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Pressure Ulcer Prevention

9

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9.1 Introduction

The prevention of pressure ulcers (also categorised as ‘skin injury’, pressure injuries or pressure sores) is a fundamental aspect of managing the patient following a fragility fracture, especially following hip fracture and associated surgery. The term ‘pressure ulcer’ will be used here as it is used by the WHO and has an ICD-11 code, EH90 [1]. Pressure ulcer prevention has traditionally been associated with nursing aspects of care, but it is now recognised that the causes of skin injury are complex and that prevention is the responsibility of the wider disciplinary team.

Ageing skin and multiple comorbidities are significant factors in skin injury. This chapter aims to explore the causes of pressure ulcers and provide the reader with an overview of evidence-based approaches to preventing pressure ulcers following fragility fractures.

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9.2 Learning Outcomes

At the end of the chapter, and following further study, the practitioner will be able to:

- Explain the causes and pathophysiology of pressure ulcers.
- Recognise risk factors for pressure ulcers in patients following significant fragility fractures/hip fracture.
- Provide evidence-based care to patients at risk of pressure ulcers.

9.3 Introduction

Pressure ulcers (sometimes known as pressure injuries) are a significant risk to patient safety and recovery following fragility fracture, especially significant fractures requiring hospitalisation and surgery such as femoral, pelvic, and hip fractures. Pressure ulcers result in short- and long-term pain and delayed or limited rehabilitation and are associated with other complications that can lead to increased mortality. Due to the avoidable nature of most pressure ulcers, since 2001 they have been considered indicators of the standard of care provided [2]. For that reason, many of the established national clinical audits for hip fractures now audit pressure ulcer care as a key standard [3].

Local and national clinical audits of pressure ulcer incidence and prevalence are central to good prevention policy and practice. Johansen et al. [4] reported that the incidence of pressure ulcers recorded across multiple national hip fracture audits ranged from 2 to 4%. Evidence from existing hip fracture audits has demonstrated that measuring and feeding back to units can help to achieve a reduction in pressure ulcers. It is sometimes argued that pressure ulcers resulting from a long lie on the floor following a fall at the time of fracture may be considered unavoidable. However, hospital-acquired pressure ulcers are avoidable with appropriate interventions [5].

The Fragility Fracture Network's Hip Fracture Audit Special Interest Group reviewed the key variables captured in all existing hip fracture audits. Of all hip fracture audits, 70% were capturing data on pressure ulcers, but the review recommended that any new or existing audits should also measure pressure ulcers as a key metric as part of their minimum common data set [3].

To reduce pressure ulcer incidence, an essential part of patient safety and service improvement is ensuring that practitioners are well educated and possess the skills and knowledge of evidence-based practice in pressure ulcer prevention. For example, the implementation of a national patient safety program has had a positive impact on the nationwide pressure ulcer prevalence and occurrence of prevention strategies. Such programmes can successfully engage leadership and healthcare staff to work systematically with prevention, evaluation and audit [5].

9.4 Pathophysiology and Causes of Pressure Ulcers

Pressure ulcers are defined as localised areas of tissue damage, usually over a bony prominence, resulting from direct pressure and/or shearing forces. Both pressure and shear deform soft tissue and can result in cell death due to the deformation itself or ischemia that the deformation creates in the long term. Current aetiological knowledge confirms that pressure ulcers develop due to sustained mechanical loading leading to soft tissue deformation [6, 7].

Pressure ulcers occur in older people, those who have limited mobility, and/or those who are confined to a bed or chair by an acute or chronic health problem, injury, or surgery and who have impaired nutrition. These factors are common for patients who are frail and have fragility fractures. Such circumstances reduce the tolerance of the individual's skin and underlying tissues to forces that damage the skin and circulation. Patients with fragility fractures who are also frail (see Chap. 3) are at high risk of skin damage because of the physiological vulnerability that accompanies frailty and its impact on skin health [8].

