous fat layer, making it more prone to tearing and bruising.

The Best Practice Statement on Care of the Older Person's Skin (White et al, 2012) states, 'all individuals should be assessed to determine the condition of their skin.'

The International Skincare Advisory Panel (ISTAP) Skin Tear Framework (LeBlanc, 2017) outlines the considerations when assessing a person's risk of skin tears.

ISTAP recommends an inter-disciplinary team approach to implementing a systematic skin tear prevention strategy, that is based on three risk factors (LeBlanc, 2013):

- Skin (extremes of age, dry/fragile skin, previous skin tear);
- Mobility (history of fall, impaired mobility, dependence on assistance for activities of daily living, mechanical trauma);
- General health (comorbidities, polypharmacy, impaired cognition, malnutrition).

The Skin Integrity Risk Assessment Tool (LeBlanc and Baranoski, 2011; White et al, 1994) is often used in the home care setting to place patients into risk groups, and recommend a skin care prevention plan. A risk reduction checklist is available (Wounds

International 2018, adapted from LeBlanc and Baranoski, 2011).

Implementing skin tear prevention strategies

Skin tears need to be correctly identified on presentation in order to develop an appropriate treatment and management plan (Wounds International, 2018). The ISTAP Classification System (LeBlanc et al, 2013) can be used to classify skin tears.

Specific intrinsic risk factors for skin tear formation – such as thinning of the epidermis, reduced collagen, elastin and glycosaminoglycans, atrophy and contraction of the dermis, thinning of blood vessel walls, and increased low-echogenic pixels – are hard to prevent (Moncrieff et al, 2015).

However, extrinsic risk factors can be minimised by taking the following preventative measures:

- Keeping fingernails trimmed short and avoiding sharp jewellery
- Padding /removing hazardous furniture to reduce risk of falls
- Covering skin with appropriate clothing, shin guards, stockings or retention bandages
- Using emollients and other skin-friendly products (Wounds UK, 2015)

Implementing an individualised skin care plan using a skin-friendly cleanser (not traditional soap) and warm (not hot) water, with daily emollient is considered highly beneficial. Emollient therapy is considered a vital part of skin care in patients with aged skin, for its role in promoting general skin health and reducing the incidence of skin tears by up to 50% (Carville et al, 2014).

If patients have dry, fragile, vulnerable skin assess their risk of accidental trauma. Avoid friction and shearing and use good manual handling techniques as per local guidelines (Wounds International, 2018).

Skin integrity assessment checklist

- ✓ All individuals should have their skin assessed as part of a holistic assessment
- ✓ Perform a regular daily skin inspection
- ✓ Look for any signs of skin irritation, blisters or red discolouration
- ✓ Use a compact mirror to visualise difficult-to-see areas such as heels
- ✓ Special attention should be paid to bony prominences and areas of skin that come into contact with devices, such as catheters, masks etc
- ✓ Where an area of redness or skin discolouration is noted, test for blanching and refer to a qualified nurse
- ✓ Distinguish between skin changes due to pressure damage and other causes
- ✓ Manage dry skin conditions to keep skin hydrated
- ✓ Where skin changes are due to excessive moisture, use barrier products and other measures to keep skin clean and dry
- ✓ Use non-adherent dressings or tapes to protect fragile skin
- ✓ Encourage and educate patients who are willing and able to inspect their own skin
- ✓ Document areas of pressure damage in the health records and implement pressure ulcer prevention plan
- ✓ Record any pressure ulcer prevention methods used
- ✓ Advise patients to wear protective clothing, and to avoid sharp/long fingernails
- ✓ Implement falls prevention programme - remove clutter / tripping hazards
- ✓ Optimise nutrition and hydration

SECTION 6: ROLE OF EMOLLIENTS

Emollients help to restore the barrier function of the skin, reduce itching, and increase the level of hydration. The benefits of emollient therapy to treat specific skin conditions are well recognised, but in patients at risk of skin breakdown, emollient therapy should also be used as part of an everyday skin care routine.

Emollients to protect skin integrity

The use of emollients plays a key part in the prevention and treatment of skin tears and superficial pressure ulcers (Bale et al, 2004). Clinical evidence from an Australian trial in older people reported almost a 50% reduction of skin tears when emollient therapy was applied twice a day (Carville et al, 2014).

