Clinical Practice Guidelines

for the Prediction and Prevention of Pressure Ulcers

(abridged version)

Australian Wound Management Association Inc. Press

These guidelines are prepared in a full version, an abridged version and as a pocket guide. Further copies of all three versions can be ordered by using the order form on the Australian Wound Management Association Inc. website <www.awma.com.au>. This document is sold at a cost that covers the costs of printing and distribution. The full version of the guidelines can also be downloaded free of charge from the website.

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Foreword

A great deal has been written about pressure ulcers in the literature over the last few decades. Despite a general consensus that pressure ulcers are preventable adverse events, they continue to remain a problem in all health care settings and extract a considerable fiscal and social cost.

In 1997, Young [1] estimated the cost of managing a stage four (Stage 5 Torrance classification) pressure ulcer at $A61,230. Davenport [2] estimated the cost of treating a stage two pressure ulcer at an additional $A586 per month. In the United Kingdom, the cost of treating a stage four ulcer is estimated as high as £40,000 [3].

In addition to the financial costs the social cost must also be considered in terms of pain, discomfort, decreased mobility, loss of independence and even social isolation. As health care professionals these are all factors that warrant our concern.

The aim of these guidelines is to present current research on the prediction and prevention of pressure ulcers in adults in an Australian context. These guidelines have been written by a national multidisciplinary team for all health care professionals across all health care settings. Recent systematic reviews from Australia, United States of America and the United Kingdom have been evaluated to provide a comprehensive approach to the prevention of pressure ulcers. Further details and updates of these guidelines will be available from the Australian Wound Management Association website, <www.awma.com.au>.

It is pertinent to acknowledge the serious gap in the evidential basis for pressure ulcer prevention. In most instances, there is limited research to support the recommendations listed. We hope that this review highlights the need for, and encourages, further research in all areas of pressure ulcer prevention and management.

1.0 Introduction

Clinical Practice Guidelines are designed to assist health care professionals and consumers in making appropriate clinical decisions. Guidelines are systematically developed statements about care for specific clinical conditions and are based on best available scientific evidence [4]. Guidelines are not intended to be prescriptive, but offer a framework within which to apply clinical judgement and consider individual patient needs.

These Clinical Practice Guidelines for the Prediction and Prevention of Pressure Ulcers have been developed by the Australian Wound Management Association (AWMA), Pressure Ulcer Interest Subcommittee (PUISC). This is a national body which consists of health care professionals from a range of disciplines and settings. The purpose of this subcommittee was to develop national clinical guidelines to identify adults 'at risk' of developing pressure ulcers and outline interventions for prevention. (The term 'adult' includes young adults (adolescents) from 14 years and over). The guidelines include a discussion on aetiology of pressure ulcer development and a selection of pressure ulcer risk assessment tools.

Further objectives of the subcommittee were: to collate national data on the incidence and prevalence of pressure ulcers in Australia; produce an inventory of pressure reducing and pressure relieving equipment; disseminate and update the guidelines.

These guidelines are not intended as a basis for care of infants and children. Nor do these guidelines describe wound management for pre-existing pressure ulcers. However, the broader principles of risk assessment and risk management are applicable to the management of individuals with pre-existing pressure ulcers. These principles include: identifying individuals 'at risk' and associated risk factors; implementing strategies aimed at eliminating risk factors and protecting the individual from potential further risk, as well as continually evaluating the effectiveness of the care delivered.

This booklet is an abridged version of the complete guidelines and focuses specifically on staging of pressure ulcers, risk factors associated with pressure ulcer development, selection of risk assessment tools, preventative management related to skin care, mechanical loading and selection of support surfaces. Further information related to incidence, prevalence and aetiology of pressure ulcers as well as risk management approaches for the prevention of pressure ulcers can be found in the full version of the guidelines.

These guidelines offer recommendations to help health care professionals provide quality care across a range of health care settings, such as acute care, post acute care, extended care facilities, nursing homes and home settings. The recommendations have been developed by a multidisciplinary team and are intended for all clinicians who examine and treat persons

at risk of developing pressure ulcers. This includes: the family; doctors; nurses; dietitians; physiotherapists and occupational therapists. The levels of evidence to support the recommendations have been evaluated according to the quality and quantity of available scientific data, and have been rated using the designation of levels of evidence as recommended by the National Health and Medical Research Council (Table 1).

Risk factors or recommendations that were agreed by the committee and which were supported by other professional groups, but which did not have adequate research support, are referred to as consensus statements.

The recommendations are generic. Discipline specific responsibilities must be decided according to professional qualifications and institutional policy.

2.0 Staging of pressure ulcers

Pressure ulcers are classified by the depth of tissue damage. The staging of pressure ulcers recommended for use by this subcommittee is consistent with the recommendations of the National Pressure Ulcer Advisory Panel (NPUAP)[5]. These recommendations were derived from previous staging systems proposed by Shea[6] and the International Association for Enterostomal Therapy (IAET)[7]. Stage 1 has recently been updated by the NPUAP to include criteria for individuals with darkly pigmented skin[8] (Figure 1).

Table 1. Strength of supporting evidence.

I	Evidence obtained from a systematic review of all relevant randomised controlled trials.
II	Evidence obtained from at least one properly designed randomised controlled trial.
III-1	Evidence obtained from well-designed pseudo-randomised controlled trials (alternate allocation or some other method).
III-2	Evidence obtained from comparative studies with concurrent controls and allocation not randomised (cohort studies), case controlled studies, or interrupted time series with a control group.
III-3	Evidence obtained from comparative studies with historical control, two or more single-arm studies, or interrupted time series without a parallel control group.
IV	Evidence obtained from case series, either post-test or pre-test and post-test.

The staging is as follows:

Stage 1: Observable pressure-related alteration(s) of intact skin whose indicators as compared to the adjacent or opposite area on the body may include changes in one or more of the following: skin temperature (warmth or coolness), tissue consistency (firm or boggy feel) and/or sensation (pain, itching).

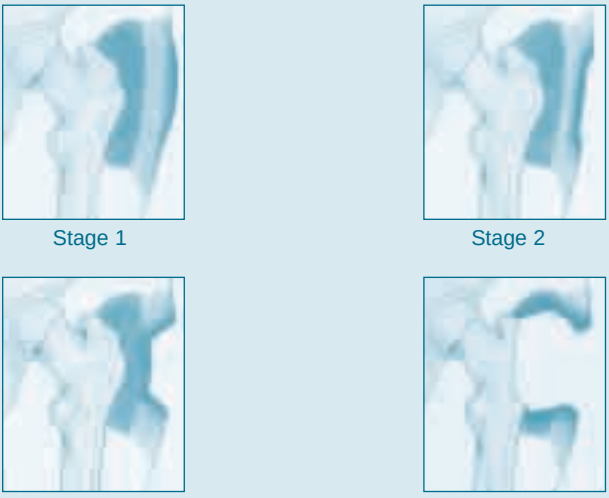
The ulcer appears as a defined area of persistent redness in lightly pigmented skin, whereas in darker skin tones, the ulcer may appear with persistent red, blue or purple hues.

Stage 2: Partial thickness skin loss involving epidermis and/or dermis. The ulcer is superficial and presents clinically as an abrasion, blister, or shallow crater.

Stage 3: Full thickness skin loss involving damage or necrosis of subcutaneous tissue that may extend down to, but not through, underlying fascia. The ulcer presents clinically as a deep crater with or without undermining of adjacent tissue.

Stage 4: Full thickness skin loss with extensive destruction, tissue necrosis or damage to muscle, bone, or supporting structures (for example, tendon or joint capsule). Undermining and sinus tracts may also be associated with Stage 4 pressure ulcers.

Figure 1. Stages of pressure ulcers.



There are limitations to any staging system and the following points should be noted:

- Reactive hyperaemia may easily be confused with a *Stage 1* pressure ulcer. Reactive hyperaemia is a normal compensatory mechanism following an episode of reduced perfusion from localised pressure. Relief of this pressure results in a large and sudden increase in blood flow to the affected tissue [9]. When a stage 1 pressure ulcer is detected during prevalence or incidence survey the individual should be repositioned and re-evaluated after 30 minutes.
- Identification of *Stage 1* pressure ulcers may be difficult in individuals with darkly pigmented skin.
- When necrotic tissue (eschar or slough) is present the true extent of tissue damage is masked. Accurate staging of the pressure ulcer is not possible until the necrotic tissue has sloughed or the wound has been debrided. Pressure ulcer staging systems should be used to document the deepest anatomy involved in the ulcer after necrotic tissue has been removed.
- Staging of healing pressure ulcers (reverse staging) remains controversial (as the healing of a *Stage 4* pressure ulcer is not equivalent to a *Stage 2* pressure ulcer) but a system may need to be developed for use in management protocols [10].
- The NPUAP recommend that the progress of a healing pressure ulcer be documented by objective parameters such as: size, depth, amount of necrotic tissue, amount of exudate, and presence of granulation and epithelial tissue [10].
- The staging system depends on visual observation of tissue involvement only. Health care professionals involved in individual care should also note the following factors: location; dimensions or surface area of the wound; nature/description of the wound bed, wound edges and surrounding skin; the amount of exudate; severity of pain; and other factors which may impede wound healing [11].