Susceptibility to damage because of underlying factors is sometimes referred to as 'skin vulnerability'—these underlying factors are threats to 'skin integrity', meaning that an individual is susceptible to damage as a result of a health threat or injury that would not normally damage the skin of a healthy individual.

As well as the extrinsic factors discussed above, patients are also vulnerable to tissue injury because of a complex interplay between various intrinsic factors that affect the skin's innate ability to resist external forces—tissue tolerance (Fig. 9.1)

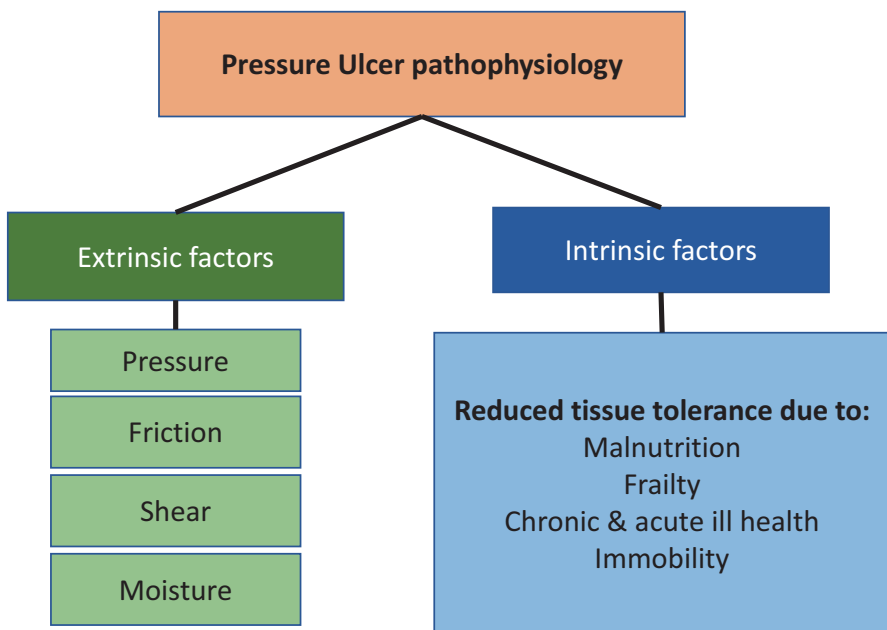


Fig. 9.1 Major factors in the pathophysiology of pressure ulcers in patients with fragility fractures

[9]. These factors include coexisting health conditions such as those affecting the respiratory and circulatory system, which result in diminished blood, oxygen, and nutrition supply to the tissues and often lead to frailty. Pulmonary disease, cardiovascular disease, and diabetes are common examples of such conditions. Frailty (see Chap. 3) significantly predicts pressure ulcers [10]. Health conditions that affect mobility, such as osteoarthritis and neurological conditions, also increase the risk of pressure ulcers because they restrict the person's ability to move, mobilise, and change their position in bed or chair. Due to the acute nature of major fragility fractures such as hip fractures, patients become instantly at risk of pressure ulcers, and timely action is vital (Fig. 9.1).

9.5 Classification of Pressure Ulcers

Understanding the development, progression, and classification of pressure ulcers and recognising the early signs are essential in helping healthcare personnel to recognise the early development of pressure ulcers so that deterioration can be prevented. The classification of a pressure ulcer is also essential in decision-making about actions for healing; not all pressure ulcers are open wounds.

Pressure ulcers are classified according to the NPIAP/EPUAP/PPPIA guidelines, updated in 2019 [9]. The initial stage of a pressure ulcer is usually skin redness (erythema), particularly over bony prominences. In the first instance, this redness indicates an area of skin subjected to pressure and other forces, resulting in an inflammatory reaction that causes local dilation of blood vessels. This is called 'blanching' erythema if all redness disappears when light finger pressure is applied, indicating that the local capillaries are undamaged. The patient may state that there is localised pain over a bony prominence even before erythema begins [11]. Blanching erythema is a sign of risk of tissue injury, and the patient's position needs to be changed as there is potential for capillary damage if pressure is not relieved. Blanchable erythema is not considered a pressure ulcer but a critical warning sign that preventive actions are needed. If the forces are not removed, blanching erythema can quickly develop into a pressure ulcer, as indicated by category 1 non-blanchable erythema of intact skin. (For further information, please see page 38 of Prevention and Treatment of Pressure Ulcers/Injuries: Quick Reference Guide [9] https://www.internationalguideline.com/static/pdfs/Quick_Reference_Guide-10Mar2019.pdf.)