The use of emollients can be incorporated into a care bundle to aid with moisture management, and using emollients instead of soap for cleansing can help protect and hydrate vulnerable skin at risk from pressure damage.

Incontinence and increased moisture can be a problem for older people and combined with bacterial, enzymatic activity and raised pH, episodes of incontinence can lead to the breakdown of vulnerable skin (Beekman et al, 2009). Skin damage as a result of exposure to moisture may be referred to as a moisture lesion, moisture ulcer, perineal dermatitis, or incontinence-associated dermatitis (IAD) (Ousey et al, 2012).

A protective emollient barrier spray or cream is recommended to help prevent skin from further breakdown (Benbow, 2012), alongside the use of appropriate products to aid management of incontinence.

Simple emollients can be used, whilst emollients with added active ingredients such as octenidine and humectants like urea are used for more complex conditions or where once-daily application is preferable.

Research evidence suggests that emollients can accelerate regeneration of the skin barrier function following disruption, with the most lipid-rich emollients restoring the

skin barrier more rapidly (Held et al, 2001; Moncrieff et al, 2015).

Range of emollients

A key benefit of emollients is that they moisturise the skin whilst cleansing, rather than de-greasing it, and some emollients are buffered so they maintain normal skin pH. Depending on the constituents of the emollients, they work either by occlusion, 'trapping' moisture into the skin, which slows the evaporation of water, or in an active way by drawing moisture into the stratum corneum from the dermis, through the effect of humectants (Moncrieff et al, 2015).

Many emollients contain humectants, which either mimic or comprise the same molecule as natural moisturising factors – e.g. urea, glycerol and isopropyl myristate. These emollients have been shown to promote increased hydration, as the humectants have water-attracting properties and encourage the active movement of water from the dermis to the epidermis, as well as helping to hold water in the stratum corneum (Loden, 2003).

The reduction of trans-epidermal water loss can be increased to 12 hours if the emollient includes povidone (polyvinyl pyrrolidone), which leaves a microscopic membrane on the surface of the skin (Moncrieff et al, 2015).

Emollients containing urea and ceramide-3, a lamellar-mimicking agent, have been shown to be effective in reducing trans-epidermal water loss with only once-daily application (Kucharekova et al, 2002). Others containing anti-itch agents or antiseptics are especially useful for treating skin conditions like eczema (Moncrieff et al, 2015).

Antiseptic creams often contain panthenol to support the natural regeneration of the skin, and the antimicrobial properties can be particularly useful in minimising odour-forming bacteria (e.g. in incontinence).

There are many formulations of topical emollients including ointments, creams, lotions, gels and sprays. Ointments are the

Key points:

1. Emollient therapy should be used as part of the patient's everyday care routine.
2. A range of emollients is available and products should be used appropriately – patient choice is key to adherence.
3. Complete emollient therapy includes replacing wash products as well as using leave-on creams.
4. Aqueous cream should be avoided for all patients.

greasiest preparations and most contain paraffin; creams are an emulsion of oil and water; lotions are the least greasy, making them less effective as an emollient (Cowdell, 2012).

Oil-in-water emollient creams are most acceptable to patients as they are more easily absorbed by the skin; however, the heavier emollient creams with a composition of water in oil, are considered too greasy for everyday use although they have a significantly better trans-epidermal water loss effect.

The heavy oil-based emollients tend to be used at night (Cork and Danby, 2009) and can also be used as soap substitutes (Moncrieff et al, 2015).

Humectant emollients, which have a longer hydrating effect, may be the most sensible choice as leave-on emollients, as they do not require frequent reapplication during the day (when working environment may make this impractical, or where a carer is relied upon to apply them).

Safety concerns have been raised about the use of paraffin-based emollients. Products with soft white paraffin plus 50% liquid paraffin, or emulsifying ointments that have contact with dressings or clothing, have been identified as a fire risk (MHRA, 2016).

Clinical studies have also shown that aqueous creams weaken the skin barrier and increase trans-epidermal water loss and should not be used (Danby et al, 2011). In response to this evidence, the MHRA issued a drug safety update. Aqueous cream now has a warning of potential skin irritation due to the sodium lauryl sulphate (a detergent and surfactant) used as a thickening and emulsifying agent in it, and it is advised that patients should avoid any contact with aqueous cream.

How to use emollients

Emollients are only effective if they are used appropriately, and patient acceptability is an important consideration and key to

adherence (Cowdell, 2012; Moncrieff et al, 2015).