3.0 Risk factors

Any factor which exposes the skin to excessive pressure, or diminishes its tolerance to pressure, is considered a 'risk factor'. Many risk factors are mentioned in the literature but few have been rigorously evaluated. The most thorough evaluation would be that a proposed factor is repeatedly demonstrated as an independent risk factor in prospective, longitudinal studies. Subsequent evaluation would then demonstrate that elimination or modification of that risk factor reduces the incidence of pressure ulcer development.

Using the framework described by Braden and Bergstrom (Figure 2)[12] an attempt has been made to evaluate the strength of evidence supporting or discounting each risk factor (Table 1)*. Risk factors not shown in this model, for which evidence exists, have also been included, for example, dry skin. Evidence has been gathered largely from primary sources, however several reviews have also been cited[9, 12, 13].

3.1 Intensity and duration of pressure

Risk factors which contribute to prolonged and intense pressure can be classified as factors which impede mobility, activity and sensory perception. Both immobility and diminished activity are considered primary risk factors in the development of pressure ulcers[9].

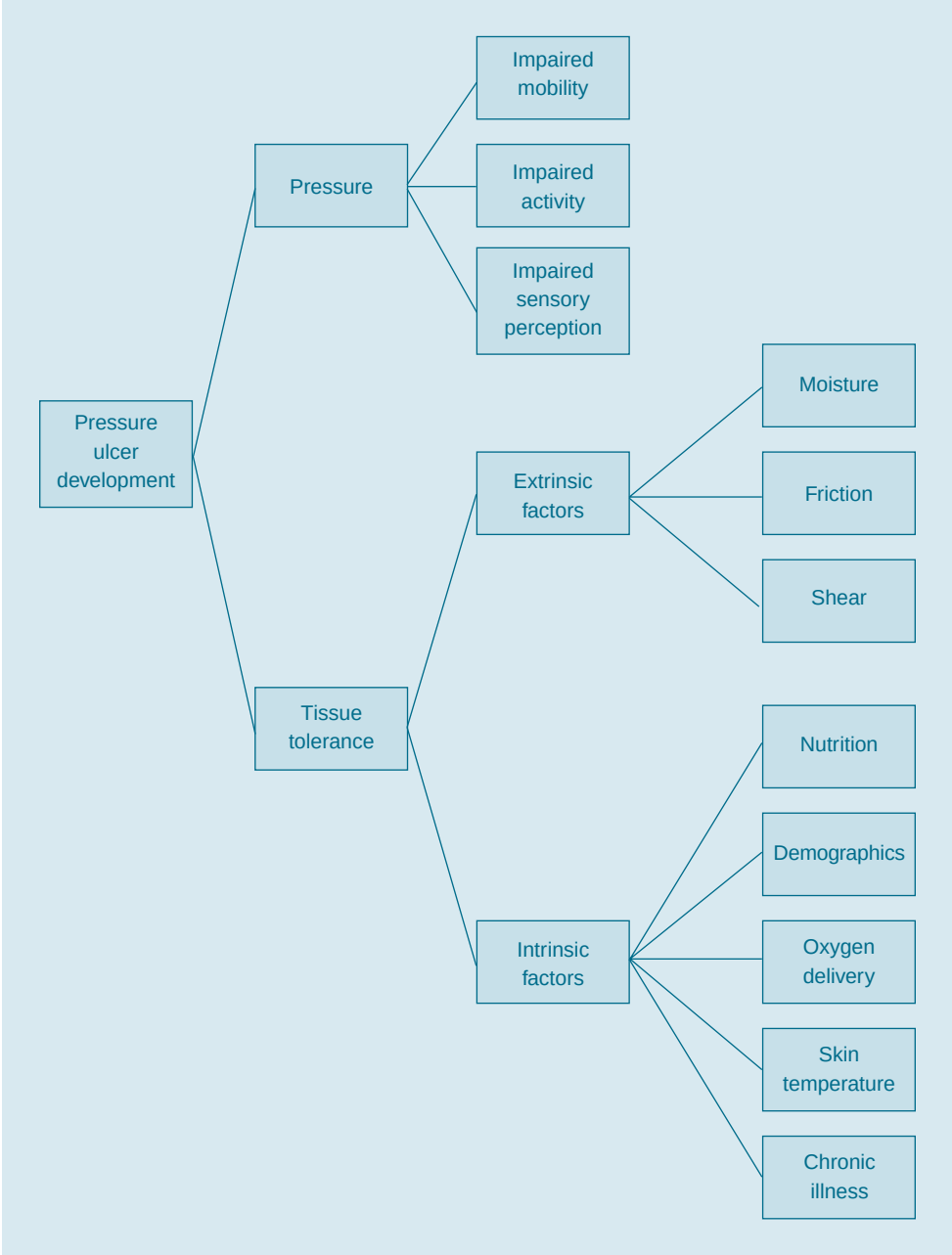
Impaired mobility refers to the degree to which the individual is unable to independently change body position. There are numerous reasons an individual will suffer loss of mobility, ranging from a diminished conscious state induced by trauma, disease or anaesthetics, to hemiplegia, para/quadriplegia, trauma to the lower limbs (especially fractured hips), obesity, pain or burns. Diminished activity describes individuals who are able to control their body position but cannot avoid intense or prolonged periods of pressure, for example, individuals who are bed ridden, wheelchair bound or chairfast[14].

Immobility and diminished activity were the most commonly identified risk factors in both prospective and retrospective studies[15-23]. Pase[22] demonstrated that the more mobile or active the individual, the lower the incidence of pressure ulcers *(level of evidence III-2)*.

Impaired sensation or a reduced ability to respond to discomfort or pain predisposes the individual to prolonged and intense pressure[12]. Risk factors related to this include spinal injury, an impaired cognitive state, or an altered level of consciousness.

* The level of evidence has been highlighted against specific risk factors in this section of the guidelines. In subsequent sections the same classification for levels of evidence is used to support recommendations and the level of evidence is listed with each recommendation.

Figure 2. Pressure ulcer development model based on Braden and Bergstrom's conceptual schema for the study of the aetiology of pressure ulcers [12].



Studies on sensory loss were largely associated with spinal injury. Total loss of sensory and motor function, and complete paralysis with some sensation below the level of the lesion, have been demonstrated as significant risk factors for pressure ulceration [24, 25] *(level of evidence III-2)*. Impaired cognitive state or an altered level of consciousness, have also been identified as risk factors [16, 19, 26] *(level of evidence III-2)*.

Surgery may also be classified as a risk factor under this category. The individual is immobilised for prolonged periods, as well as being anaesthetised and unable to respond to the stimulus of prolonged, intense, localised pressure. Intraoperative time exceeding three hours is a predisposing factor for pressure ulceration [27-30]. Other studies support this when induction time (total anaesthestic time) is taken into consideration, along with other factors such as age and use of an extracorporeal circuit [31, 32] *(level of evidence III-2)*.

3.2 Tissue tolerance for pressure

Tissue tolerance is the ability of both the skin and its supporting structures to endure the effects of pressure without adverse sequelae. In other words, tolerance is how well the tissue acts as a cushioning factor, transferring pressure loads from the skin surface to the skeleton below [12, 33]. Tissue tolerance is affected by both extrinsic and intrinsic factors (Figure 2). *It is important to note that these factors in the absence of pressure will not cause pressure ulceration.*

3.2.1 Extrinsic factors

Extrinsic factors influence tissue tolerance by impinging on the skin surface and reflect the degree to which the skin is exposed to shear, friction and moisture [12].

Shear is created by a parallel load forcing the skeleton to slide against a resistance created between the skin and its contact surface. The epidermis and dermis remain relatively anchored to the contact surface while the deep fascia moves with the skeleton. The blood vessels between the dermis and deep fascia may be distorted, resulting in thrombosis and capillary occlusion [34-38].

When relatively high levels of shear are present, the amount of pressure required to produce vascular occlusion is only about half the amount when shear is not present [39-41]. In the formation of pressure ulcers the primary force in generating mechanical occlusion is pressure, but shear also plays a significant contributory role *(consensus statement)*.