One example of an online education programme called 'React to Red' [12] focuses specifically on recognising and acting on red skin because of the importance of early intervention, <https://www.reactto.co.uk/resources/react-to-red/>.

9.6 Pressure Ulcer Prevention

A pressure ulcer is classified as patient harm, and most are preventable. Preventive interventions must be led by the latest evidence-based guidance and coordinated by the interdisciplinary team. The NPIAP/EPUAP/PPPIA guidelines [9] provide direction for practice worldwide, and the following advice is based on this guidance. A quick reference guide to the guidelines can be downloaded [here](#):

The implementation of guidance, education, evaluation of practice, and regular audit and monitoring of pressure ulcer prevalence or incidence should be led by local experts/leaders responsible for service improvement [13]. This should include reporting, investigation, and root-cause analysis of hospital- and care facility-acquired pressure ulcers. It is crucial to raise awareness to prevent the formation of pressure ulcers. The European Pressure Ulcer Advisory Panel (EPUAP) have published two algorithms (patient algorithm and algorithm for professionals) that can act as guidelines to follow when preventing/treating pressure ulcers. They can be handed out in hospitals and other healthcare institutions not only to healthcare workers but also to patients themselves. The algorithm can be downloaded [here](#).

9.6.1 Risk Factors and Risk Assessment

The NPIAP/EPUAP/PPPIA guidelines [8] state that individuals with limited mobility, limited activity, and a high potential for friction and shear should be considered at risk of pressure ulcers. This includes all patients admitted to the hospital with a hip fracture, for example. Pressure ulcers are a common complication of hip fractures and hip fracture surgery [14, 15]. The risk increases significantly when the patient undergoes surgery and in the early post-operative period because of the additional impact of both intrinsic and extrinsic factors.

Assessment is central to planning effective preventive interventions as it provides an understanding of those risk factors, which can be mitigated by effective evidence-based care.

9.6.1.1 Skin Assessment

- Full skin assessment should be done as soon as possible after admission as part of every risk assessment, or more frequently if the patient's health deteriorates or healthcare interventions such as procedures or surgery increase the risk.
- Skin assessment should focus on common pressure points over bony prominences such as the sacrum, buttocks, heels, back of the head, elbows, shoulders, hips (over the greater trochanter), ischial tuberosities, sides of knees, and ankles/malleoli. Any red or discoloured skin over bony prominences indicates possible tissue damage and must be acted upon immediately to prevent deterioration.
- Any existing or new pressure ulcer should be recorded and classified according to the NPIAP/EPUAP/PPPIA classification system [9].
- It is essential to recognise early signs of damage to skin colour, especially in persons with darkly pigmented skin since those with dark skin tones are more

likely to develop pressure ulcers than those with lighter skin tones [16]. However, it is important to address the knowledge gap that exists for many practitioners relating to assessing and identifying pressure ulcers across the tone diversity and how this affects the risk for individuals [17].

9.6.1.2 Moisture-Associated Skin Damage

Moisture-associated skin damage (MASD) is an umbrella definition of irritant-contact dermatitis; common irritants include urine, faeces, intestinal liquids from stomas, and exudate from a wound. There are four different types of MAS: intertriginous dermatitis, peri-wound skin damage, peri-stomal moisture, and incontinence-associated dermatitis (IAD) [18, 19].