Emollients should be part of the patient's everyday self-care routine. Emollients should generally be applied twice daily, or once daily with humectant-containing emollients as instructed.

Complete emollient therapy (CET) should be recommended, which is defined as 'everything that goes on the skin should be emollient-based and all soaps replaced with emollient wash products' (Cork, 1997). CET therefore includes the use of a combination of emollient wash products, as well as leave-on creams and ointments.

Generally leave-on emollients should be applied using gentle downward strokes following the lie of the hair on the body to minimise irritation or blocked hair follicles (Penzer and Ersser, 2010; Moncrieff et al, 2015). They should be applied frequently and liberally; however, this is influenced by the individual patient.

Emollients should be used every day but at the first signs of any localised irritation in fragile, at-risk skin, it may be beneficial to use a skin-friendly product to minimise further risk, such as a repair cream. This will support the natural regeneration of the skin and soothe irritation, while an added antimicrobial (e.g. octenidine) can help with the risk of infection control in at-risk skin, reducing the risk of further complications. It should be noted that such products should be used on limited skin areas, not the whole body.

If inflammation becomes more severe, a short course of topical steroids can be used simultaneously, although at separate application times (NICE, 2007; BAD/PCDS, 2015). Topical steroids have multiple anti-inflammatory, anti-proliferative and immunosuppressive effects; however, with long term use, adverse events are likely to occur, such as cutaneous atrophy and persistent erythema.

SECTION 7: IMPLEMENTING A SKIN INTEGRITY PROTOCOL

Implementing a skin care pathway is an attribute of quality care, and early recognition of who is at risk of developing any form of skin breakdown is essential. The key principles of a skin integrity protocol should be prevention, early intervention and treatment (Young, 2015; Figure 2).

Tissue viability nurses (TVNs) may be more familiar with barrier preparations used to

prevent peri-wound breakdown in wound care; however, complete emollient therapy involves preventing dry skin and potential skin breakdown. TVNs should have knowledge of the vulnerable skin barrier in patients and understand the benefits of complete emollient therapy. Emollients should be included in any skin care protocol and not just seen as an adjunct (Moncrieff et al, 2015).

Key points:

1. Implementing a skin care pathway is essential
2. Skin integrity protocol should be based on prevention, early intervention and treatment.