Friction is the force related to two surfaces moving across one another [42]. Friction works in conjunction with gravity to cause shear by creating that resistance between the skin and the contact surface. Friction is not a primary factor in pressure ulcer development but has been

demonstrated to increase the skin's susceptibility to pressure [38, 43] and may cause the initial break in the skin *(consensus statement)*.

Moisture is thought to alter the resilience of the epidermis to external forces. Exposure to moisture for prolonged periods of time causes maceration of the epidermis, making it more friable and susceptible to injury. Moisture may be in the form of urine, faeces, perspiration, and drainage from fistulae or wounds [12].

Although urinary and faecal incontinence are widely cited as risk factors for pressure ulcer formation, there is conflicting evidence in the literature. Urinary incontinence has been cited as a significant risk factor in some studies [24, 44-49] *(level of evidence III-2)*.

Other studies suggest that faecal incontinence is more important than urinary incontinence in pressure ulcer formation [17, 19, 50-52]. In addition to maceration, faecal incontinence exposes the skin to bacteria and toxins which act as major irritants [53] *(level of evidence III-2)*.

It is important to also note that, urinary and faecal incontinence have also been cited as non-significant risk factors in studies [16, 22, 54].

3.2.2 Intrinsic factors

Intrinsic factors are those that influence the skin's supporting structures and/or the vascular and lymphatic system (Figure 2) [12].

Individual characteristics of age (>65years) [15, 31, 32, 55] *(level of evidence III-2)*, male gender [17, 55], and Caucasians [55] have been implicated as predisposing factors for pressure ulceration *(level of evidence III-2)*.

Chronic illnesses which have been identified as risk factors are: diabetes [17, 19, 32], and metastatic carcinoma [19] *(level of evidence III-2)*. Other chronic illnesses which have been identified as predisposing factors with little evidence are: lymphoedema [15], and renal failure or renal impairment [56].

Numerous studies have indicated that poor nutrition plays a significant role in the development of pressure ulcers. Identification of critical nutrients that directly contribute to pressure ulceration however has not yet been achieved [57-59]. Risk factors such as malnutrition [15, 19, 57, 60, 61], inadequate protein/ hypoalbuminaemia or poor energy intake [16, 61, 62], and recent weight loss [61] have been identified in prospective and retrospective studies as independent risk factors *(level of evidence III-2)*.

Other factors such as vitamin C deficiency [63-65] *(level of evidence III-2)* and inability to feed oneself [17] have been identified in some studies as possible risk factors. Mineral deficiencies

of zinc and other trace elements have been implicated as contributors to tissue breakdown [66]. However, the above deficiencies are also observed in hospitalised elderly individuals who are free of pressure ulcers [63].

Factors which impair the delivery of oxygen to the tissues have been implicated in predisposing to pressure ulceration. Such factors are: anaemia [16, 21, 57-59, 67-69]; low systolic or diastolic blood pressures [33, 70-75]; circulatory abnormalities [19, 72, 74]; tobacco smoking [67, 76, 77], and autonomic dysfunction from spinal cord injury resulting in lower than normal transcutaneous oxygen tensions [78] *(level of evidence III-2)*.

Skin temperature elevation was associated with pressure ulcer development in several studies [50, 79-82]. The association has not been fully explained, however, it may be related to an increasing oxygen demand in tissue already deprived of oxygen. With each degree centigrade rise in temperature, there is an increase in tissue metabolism and oxygen demand by 10 percent [82] *(consensus statement)*.

Dry skin has been identified as a sign associated with pressure ulceration [15, 23] *(level of evidence III-2)*. However, excessive skin washing has not been identified as a risk factor in any studies, despite it being a theoretical risk factor.

Many of the above risk factors are not independent of each other – for instance, nutritional status may be referred to as malnutrition, inadequate protein/energy intake, hypoalbuminaemia, (recent) weight loss or unable to feed one's self. Malnutrition may also be associated with old age, and/or chronic illness. Old age is associated with increased risk of hospitalisation, chronic illness, poor peripheral perfusion and loss of peripheral sensation. The above risk factors have a sound theoretical basis but little prospective randomised controlled interventional evaluation has occurred. The multifactorial nature of pressure ulcers limits researchers ability to independently evaluate individual risk factors and controlled trials are often limited to animal models that diminish the relevance of results.

4.0 Risk assessment tools

The purpose of a risk assessment tool is to identify individuals 'at risk' of developing pressure ulcers. A systematic assessment for pressure ulcer risk factors should be incorporated into the assessment of all individuals in any health care setting. The presence of any condition that reduces mobility or diminishes activity to the point where the individual is unable to independently move or change positions to relieve pressure, should automatically place the individual in the 'at risk' category [9, 16, 19, 21, 22]. Additional risk factors

contributing to pressure ulcer formation should be considered as they may place the individual at higher risk.

The aim of any risk management strategy is to shift the focus from crisis intervention and blame, to preventative management. In the prevention of pressure ulcers, health care professionals may use professional judgement, a risk assessment tool or a combination of both [83]. There are numerous risk assessment tools for pressure ulcers used in the UK and the USA, but their use appears to be sporadic and limited in Australia.

Risk assessment tools are based on risk factors known to predispose an individual to pressure ulcers (see Risk Factors section). Most risk assessment tools utilise a numerical scoring system to weight the severity of risk into the categories of: no risk, low, medium, or high risk. These tools assist health care professionals to gather information systematically and identify individuals 'at risk'. Risk assessment tools are *not* designed to replace clinical judgement but rather to assist in decision making in order to channel resources appropriately [84].

Selection of a pressure ulcer risk assessment tool is often a matter of personal preference [85]. Any tool should be 'user-friendly' and have clearly defined, commonly understood assessment categories, which have a proven relationship to the development of pressure ulcers [86]. A good risk assessment tool should also meet basic requirements of validity and reliability (see Tables 2 and 3) [87]. The tool must identify those persons it claims to identify (validity) and must identify the same person regardless of who uses the tool (reliability) [88].

Table 2. Measures of validity [87].

Sensitivity – the accuracy in predicting those who develop a pressure ulcer.

Specificity – the accuracy in predicting those who do not develop a pressure ulcer.

The predictive value of positive tests – percentage of those 'at risk' of pressure ulcer development who actually develop a pressure ulcer.

The predictive value of negative tests – the percentage of those not 'at risk' of developing a pressure ulcer who do not develop a pressure ulcer.

Table 3. Measures of reliability [87, 88].

Percentage agreement – the percentage of occasions in which different people using the same instrument obtain the same results.

Correlation – can be used to quantify the magnitude and direction of a relation. Scores range from –1.00 to +1.00. The closer to -1.00 or +1.00 the better the reliability of the tool.

Few pressure ulcer risk assessment tools described in the literature have been rigourously tested for reliability, sensitivity, specificity or predictive value [89]. The most frequently scrutinised tools are the Norton Risk Assessment Score, The Waterlow Risk Assessment Card and The Braden Scale.

The Norton Risk Assessment Score is a widely used risk assessment tool in Australia. Although simple, it has been criticised for under-prediction and has only been validated using elderly patients in hospital settings [9]. The Waterlow Risk Assessment Card is a comprehensive tool which is widely distributed as a laminated pocket sized card, for quick reference. However, it is criticised for its complexity and overprediction [87, 90]. The Braden Scale for Prediction of Pressure Sore Risk is widely used in the USA. It has proven reliable when used by a registered nurse and validity appears to compare favourably with the Norton and Waterlow tools [87, 88, 91, 92].

It is difficult to recommend any one risk assessment tool over the other as there is great variability in reported validity and reliability [89]. This probably reflects differences in study settings, populations and outcome measures (prevalence or incidence rates). Not all studies include Stage I ulcers as an outcome and there are inconsistent definitions of these lesions. The degree to which preventative interventions have been implemented in response to the findings of the risk assessments may have also contributed to the variability in their reported performance. There is no firm evidence to recommend adoption of any assessment tool or the assessment of any single risk factor, or combination of risk factors as better predictors of risk [9, 89].

To demonstrate value, a pressure ulcer risk assessment tool should be linked to intervention. However, there are few studies which demonstrate that use of a risk assessment tool promoted early intervention of patients considered at 'high risk'. Salvadalena *et al* [93] found that intervention measures were used only 27% of the time after the identification of individuals 'at risk'. Abruzzese [94] also found that nurses using an assessment scale did not specify any more nursing intervention for preventing pressure ulcers than nurses who did not use a scale.