9.6.1.3 Incontinence-Associated Dermatitis

Incontinence-associated dermatitis (IAD) presents as an inflammation and/or disruption of skin integrity. It is one form of irritant-contact dermatitis, WHO ICD11 EK02.22 [1]. IAD, caused by prolonged exposure of skin to urine or faeces, alters the skin pH level to become more alkaline, reducing barrier function and defence against infection. Often, IAD is mistaken for a category 2 pressure ulcer. However, prevention and treatment are different. Therefore, it is important that it is diagnosed correctly to reduce the potential for skin damage and to manage the condition with appropriate treatment.

9.6.1.4 Risk Assessment

A structured risk assessment for pressure ulcers must be carried out as soon as possible after admission to identify any risk of pressure ulcer development and the individual factors that require intervention. Patient characteristics that indicate the potential risk of pressure ulcers should be documented in the risk assessment, including patient age, medical conditions impacting tissue health, and drug or other therapy impacting tissue health. Subsequently, a risk assessment should be conducted again after any change in health status.

Risk assessment tools offer a structured approach to assessment but do not replace a comprehensive assessment conducted by practitioners. Assessment should also include taking note of any medical devices (e.g. casts, urinary catheters, intravenous lines, oxygen masks, straps, and ties) that can lead to additional injury (medical device-associated pressure ulcers).

It must be stressed that assessment alone is not sufficient to reduce the incidence of pressure ulcers [10] and that it is the preventive interventions that follow which are the most important factors.

9.6.2 Evidence-Based Preventive Interventions

Pressure ulcers are important indicators of the quality of care, and the development of an avoidable injury is a breach in patient safety. It is essential that prevention of pressure ulcers begins in pre-hospital care (e.g. at the scene of the fall, and in the ambulance) continuing through hospitalisation to discharge. Heel pressure ulcers

are a particular concern throughout the care process in those who have sustained a lower limb injury such as hip fracture [20].

Assessment and interventions for prevention and treatment of pressure ulcers need to be patient centred. Although much research has been conducted into the causes of and most effective prevention methods, and there is much evidence-based guidance readily available, pressure ulcers are still a significant problem for hospitalised patients [21]. Failures in prevention that lead to hospital-acquired pressure ulcers can be viewed as healthcare-associated complications and are sometimes considered an indicator of the quality of interdisciplinary care. The results of a European prevalence study in 2002 suggested that as few as 10% of patients at risk of pressure ulcers were receiving enough preventive care at that time [22]. In a 10-year survey, pressure ulcer prevalence in hospitalised patients decreased from 17.0% to 11.4%, while preventive measures such as pressure-reducing mattresses, sliding sheets, heel protection, and repositioning plans increased [5]. In 2018, a systematic review [23] reported that the overall global prevalence of pressure ulcers using point prevalence and period prevalence was 14.8% and 11.6%, respectively, and the overall mean incidence of pressure ulcers was 6.3%. It is difficult to draw conclusions from these data since pressure ulcer incidence and prevalence are measured differently in various studies, but these findings highlight the continuing problem of pressure ulcers.

One example of a national approach to pressure ulcer prevention is the UK National Health Service, which has developed an approach to pressure ulcer prevention known by the acronym SSKIN (Skin, Surface, Keep moving, Incontinence, and Nutrition), which is part of the 'React to Red' programme mentioned earlier in this chapter. This provides one approach to identifying evidence-based interventions for the prevention of pressure ulcers as follows:

Skin: Fundamental care that helps to maintain the skin's protective purpose includes keeping the skin clean and dry using unscented skin cleansers that do not irritate. This is particularly important for patients with older, dry skin and for those with skin allergies and other skin conditions. It is also helpful to protect the skin's moisture barrier by regularly applying a light layer of simple, unscented moisturisers or emollients while avoiding the overuse of creams and lotions. In addition, positioning the patient on areas of erythematous (red) skin and massaging the skin should be avoided. Massage causes friction and shear that can damage the delicate microcirculation and lead to inflammation and tissue damage.

Surface: Support surfaces on both beds and chairs, as well as operating tables during surgery, should meet individual patient needs. Support surface choice is based on the patient's level of mobility; those who are mainly bedbound (e.g. while awaiting surgery or immediately afterwards) may benefit from the use of an alternating pressure mattress from admission, but this should never replace frequent repositioning (see *keep moving* below). The relative merits of these higher specification support surfaces in preventing pressure ulcers are unclear [24]. Once the patient can sit out of bed, the risk of pressure ulcers must be acknowledged, and a redistributing pressure cushion should be used until the patient is fully mobile.