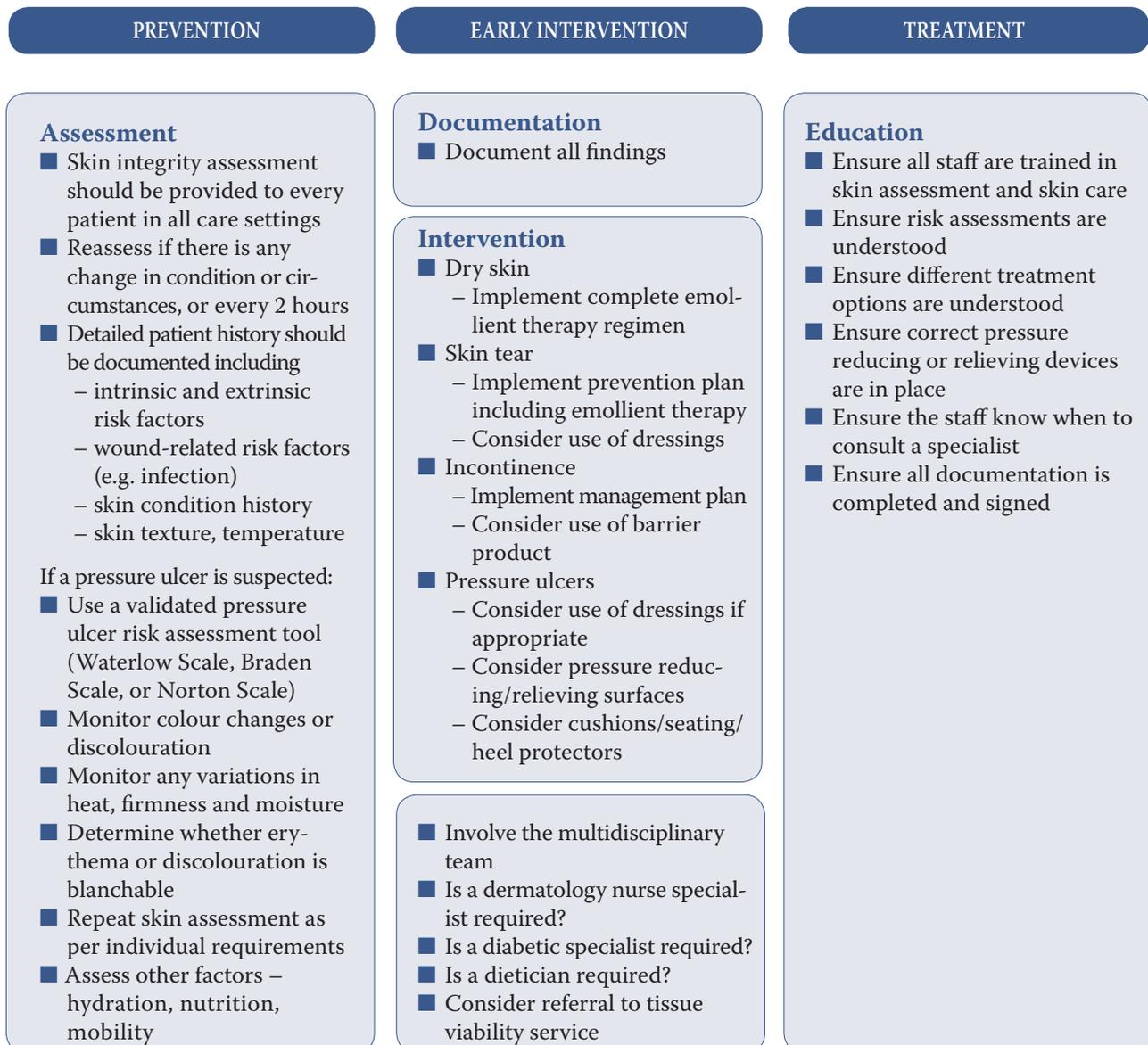


Figure 2: Key principles of skin integrity protocol

- Bale S, Tebble N, Jones V, Price P (2004) The benefits of implementing a new skin care protocol in nursing homes. *J Tissue Viability* 14(2):44-50
- Bank D, Nix D (2006) Preventing skin tears in a nursing and rehabilitation center: An interdisciplinary effort. *Ostomy Wound Management* 52(9):38-46
- Beeckman D, Schoonhoven I, Verhage S et al (2009) Prevention and treatment of incontinence-associated dermatitis: literature review. *J Adv Nurs* 65(6):1141-54
- Benbow M (2012) Skin care of the incontinent patient. *Journal of Community Nursing* 26(2):31-7
- Bergstrom N, Braden BJ, Laguzza A, Holman V (1987) The Braden Scale for Predicting Pressure Sore Risk. *Nurs Res* 36(4):205-10
- British Association of Dermatologists and Primary Care Dermatology Society (2015). Guidelines for the management of atopic eczema. Available at www.guidelines.co.uk/skin-and-wound-care/pcds-atopic-eczema-guideline/252674.article (accessed 30.08.2018)
- Britton J (2003) The use of emollients and their correct application. *J Community Nurs* 17(9):22-5
- Butcher M, White R J (2005) The structure and functions of the skin. In: RJ White (ed) *Skin Care in Wound Management: Assessment, Prevention and Treatment*. Wounds-UK Books, Aberdeen.
- Carville K, Leslie G, Osseiran-Moisson R et al (2014) The effectiveness of a twice daily skin-moisturising regimen for reducing the incidence of skin tears. *International Wound Journal* 11:446-53
- Carville K, Newall G, Haslehurt P et al (2007) STAR: A consensus for skin tear classification. *Primary Intention* 15(1):18-28
- Carville K, Leslie G, Osseiran-Moisson R et al (2014) The effectiveness of a twice-daily skin-moisturising regimen for reducing the incidence of skin tears. *Int Wound J* 11: 446-53
- Chaloner DM, Franks PJ (2000) Validity of the Walsall Community Pressure Sore Risk Calculator. *Br J Community Nurs* 5(6):266-76
- Clark A (2003) The psychological impact of living with skin disease. *Nursing Times*. Available at www.nursingtimes.net/the-psychological-impact-of-living-with-skin-disease/199676.article (accessed 30.08.2018)
- Clinical Epidemiology and Health Service Evaluation Unit: Melbourne Health (2004) Best practice approaches to minimize functional decline in the older person across the acute, sub-acute, and residential aged care settings. Victorian Government Department of Human Services on behalf of the Australian Health Ministers' Advisory Council, Melbourne
- Cooper P, Gray D (2008) Comparing Tena Wash Mousse with Clinisan Foam Cleanser: the results of a comparative study. *Wounds UK* 4(3):12-21