Risk assessment is not only part of the admission process, but part of the ongoing preventative management of each individual. A pressure ulcer risk assessment should be performed:

- on admission to the health care facility or home care service;
- regularly throughout the length of stay;
- following a change in the individuals condition which places that person "at risk", for example a sudden deterioration in condition; or

- prior to, during and following prolonged procedures which involve reduced mobility and hardened surfaces[9, 95].

Individuals identified 'at risk' of developing pressure ulcers should have a comprehensive management plan instituted in order to protect the individual against the forces of pressure shear and friction and to reduce the risk of pressure ulcers[96-102].

Consensus statements

1. *Risk assessment should be performed on admission to any health care facility or home care service, following a change of health status and at appropriate intervals throughout the continuum of care.*
2. *The 'at risk' status and risk factors should be documented regularly or following a change in the individuals condition.*

Recommendations

1. *The presence of any condition which reduces mobility or diminishes activity to the point where the individual is unable to independently move or change positions to relieve pressure, should automatically place the individual in the 'at risk' category[16, 19, 21, 22] (level of evidence III-2).*
2. *Individuals identified 'at risk' of developing pressure ulcers should have a comprehensive preventative management plan instigated which aims to maintain tissue tolerance to pressure and protect the individual against the forces of pressure, shear and friction[96-102] (level of evidence II).*

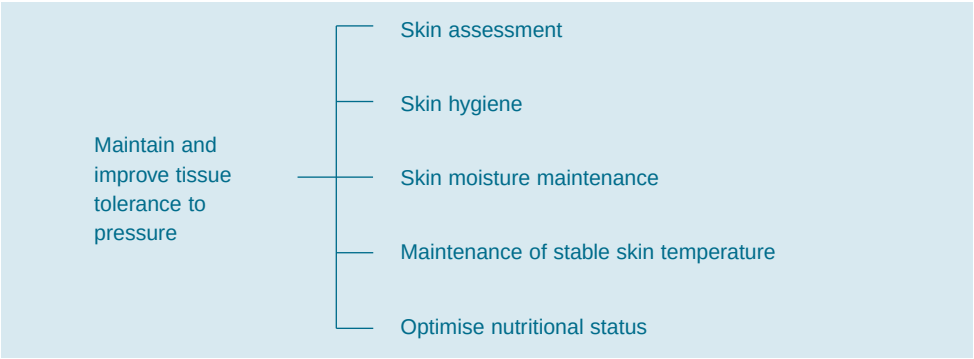
5.0 Skin care

All individuals identified as 'at risk' of developing pressure ulcers should have a management plan that aims to improve and maintain their tissues' tolerance to pressure. The management plan should incorporate the following aspects of care: skin assessment; optimal skin hygiene and skin moisture maintenance, and maintenance of a stable skin temperature. In addition to this the 'at risk' individual's nutritional status should be monitored and reassessed regularly (Figure 3).

5.1 Skin assessment

Skin assessment is fundamental to the early identification of skin damage and provides a baseline for the planning and evaluation of interventions. Individuals 'at risk' of developing pressure ulcers should have a comprehensive skin inspection at least daily for signs of impaired skin integrity[9, 103].

Figure 3. Skin care.



Localised skin checks should occur with each repositioning or turn. Attention should be paid to skin overlying bony prominences, for example the sacral area, the heels, and greater trochanters. These bony prominences are not designed to support external pressure. They are close to the body surface, have less subcutaneous fat and muscle and are subsequently stressed when exposed to high concentrations of body weight over a relatively small surface area [103].

In instances where a pre-existing pressure ulcer is present this should be noted in the clinical record in terms of location and severity with a description of the pressure ulcer and surrounding skin (see Section 7.0, Documentation). In addition to this a photograph or sketch will aid reassessment and evaluation of management.

5.2 Skin hygiene

The normal pH of the skin is between 4 and 6.8 and is referred to as the acid mantle. Maintenance of a stable skin pH discourages colonisation of bacteria and reduces the risk of opportunistic infection [104].

In order to maintain skin integrity, all potentially irritating substances should be eliminated or minimised [105]. Skin should be kept clean and dry, without excessive dryness. Skin cleansing regimens should be personalised according to individual need and preference. All skin care products should be evaluated for their pH value and dermatological safety [105]. Alkaline soaps should be avoided as they alter the acid mantle of the skin. Excessive washing or the use of soap and detergents may not only result in chemical and physical irritation but may also compromise the water-holding capacity of the skin and interfere with bacterial resistance [105, 106].

5.3 Skin moisture maintenance

Skin hygiene is fundamental to promoting dignity, comfort and skin integrity. Elimination or containment of intrinsic and extrinsic factors that result in dryness or maceration of the skin aids the skin's ability to resist trauma [48, 107].

Dryness and reduced tissue turgor diminish the tissue's resistance to mechanical forces such as pressure, shear and friction [108]. Dry, flaky or scaling skin should be treated with a topical moisturiser [9].

Skin which is exposed to excessive or sustained contact with bodily fluids such as: saliva, perspiration, urine, faeces or wound drainage can result in maceration, reducing the tensile strength of the skin [104, 109]. Irritating substances such as urine and faeces not only increase the risk of maceration but provide a favourable environment for bacterial growth. Wound dressings and clothing items that occlude the skin elevate the skin's pH and in the presence of faeces, increase the activity of faecal enzymes [104, 109]. In the presence of urine the irritant effect of faeces on skin is accentuated [104].

Measures to promote continence, such as continence training, regular toileting, the use of continence pads, garments or protective bed or chair sheets that present a quick-drying surface to the skin should be employed [9]. Protective plastic bed surfaces can prolong exposure to moisture and should be avoided where possible. Moisture barrier ointments, creams and skin barrier films provide skin protection from moisture and chemical irritants [110].

5.4 Maintenance of a stable skin temperature

Overheating of the skin predisposes the individual to a greater risk of pressure ulcer development [80, 82]. Increased skin and body temperature also contributes to increased perspiration and compromises moisture maintenance. Maintenance of a stable skin and body temperature is important in reducing the metabolic and oxygen demands of the skin.

Contact surfaces that interfere with conduction and convection of heat, such as plastic surfaces covering mattresses and pillows, should be avoided where possible [82]. The intraoperative and postoperative use of warming blankets have been demonstrated to significantly increase skin and core temperature. Removal of such warming devices from beneath patients once core temperature has been normalised and is stable, is recommended [32, 111].

The length of time between turning intervals has a significant effect on skin surface temperature. Knox *et al*. [82] demonstrated a significant increase in skin surface temperature with 2 hourly turns when compared to turning schedules shorter than 2 hours.

5.5 Influence of nutrition on the skin

A balanced diet should be encouraged to provide adequate caloric requirements for the maintenance of an appropriate Body Mass Index (BMI) and for tissue maintenance and repair [57]. It is important to assess the individual's dietary intake regularly, particularly in an acute care setting where interruptions to diet due to diagnostic tests, treatments or surgical procedures are frequent occurrences. Food and fluid intake should be assessed along with other simple indices of nutritional state, for example: muscle wasting, body weight < 85% of ideal, or any signs of vitamin or mineral deficiencies. What may normally be considered an adequate dietary intake may actually be inadequate in the context of the underlying illness [105]. A dietitian should be consulted, and oral, enteral or parenteral supplementary nutrition should be considered when obvious deficits compromise tissue integrity [22, 113].

Consensus statements

1. *Individuals 'at risk' of developing pressure ulcers should have a comprehensive skin inspection at least daily for signs of impaired skin integrity.*
2. *The skin should be kept clean and free from all potentially irritating substances or those that substantially alter the skin pH.*
3. *All intrinsic and extrinsic factors that result in dryness or maceration of the skin should be eliminated or minimised by: a) treating dry, flaky or scaling skin with a topical moisturiser; b) avoiding sustained or excessive contact with body fluids, and/or c) encouraging continence by employing interventions such as continence training or the use of continence aids.*
4. *Maintain a balanced diet in individuals 'at risk'. They should be assessed regularly and referred to a dietitian if their diet is inadequate.*
5. *Avoid extremes in skin temperature, by avoiding skin contact with plastic support surfaces and ensuring that turning schedules do not exceed 2 hourly intervals for patients on basic mattresses.*

Recommendation

1. *Avoid high skin temperature by removing warming blankets from beneath patients once core temperature has been normalised and is stable [111] (level of evidence IV).*

6.0 Mechanical loading and support surfaces

To protect the skin from external forces of pressure, shear and friction requires a management plan that incorporates the following: an appropriate turning schedule; elimination of shear and friction; reduction or elimination of heel pressure; promotion of mobility and activity and the use of an appropriate support surface (Figure 4).