- Cooper P, Gray D (2001) Comparison of two skin care regimes for incontinence. *British Journal of Nursing* 10(6):(suppl) S6-S10
- Cork MJ (1997) The importance of skin barrier function. *J Dermatol Treat* 8: s7-13
- Cork MJ, Danby S (2009) Skin barrier breakdown: a renaissance in emollient therapy. *British Journal of Nursing* 18:978-80
- Cowdell F (2012) Maintaining skin health in older people. *Nursing Times* 108(49):16-20
- Curley MA, Razmus IS, Roberts KE et al (2003) Predicting pressure ulcer risk in pediatric patients: the Braden Q scale. *Nurs Res* 52(1): 22-33
- Danby S, Al Enezi T, Sultan A (2011) The effect of aqueous cream BP on the skin barrier of healthy volunteers with a previous history of atopic dermatitis *British Journal of Dermatology* 165:329-34
- Del Rosso J, Friedlander SF (2005) Corticosteroids: options in the era of steroid-sparing therapy. *J Am Acad Dermatol* 53:850-8
- Department of Health Australia (2015) Best care for older people everywhere: The toolkit. Available at: www.health.vic.gov.au/older/toolkit/index.htm (accessed 30.08.2018)
- Dougherty L, Lister S (2008) *The Royal Marsden Hospital Manual of Clinical Nursing Procedures*. Oxford: Wiley-Blackwell
- Downey L, Lloyd H (2008) Bed bathing patients in hospital. *Nursing Standard* 22(34):35-40
- Ersser SJ, Maguire S, Nicol H et al (2009) Best practice in emollient therapy: A statement for healthcare professionals. *Dermatological Nurs Suppl* 8(3):1-22
- Ersser SJ, Gelliffe K, Voegeli D, Regan S (2005) A critical review of the inter-relationship between skin vulnerability and urinary incontinence and related nursing intervention. *International Journal of Nursing Studies* 42:823-35
- Fendler E (2000) Physico-chemical considerations. In: Lodén M and Maibach HI (eds) *Dry Skin and Moisturisers – Chemistry and Function*. CRC Press, Boca Raton
- Fine JD (2010) Inherited epidermolysis bullosa: past, present, and future. *Ann NY Acad Sci* 1194:213-22
- Flanagan M, Fletcher J (2003) Tissue viability: Managing chronic wounds. In: Booker C, Nicol M (eds) *Nursing adults: The practice of caring*. Mosby, St Louis
- Fluhr J, Cavallotti C, Berardesca E (2008) Emollients, moisturizers and keratolytic agents in psoriasis. *J Dermatol Treat* 8:s25-7
- Flynn TC, Petros J, Clark RE, Viehman GE (2001). Dry skin and moisturizers. *Clin Dermatol* 19(4):387-92
- Green L (2010) The effect of skin conditions on patients' quality of life. *Nursing Standard* 25(9):48-55
- Günnewicht B, Dunford C (2004) *Fundamental aspects of tissue viability nursing*. Southampton: Quay

REFERENCES

- Harding K, Dowsett C, Fias L et al (2015) Simplifying venous leg ulcer management: Consensus recommendations. *Wounds International*. Available to download from www.woundsinternational.com
- Held E, Lund H, Agner T (2001). Effects of different moisturizers on SLS-irritated human skin. *Cont Derm* 44(4):229-34
- Hengge UR (2008) Topical corticosteroids. In: Gaspari AA, Tyring SK (eds) *Clinical and Basic Immunodermatology*. London: Springer-Verlag
- Hoare C, Li Wan Po A, Williams H (2000) Systemic review for treatments of atopic eczema. *Health Tech Assess* 14(37):1-191
- Inamadar AC, Palit A (2013) *Critical care in dermatology*. Jaypee Medical Publishing, Delhi
- Korting HC, Kober M, Mueller M, Braun-Falco O (1987) Influence of repeated washings with soap and synthetic detergents on pH and resident flora of the skin of forehead and forearm: Results of a cross-over trial in health probationers. *Acta Derm Venerol* 67(1):41-7
- Kottner J, Lichterfeld A, Blume-Peytavi U (2013) Maintaining skin integrity in the aged: a systematic review. *British Journal of Dermatology* 169:528-42
- Koyano K, Nakagani G, Iizaka S et al (2016) Exploring the prevalence of skin tears and skin properties related to skin tears in elderly patients at a long-term medical facility in Japan. *Int Wound Journal* 13(2) 189–97
- Krasner D (2010) Skin tears: Understanding problem leads to prevention, proper care. *Journal of American Geriatric Society* 29(5):30-3
- Kirsner R, Froelich C (1998) Soap and detergents: understanding their composition and effect. *Ostomy Wound Management* 44(3A suppl):62S-70S
- Kucharekova M, Schalkwijk J, Van De Kerkhof PCM et al (2002) Effect of a lipid-rich emollient containing ceramide 3 in experimentally induced skin barrier dysfunction. *Contact Dermatitis* 46(6):331-8
- Kuhn BA, Coulter SJ (1992) Balancing ulcer cost and quality equation. *Nurs Econ* 10(5):353-9
- Lavender T, Bedwell C, Roberts SA et al (2013) Randomized controlled trial evaluating a baby wash product on skin barrier function in healthy, term neonates. *J Obstet Gynecol Neonatal Nurs* 42(2):203-14
- LeBlanc K, Baranoski S (2011) Skin tears: State of the science: consensus statements for the prevention, prediction, assessment, and treatment of skin tears. *Advances for Skin & Wound Care* 24(9):2-15
- LeBlanc K, Campbell K, Beeckman D et al (2018) Best practice recommendations for the prevention and management of skin tears in aged skin. *Wounds International*. Available to download from www.woundsinternational.com
- LeBlanc K, Baranoski S, Christensen D et al (2013) International Skin Tear Advisory Panel: A tool kit to aid in the prevention, assessment, and treatment of skin tears using a simplified classification system. *Adv Skin Wound Care* 26(10):459-76
- LeBlanc K, Baranoski S, Christensen D et al (2016) The art of dressing selection: a consensus statement on skin tears and best practice. *Adv Skin Wound Care* 29(1): 32-46
- LeBlanc K, Christensen D, Orsted H, Keast D (2008) Prevention and treatment of skin tears. *Wound Care Canada* 6(1):14-30
- Loden M (2003) The skin barrier and use of moisturizers in atopic dermatitis. *Clin Dermatol* 21:145-57
- Lowthian P (1989) Identifying and protecting patients who may get pressure sores. *Nurs Stand* 4(4):26-9
- Malnutrition Advisory Group (2003) The 'MUST' Report. Nutritional Screening for Adults: A Multidisciplinary Responsibility. Available at: www.bapen.org.uk (accessed 13.01.2016)
- McNichol L, Bianchi J (2016) MARS (medical adhesive-related skin injuries) Made Easy. Wounds UK. Available at www.wounds-uk.com
- Medicines and Healthcare Products Regulatory Agency (2016) Drug safety warning: Paraffin-based treatments: risk of fire hazard. Available at www.gov.uk/drug-safety-update/paraffin-based-skin-emollients-on-dressings-or-clothing-fire-risk (accessed 30.08.2018)
- Moncrieff G, Cork M, Lawton S et al (2013) Use of emollients in dry skin conditions: consensus statement. *Clinical and Experimental Dermatology* 38(3):231-8
- Moncrieff G, Van Onselen J, Young T (2015). The role of emollients in maintaining skin integrity. *Wounds UK* 11(1):68-74
- Mosteller RD (1987) Simplified calculation of body-surface area. *N Engl J Med* 317:1098
- National Institute for Health and Care Excellence (2007) Atopic eczema in children. Management of atopic eczema in children from birth up to the age of 12 years. Clinical guideline CG57. Available online at www.nice.org.uk/guidance/cg57 (accessed on 30.08.2018)
- National Institute for Health and Care Excellence (2014) Pressure ulcers: prevention and management. NICE guideline CG179. Available at: www.nice.org.uk/guidance/cg179 (accessed 30.08.2018)
- Nazarko L (2005) Preventing and treating skin tears. *Nurs Resident Care* 7(12):549-50
- NHS (2010) Skincare of patients receiving radiotherapy. NHS Quality Improvement Scotland
- NHS Midlands and East (2013) How to keep the skin healthy. Available online at www.lovegreatskin.co.uk (accessed 30.08.2018)
- Nicol NH (2005) Anatomy and physiology of the skin. *Dermatology Nursing* 17(1):62
- North American Nursing Diagnosis Association (2018) *Nursing Diagnoses, Definitions and Classification*. Available at: www.nanda.org/nanda-i-publications/