6.1 Positioning and repositioning*

Any individual who is assessed to be 'at risk' of developing pressure ulcers should be repositioned as frequently as their skin's tolerance to pressure dictates[9, 115]. There is very little evidence to demonstrate the optimal frequency of manual repositioning[89, 116]. The most frequently recommended repositioning regimen or turning schedule is two hourly. However, repositioning needs may vary between individuals from less than one hourly to greater than two hourly. Skin inspection with each turn is the key to determining effectiveness of any turning schedule[103].

Pillows and foam wedges can be used when repositioning to assist in maintaining body alignment and avoiding direct contact between bony prominences. Correct body alignment when lying or sitting ensures the even distribution of body weight, reducing point pressure[103]. Where possible, direct positioning on the greater trochanter should be avoided[9].

Any person 'at risk' of developing pressure ulcers should avoid uninterrupted sitting in a chair or wheelchair. Repositioning or shifting of pressure points should occur as frequently as every 15 minutes and at least every hour[9]. When sitting out of bed, foot placement should be below the level of the hips. Feet positioned higher than the hips will transfer weight from the posterior thighs to the ischial tuberosities (buttocks)[103].

Figure 4. Mechanical loading and support surfaces.

* All health care professionals and carers are advised to note the manual handling policy of their clinical facility, home care service or that of their respective professional association. Where possible manual handling should be minimised and mechanical lifting aids and other handling equipment should be employed[114].

6.2 Eliminating shear and friction

Immobile and inactive individuals are often exposed to the forces of shear and friction as a result of clinical practices such as lifting, turning, positioning and massaging over bony prominences. Friction is commonly experienced when the individual cannot be sufficiently lifted during repositioning and is dragged over the rough surface of the bed linen. Shear is often encountered when the individual cannot support their own body weight, maintain postural alignment or move independently [103].

To avoid friction, proper lifting and manual handling techniques should be employed when repositioning or transferring the individual. There are many devices available to assist carers with lifting and transferring, for example hoists, turning devices, slide sheets and slide boards.

Skin that is constantly exposed to friction should be protected with padding or protective dressings, for example hydrocolloids or transparent films [9]. Sheepskins play a questionable role in pressure relief, but can guard against friction and provide comfort [117].

Massage over bony prominences was traditionally taught to care providers in the belief that rubbing stimulated blood flow to the affected area and consequently increased oxygenation and nutrition to the affected tissue. There is no established scientific evidence to support this practice and there is the suggestion that in 'at risk' individuals massage may lead to deeper tissue trauma through the forces of friction and shear [9, 113, 118].

When an individual is unable to support their own body weight or move independently, the force of shear can be reduced by elevating the foot of the bed by 10 to 20 degrees. This helps to prevent sliding when sitting or semi-recumbent [119]. The head of the bed should also be maintained at the lowest possible elevation consistent with the individuals medical condition and comfort. If the individual is constantly exposed to sliding when sitting up in bed or in a chair, time in this position should be limited [9].

6.3 Reducing heel pressure

Heels are particularly vulnerable to pressure as the calcaneum (heel bone) exerts pressure on a small surface area that has only minimal protection from a thin covering of subcutaneous fat [120]. Individuals who are bed-bound or have immobilised lower extremities are at greatest risk of developing pressure ulcers on their heels. Care should be aimed at providing total relief of pressure from the heels. Constriction of the foot by tight or heavy bed linen can be prevented by the use of a bed cradle. Pillows or foam under the *full* length of the lower leg, suspending the heels, will also assist in relieving pressure from the heels [9]. However, this can be difficult if the individual experiences knee pain, is confused or agitated.

Standard heel protectors such as gel or cushioned booties provide modest pressure reducing qualities; they largely help to reduce the forces of shear and friction. Devices which offer the best heel protection feature clearance of the heel from any surface contact by elevating the entire lower leg. These devices can be difficult to apply and require several adjustments to ensure proper positioning. Heel protectors can cause reduced ventilation and, if fitted too tightly, may increase the surface-interface pressure [120].

6.4 Activity and mobilisation

Mobilisation and activity alter pressure on weight bearing areas, relieving stressed or damaged tissue of pressure and improving circulation [103]. Individuals should be encouraged to maximise activity and mobilisation consistent with their medical condition, ability and energy level [21]. Particular attention should be paid to early mobilisation following surgery, stroke or other major illnesses. The health care team should assess the need for devices that assist individuals with activity and mobilisation, for example: trapeze, cotsides, cane, walker or handrails [22]. Where appropriate the individual should be referred to a physiotherapist or occupational therapist.

6.5 Support surfaces

The optimal support surface relieves pressure, shear and friction and maintains a stable skin temperature – the major extrinsic factors identified in pressure ulcer development. Such a support surface ideally distributes total bodyweight over the largest possible surface, or totally removes pressure from the body surface, thereby reducing point pressure and tissue damage. The support surface should be dense enough or high enough that bony prominences do not 'bottom out' on the mattress base [121].

There are a multitude of support surfaces on the market that offer a variety of features and varying degrees of pressure relief. Support surfaces may be categorised according to a number of different criteria, some of which relate directly to their effect on the patient (clinical classification) and others which relate to their physical characteristics. The most useful clinical classification for devices is that of *constant low pressure devices* and *alternating pressure devices*. These categories are commonly found in the UK literature and are used in the Cochrane Collaboration systematic review on pressure ulcers [122]. The method of classification of devices created much debate in the Committee and was flagged as a section to be critically reviewed when the guidelines undergo their first revision.

Clinical classification

- *Constant low pressure*

  Constant low pressure devices conform closely to the body contours aiming to redistribute the body weight over a wider area thereby reducing tissue interface pressure. These may be foam or fibre-filled mattresses and overlays, water beds, gel pads, air overlays and mattresses both static/constant air or low air loss devices. These devices may also be powered, mechanical devices or non-powered, non-mechanical devices. Air fluidised beds achieve the lowest interface pressures in this product group.

  Pressures applied to the skin surface which are below capillary closing pressure can still cause tissue ischaemia and necrosis. A constant low pressure device must therefore be combined with a turning regimen, relating to the individual's degree of risk and the skin's tolerance to pressure[123], as it is imperative that pressure is completely eliminated at frequent intervals to allow blood to circulate to ischaemic tissues.

- *Alternating pressure devices*

  Alternating pressure devices generate alternating high and low pressures between the body and the support surface in a manner similar to that employed in the healthy individual who continually changes position in response to pressure pain. This is universally achieved by cyclically inflating and deflating groups of air filled cells placed transversely across the mattress surface. The inflated cells support the body while the deflated ones reduce contact pressure to a greater or lesser degree. These devices are available as overlays, and single or multi-layered mattress replacements.

Classification of physical characteristics

These classifications are found in the literature and relate to the physical characteristics of support surfaces, however they have little relevance to the clinical application of these devices.

- *Pressure reducing or pressure relieving qualities*

  This categorisation is found predominantly in the American literature. *Pressure reducing support surfaces* have been defined as reducing pressure at the surface interface below that found with the standard hospital mattress. *Pressure relieving support surfaces* are defined as maintaining a tissue interface pressure consistently below the capillary closing pressure found in healthy individuals (32 mm Hg) (Table 4). Pressures at the skin surface that are below capillary closing pressure but are applied for prolonged periods are still capable of causing tissue ischaemia and necrosis. These categories provide an indication of the interface pressure only at the skin surface.

Table 4. Capillary closing pressure and tissue interface pressure [124].

Capillary closing pressure (CCP) – the point at which external pressure on the capillary exceeds internal pressure and the structural strength of the vessel and causes capillary collapse. Generally quoted as 32 mmHg in healthy individuals.

Tissue interface pressure (TIP) – the pressure applied to the epidermis by the surface that is supporting it.

TIP = patient weight/surface area supported

TIP does not equal CCP, there is no conversion constant as it is not directly proportional. Both measurements are influenced by multiple variables such as: amount of fatty tissue, relative location of bony prominences, vertical and horizontal shearing forces, vascular circulation, systemic blood pressure, general health.

The general rule of thumb is: the lower the tissue interface pressure, the lower the pressure on the capillary.

- *Static or dynamic components*

  Static devices are non-mechanical, non-powered support surfaces that remain motionless except in response to patient movement, for example foam, fibre, air or water-filled overlays [121, 123].

  Dynamic devices have moving parts and require an electrical power source. Dynamic devices offer such features as constant regulated air flow (low and high air loss devices), alternating air flow or flotation support [121].