- Ousey K, Bianchi J, Beldon P, Young T (2012) Identification and treatment of moisture lesions. *Wounds UK* (Suppl). Available from www.wounds-uk.com
- Penzer R, Ersser SJ (2010) *Principles of Skin Care*. Chichester: Wiley-Blackwell.
- Peters J (2011) Caring for dry and damaged skin in the community. *British Journal of Community Nursing* 6(12):645-51
- Proksch E, Brandner JM, Jensen JM (2008).The skin: an indispensable barrier. *Exp Dermatol* 17(12): 1063-72
- Rappl LM (2008) Physiological changes in tissues denervated by spinal cord injury tissues and possible effects on wound healing. *International Wound Journal* 5:435-44
- Rawlings A, Scott I, Harding C, Bowser P (1994) Stratum corneum moisturisation at the molecular level. *J Invest Dermatol* 103(5):731-40
- Sawamura D, Nakano H, Matsuzaki Y (2010) Overview of epidermolysis bullosa. *J Dermatol* 37(3):214-9
- Schofield J (2013) Skin integrity and dermatology. In: Flanagan M (ed) *Wound Healing and Skin Integrity Principles and Practice*. Chichester: Wiley-Blackwell.
- Scottish Intercollegiate Guidelines Network (2011) Management of atopic eczema in primary care: a national clinical guideline. Available online at www.sign.ac.uk/sign-125-management-of-atopic-eczema-in-primary-care.html (accessed 30.08.2018)
- Shipman AR, Millington GWM (2011) Obesity and the skin. *The British Journal of Dermatology* 165(4):743-50
- Sibbald G, Orstead H, Courts P, Keast D (2006) Best practice recommendations for preparing the wound bed. *Wound Care Canada* 4(1):19-29
- Sussman G, Golding M (2011) Skin tears: Should the emphasis be only their management? *Wound Practice and Research* 19(2):66-77
- Timmons J (2006) Skin function and wound healing physiology. *Wound Essentials* 1:8-17
- Tortora GJ, Grabowski SR (1993) *Principles of Anatomy and Physiology*. London: Harper Collins
- Voegeli D (2008a) LBF 'no-sting' barrier wipes: skin care using advanced silicone technology. *British Journal of Nursing* 17(7):472-6
- Voegeli D (2008b) The effect of washing and drying practices on skin barrier function. *Journal of Wound, Ostomy and Continence Nursing* 35(1):84-90
- Voegeli D (2007) Factors that exacerbate skin breakdown and ulceration, In: *Skin Breakdown, the silent epidemic*. Hull: Smith and Nephew Foundation
- Warner MR, Camisa C (2013) Topical immunomodulatory and antiproliferative drugs: topical corticosteroids. In: Wolverton S (ed) *Comprehensive Dermatology* (3rd ed). Edinburgh: Saunders/Elsevier
- Waterlow J (2005) *Pressure Ulcer Prevention Manual*. Taunton: Waterlow
- White MW, Karam S, Cowell B (1994) Skin tears in frail elders: A practical approach to prevention. *Geriatric Nursing* 15(95):95-9
- Wingerd B (2013) *The human body: Concepts of anatomy and physiology* (3rd ed). London: Lippincott, Williams and Wilkins
- Wounds UK (2012) Best Practice Statement. Care of the Older Person's Skin (2nd edition)
- Wounds UK (2015) All Wales Guidance for the prevention and management of skin tears. Available at: www.welshwoundnetwork.org/files/8314/4403/4358/content_11623.pdf (accessed 30.08.2018)
- Yosipovitch G, Tur E, Cohen O, Rusecki Y (1993). Skin surface pH in intertriginous areas in NIDDM patients: Possible correlation to candidal intertrigo. *Diabetes Care* 16(4):560-3
- Young T (2015) The introduction of a novel skin care regimen in an elderly in-patient population. Poster presented at: Skin Academy Symposium. Barcelona, Spain. March 2015
- Wagner TH, Hu TW (1998) Economic costs of urinary incontinence in 1995. *Urology* 51:355-61

Wounds_{UK}