- *Adjunct to or replacement of the basic mattress or bed*

  Overlays rest on top of the basic mattress, trolley, operating table or chair. Overlays vary in size and thickness and may provide either a static or dynamic surface.

  Replacement mattresses are substituted for the basic mattress. Again they may provide either a static or a dynamic surface.

  Specialty beds have the support surface integrated into a bed frame and replace the entire bed.

6.5.1 Basic hospital mattresses

Basic hospital mattresses, emergency department trolleys and radiology and operating room tables offer very little in the way of pressure relief. They usually consist of a single piece of polyurethane foam confined by a non-stretch plastic/nylon cover. They have a relatively short life expectancy (around two to three years) and should be regularly assessed for 'core

fatigue'. This occurs when the foam mattress softens under the area of maximal weight and the patient sinks into the foam and 'bottoms out' onto the underlying bed base. A simple test for foam quality can be performed by spreading the hands in the middle of the mattress and pushing down with full body weight; the base of the bed should not be felt [125].

Tight mattress covers or bed linen which aim to be wrinkle-free produce a 'hammocking' effect which increases the hardness of the mattress or any support surface and reduces its ability to mould around the body, effectively undermining the pressure relieving qualities of the support surface [125, 126].

6.5.2 Foam pressure reducing devices

Foam has been used for many years as an inexpensive and convenient support surface. Foam is available in a variety of sizes, and thickness for use as overlays on beds, trolleys and operating tables, or as cushions for chairs. Foam is easily shaped for specific bony prominences, such as heels and heads. Newer formulations of foam have increased its resiliency and fire-retardant characteristics making it safer and improving its firmness and compressibility [121].

Ten centimetre thick foam overlays have demonstrated improved pressure reducing capabilities when compared with five centimetre thick foam overlays or the basic hospital mattress. Ten centimetre thick foam overlays are suited to those individuals at low or moderate risk of developing pressure ulcers [127].

Pressure reducing foam replacement mattresses are a more recent addition to pressure reducing devices. These mattresses consist of foam layers of varying densities, or sections or cubes of foam that can be temporarily removed to provide greater pressure relief to specific areas. Foam replacement mattresses may also be a combination of materials such as foam and gel, or foam with air filled chambers.

Pressure reducing foam mattresses are used as permanent replacements for basic hospital mattresses [121]. Studies demonstrate that foam replacement mattresses are more effective in preventing pressure ulcers in individuals at low to moderate risk than basic hospital mattress or foam overlays [127, 128].

The major advantages of foam as a pressure reducing device include ease of transport and installation, minimal maintenance and resistance to puncture by sharp objects. Foam's disadvantage is its limited life expectancy; two to three years for an overlay and around 5 years for a replacement mattress. Foam also traps perspiration, absorbs body heat, stains easily, retains odour and may be difficult to clean [121].

6.5.3 Sheepskins, fibre-filled overlays and gel pads

Sheepskins, fibre filled overlays and gel pads are other forms of pressure reducing static devices that cover existing hospital mattresses, trolleys, operating tables or chairs. These devices are also available in a wide range of accessories such as heel and elbow protectors. They are easy to use, easy to transport and easy to clean. However, research is limited on their effectiveness to reduce pressure below that of the basic hospital mattress. Their use should be limited to individuals at low risk of developing pressure ulcers [129].

Sheepskin is well recognised by the general community as a pressure ulcer preventative device. However, there are only a few published studies, albeit poorly designed and inconclusive, that cite any benefit of sheepskin [89]. Generally a natural fleece sheepskin is considered a comfort measure that may potentially reduce friction and improve vapour loss [130]. These physical properties are impaired when the sheepskin is overlaid by sheets or clothing, or if matting occurs due to poor laundering [117].

Gel filled pads or dry visco-elastic polymer-flotation pads have been reported to be effective in protecting the sacral area and to work well with obese patients [117, 131]. They are frequently used on operating theatre tables as overlays or for protecting the head, heels or ankles. They are easy to clean, extremely durable, can be reused and are easy to repair. Gel pads, however, can be heavy to handle and lack airflow – reducing moisture control. The gel can migrate downward into folds and crease when the patient is semi-recumbent or sitting up [121].

Fibre filled overlays consist of synthetic fibres within a series of connected cushions. The fibres may be coated with silicone or formed in very small discrete balls to reduce shear and friction. Depending on the properties of the covering fabric, air may be able to circulate around the fibres thereby minimising the accumulation of moisture and maintaining an even temperature environment around the patient's skin. Fibre-filled overlays may be useful in reducing shear and friction, and providing comfort. A variety of these overlays are available with differing properties relating to stain resistance, water resistance, multiple or single use and cleanability.

6.5.4 Static air mattresses and overlays

Static air mattresses and overlays are designed with interconnected chambers that allow air exchange between compartments when compressed. Studies have repeatedly demonstrated that the pressure reducing capabilities of static air overlays are superior to the basic hospital mattress when the overlay is adequately inflated [127].

Static air overlays are suitable for individuals at moderate risk of developing pressure ulcers. They are economical, easy to clean and low in maintenance. They are, however, easily damaged by sharp objects and air is lost with use. They must be regularly checked and adjusted to the individuals body weight as over or under-inflation of static air overlays can increase the interface pressure [121, 131].

6.5.5 Alternating pressure devices

Alternating pressure devices work on the principle of cyclic inflation and deflation of air cells over a short period of time. This continual alternation of inflating and deflating cells changes interface pressure temporarily, thus relieving sections of the body from pressure and creating a pressure gradient that enhances blood flow [121, 127].

Alternating pressure devices are available as overlays for beds and chairs or as replacement mattresses. Overlays can be small 'bubble cell' overlays with diameters of 3-5 cm or large cell overlays with cell diameters of 10 cm or more. Alternating pressure devices are also available as mattress replacement systems that are more sophisticated and can adjust to patient weight and change of position.

Studies demonstrate that alternating pressure devices significantly lower tissue interface pressure when compared with a basic hospital mattress and reduce the incidence of pressure ulcers when cell diameter is greater that 10 cm. These devices are suitable for moderate to high risk individuals [89, 129].

These types of overlays and mattresses are easy to clean and are durable. However, they are also easy to puncture, require mechanical components to operate, have tubing that may kink, can be noisy and the constant alternating pressure may bother some individuals [121]. The alternating pressure effect can also be impeded by the use of multiple layers of bed-clothing between the support surface and the patient. Plastic sheets, draw sheets, cellulose incontinence sheets (blueys) and sheepskins reduce the pressure relieving qualities of the alternating pressure device to that of a static support surface so the benefits of a reduced turning regimen are negated.

6.5.6 Low air loss devices

Low air loss devices provide a continuous flow of air from the entire surface of the mattress; this is achieved by using a microporous material for the transverse air cells that constitute the support surface. A powerful fan maintains air cell inflation at the lowest possible level despite constant air loss. This level of inflation provides adequate patient support and body alignment.

Low air loss devices are available as an overlay, a replacement mattress or a specialty bed. The cells within the overlay and replacement mattress are interconnected. In the specialty bed they are separated so that inflation can be varied in each air cell and very low interface pressures can be achieved [117]. The overlay and mattress are suitable for moderate to high risk patients while the specialty beds cater for high risk individuals [129].

6.5.7 High air loss or air fluidised beds

High air loss or air fluidised beds are designed for the high risk individual who can not tolerate any pressure. Sand-like grains or beads are contained in a tank that is covered with an air permeable fabric [129]. Warmed high flow air is passed through the beads creating a 'dry flotation' system. Two thirds of the body is submerged within this support surface significantly reducing interface pressure. The warmed air creates a dry environment decreasing the effects of perspiration, incontinence and copious wound drainage. The support surface can be stabilised if required for some procedures by turning off the air flow [121].

Air fluidised beds can be costly and the floating properties make handling the patient difficult. The high air loss 'dry flotation' system can potentially have a dehydrating effect on the individual.

6.5.8 Turning beds

There are a variety of beds or devices that assist in turning the patient. They may be manual or mechanically controlled and may provide intermittent or continuous movement [131]. Studies have not demonstrated any benefit in the reduction of pressure ulcers [89, 131].

Figure 5 provides an overview of the categories, types of support surfaces and recommended use according to degree of risk.

6.5.9 Evaluating support surfaces

There have been few randomised controlled trials (RCTs) on pressure relieving support surfaces. The UK National Health Service Centre for Reviews and Dissemination [89] reviewed all RCTs identified in the literature (30 in total) for effectiveness of pressure relieving interventions. They found most studies were poorly designed with inadequate sample sizes. In their findings they reported

> *"... the standard hospital mattress is less effective at preventing sores than some low pressure foam mattresses. There is some evidence which suggests that large celled (diameter > 10cm) alternating pressure mattresses and certain low-air loss and air fluidised beds are more effective than foam and silicone-based surfaces in preventing and healing sores (p.6)".*

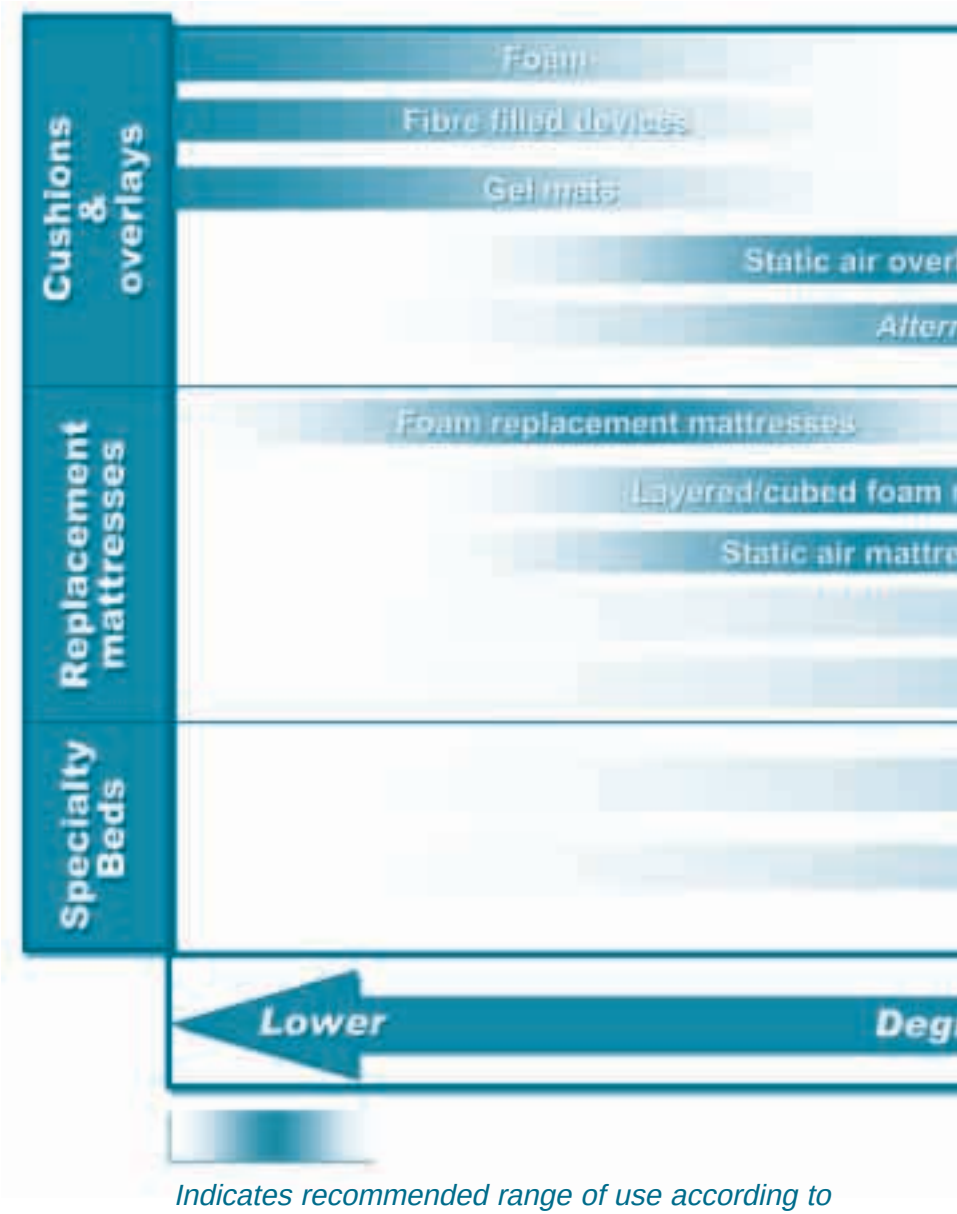
In a more recent report for the Cochrane Collaboration, Cullum *et al.* [122] reviewed 29 RCTs on pressure relieving support surfaces. In this review some previous studies used in the 1995 report [89] were discarded on the basis of non-randomised allocation of support surfaces. However, the findings were similar. Cullum *et al.* [122] concluded that in the prevention of pressure ulcers, some high specification foam mattresses were more effective than 'standard' hospital foam mattresses in moderate to high risk patients. The application of this conclusion to clinical practice is hampered by the poor description of a 'standard' hospital mattress in most studies. Low air loss beds appear effective in preventing pressure ulcers compared with foam mattresses. In addition to this, Cullum *et al.* [122] suggest that pressure relieving overlays on the operating table are of benefit in reducing the incidence of pressure ulcers

6.5.10 Selecting a support surface

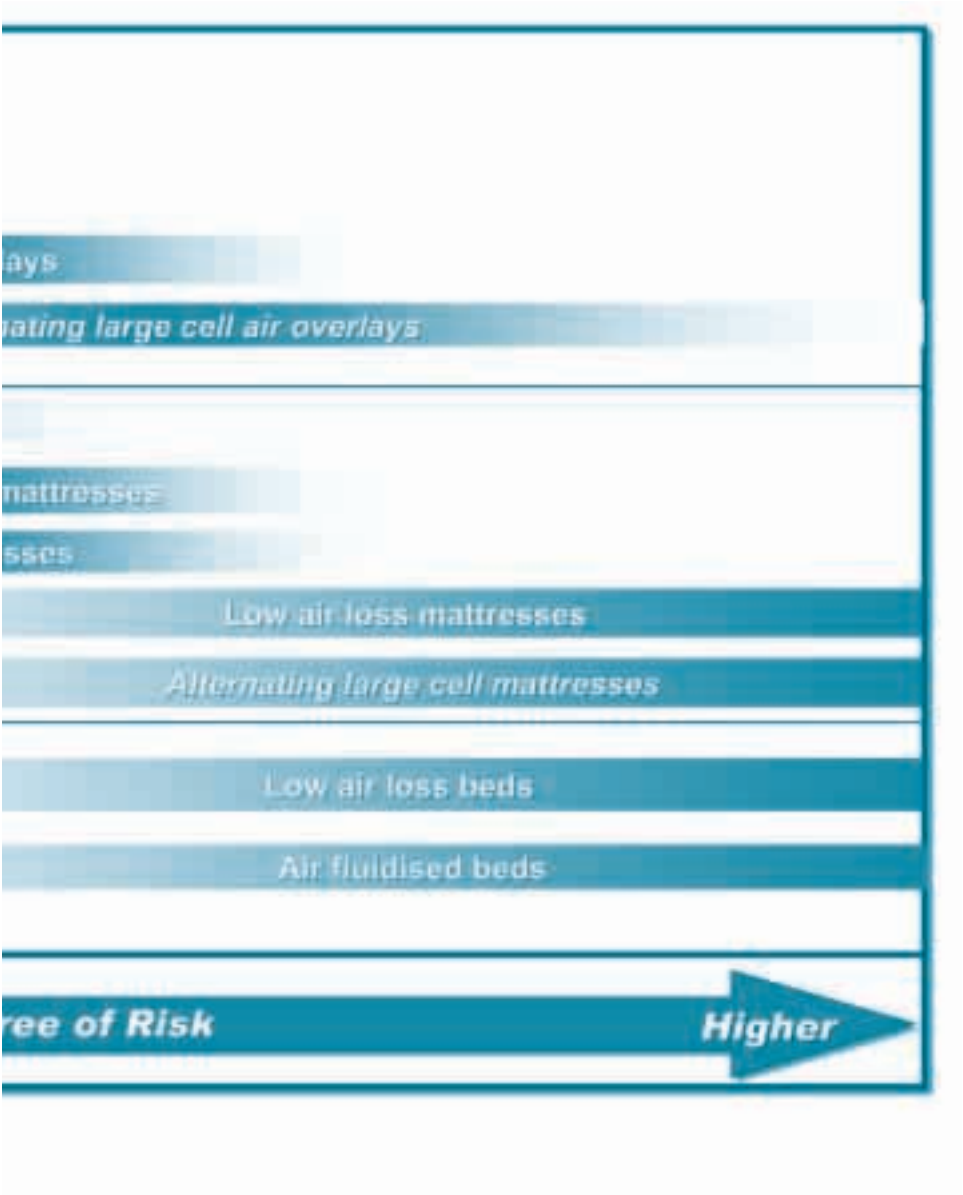
The following criteria should be considered when selecting a pressure relieving or pressure reducing support surface [131-133]:

- Durability;
- Comfort of the individual;
- Support surface conforms to bony prominences without resistance;
- Support surface allows patient immersion without "bottoming out";
- Support surface cover is impermeable to fluid or bacteria but also has properties that reduce shear, friction, moisture and temperature;
- Fire retardant properties;
- Temperature at the interface is controlled;
- Maximum weight limit the device will support;
- Access to the patient and ease of repositioning;
- Ease of transferring from bed to chair, or bed to trolley;
- Ease of transport;
- Ability to stabilise the surface to perform emergency and other procedures;
- Multiple parts required e.g.. air compressor, power source, tubing;
- Cleaning and maintenance;
- Appropriateness for clinical setting;
- Size and weight of the device;
- Availability, and
- Cost to purchase or hire.

Figure 5. Recommended use of support surfaces according to degree of risk.



Indicates recommended range of use according to degree of risk.
(Devices not in italics are constant low pressure devices)



Note: Support surfaces should be used in conjunction with an appropriate turning schedule. The above classification and recommendations are based on consensus using the best available evidence for their usage.

Consensus statements

1. *The most effective pressure relieving support surface such as a sophisticated alternating pressure device should be chosen for those individuals who are unable to tolerate a turning regimen or where a consistent turning regimen (24 hours a day) cannot be guaranteed.*
2. *Support surfaces should be used in conjunction with a comprehensive prevention strategy based on frequent observation and assessment, individualised turning regimen and measures to increase the tissues tolerance to pressure.*
3. *Pillows and foam wedges can be used to avoid direct contact between bony prominences.*
4. *Avoid prolonged uninterrupted sitting in a chair or wheelchair. Repositioning or shifting of pressure points should occur as frequently as 15 minutely to hourly depending on the tissues tolerance to pressure.*
5. *Exposure to shear and friction should be reduced by: a) employing correct lifting and manual handling techniques; b) protecting skin constantly exposed to friction with protective dressings or padding or sheepskin; c) elevating the foot of the bed to 20 degrees when sitting to prevent sliding, and d) maintaining the head of the bed at the lowest possible elevation consistent with the individuals medical condition and comfort.*
6. *Individuals who are bed bound or have immobilised lower extremities should have total relief of pressure from their heels.*
7. *Individuals should be encouraged to maximise their activity and mobilisation consistent with their medical condition, ability and energy level.*

Recommendations

1. *Any individual who is assessed to be 'at risk' for developing pressure ulcers should be repositioned as frequently as their skin's tolerance to pressure dictates* [115] *(level of evidence IV).*
2. *Replacement mattresses or beds should be used in place of standard hospital mattresses in patients who are assessed as being at high risk of developing a pressure ulcer* [89, 112] *(level of evidence I).*

7.0 Documentation

The primary aim of documentation in the patient record or management plan is to facilitate communication and continuity of care between health care professionals and across health care settings. The patient record should provide a complete picture of care from admission to discharge and should include evidence of clinical assessment, interventions and outcomes. It may be called upon in the future and may be subpoenaed for litigation purposes [134, 135].

All individuals identified 'at risk' of pressure ulcers should have their risk assessment status and risk factors clearly documented and readily accessible for all health care providers. The individual's risk status should be updated as the individual's condition changes. If a pressure ulcer is present then the following should also be included in the patient record: location and severity (stage) of the ulcer; dimensions or surface area of the wound; nature/description of the wound bed, wound edges and surrounding skin; the amount of exudate; severity of pain; and other factors which may impede wound healing. In addition to this a sketch with measurements or a photograph with a scale of the pressure ulcer will aid reassessment and evaluation of treatment.

The individual's risk status and risk factors provide the foundation for the patient management plan for prevention and treatment of pressure ulcers. The management plan should provide specific details of what care is required, who is responsible for that care, frequency of turning, equipment needed, referrals and expected outcomes [9].

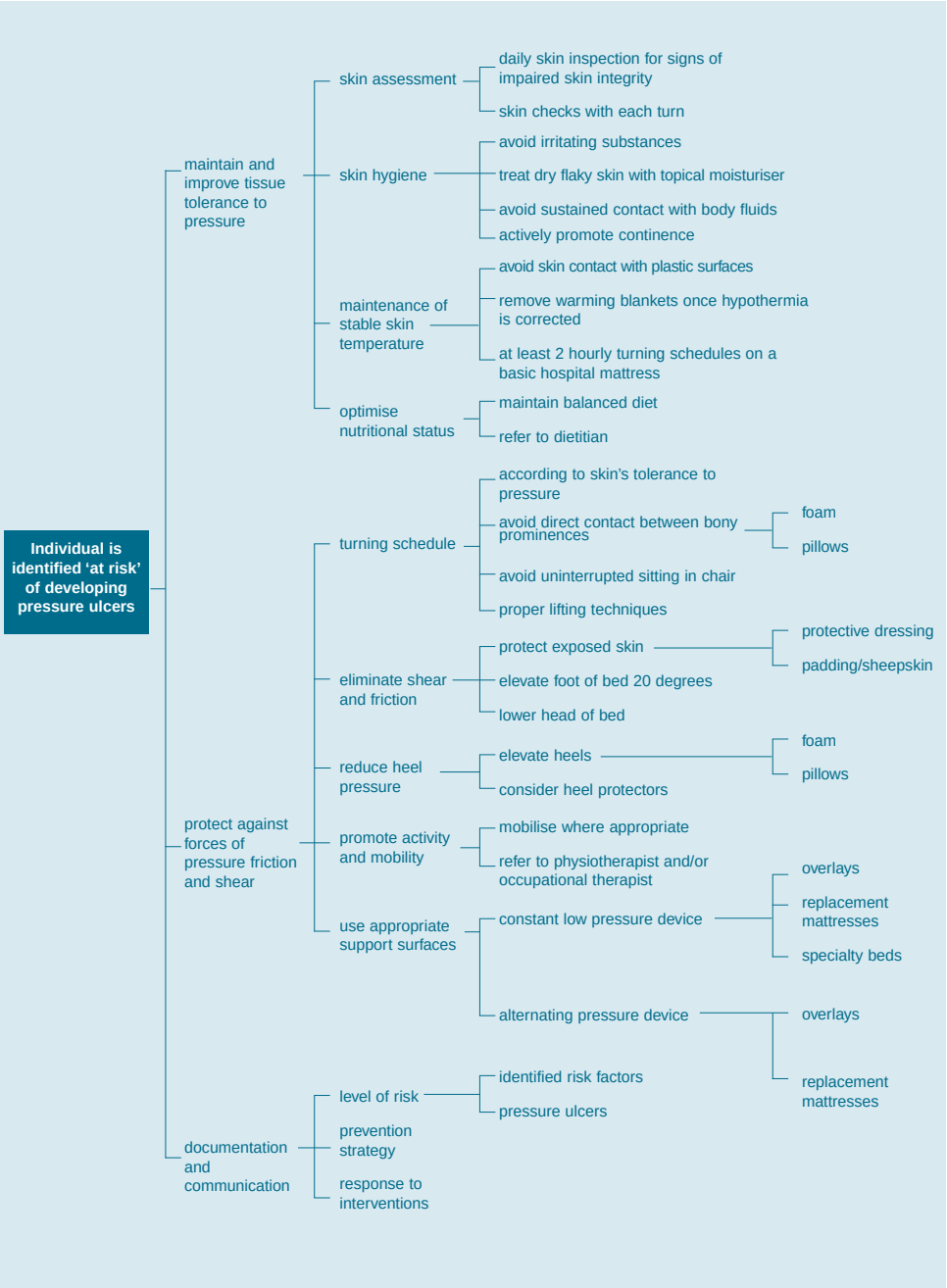
Clinical interventions, outcomes of care and adjustments to the pressure ulcer prevention/management plan should be regularly monitored and documented. The frequency of assessment will be determined by the clinical setting and the policies of the respective clinical facility or home care agency. For instance in an acute care setting, documentation of outcomes of care should be documented at least daily.

Critical pathways or care maps are useful tools to assist in coordinating and documenting care within a multidisciplinary team. These tools also provide valuable data on the outcomes of care and the effectiveness of preventative strategies through variance analysis [128].

Consensus statement

1. *All individuals 'at risk' of developing pressure ulcers should have the following details recorded in the patient record on a regular, ongoing basis: risk assessment status (low, moderate or high); identified risk factors; management plan which includes interventions used such as, turning schedules, support surface, referrals and the individual's response to treatment.*

8.0 Summary of pressure ulcer preventative strategies.



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