Keep moving: Care should support remobilisation as early as possible while recognising the effects of reduced mobility during the rehabilitation phase (see Chap.

8). Prolonged pressure to bony prominences and other vulnerable areas, along with friction and shear, must be avoided by regular repositioning of the patient, especially if they cannot do this for themselves or mobility is restricted.

Good manual handling practice is essential in avoiding friction and shear, and heels should be lifted free of the bed surface using pillows. The frequency of repositioning should be based on individual patient need relating to their skin tolerance to pressure (e.g. development of areas of blanching hyperaemia) and their general condition and comfort. Pressure should be relieved or redistributed, and repositioning onto bony prominences should be avoided using the 30° tilt options and profiling bed functions. (A short guide to using the 30° tilt can be found here: https://www.inva-care.co.uk/sites/gb/files/csv_migration/product_docs/sales_docs/DSAL010236_the_30_degree_tilt_final.pdf. Some patients may be unable to move to certain positions, such as onto the operated hip, so this needs to be considered as part of the repositioning plan. Once patients can sit in a chair, repositioning should be carried out regularly by encouraging patients to stand, mobilise (see Chap. 8), and return to lying positions depending on frequent skin reassessment. Many hip fracture audits also now include early mobilisation as a key standard, as this is associated with many benefits to the patient, including better functional recovery, increased survival, increased likelihood of being discharged home, and reduced pressure ulcers [25].

Incontinence: Incontinence of urine and/or faeces exposes the skin to excessive moisture, damaging the dermal and epidermal cells. Urine, faeces, sweat, and exudate contain chemical substances toxic to skin cells and can lead to incontinence-associated dermatitis [26]. Patients with incontinence should have an individual continence management plan that includes immediate skin cleansing following incontinence and the light use of barrier creams to protect the skin. The absorbency of continence products such as pads can be affected by barrier creams transferred from the skin to the pad.

Nutrition: Nutritional assessment and screening should be conducted to identify malnourished patients or those who are at risk of malnourishment [27]. It is essential to ensure an adequate supply of nutrients—particularly protein, energy, water, and vitamins. An individualised nutrition plan is needed for anyone with or at risk of malnutrition. Nutritional risk assessment is now more commonplace in orthopaedic wards and is also featured in several hip fracture audits.

Nutrition should be a priority in pressure ulcer prevention and all other aspects of care following fragility fracture, not an afterthought, so it is specifically highlighted here and considered in more detail in Chap. 11. The proper amounts of macronutrients and micronutrients are essential in maintaining all body tissues, so nutrition is vital in preventing and treating pressure ulcers [28].

Summary of Key Points for Learning

- Understanding the pathophysiology of pressure ulcers is a fundamental aspect of pressure ulcer prevention.
- Practitioners must recognise the risk factors for pressure ulcers, including red skin, particularly in patients at elevated risk, such as those with hip fractures.

- Evidence-based care should focus on optimal nutrition care, hydration, skin assessment, and support surfaces, keeping the patient moving by ensuring mobility and/or frequent changes of position, and effectively managing skin moisture, especially concerning incontinence.
- Pressure ulcer prevention should be started already during ambulance care.

9.7 Suggested Further Study

- Download the National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel and Pan Pacific Pressure Injury Alliance (EPUAP/ NPIAP/ PPIA) (2019) Prevention and Treatment of Pressure Ulcers: Quick Reference Guide. From: https://www.internationalguideline.com/static/pdfs/Quick_Reference_Guide-10Mar2019.pdf.
- Identify someone in your team who might be a good person to act as a pressure ulcer champion to ensure that the evidence-based guidelines are implemented in your workplace. Furthermore, the pressure ulcer champion can serve as an educator for personnel and students.
- To focus on nutrition in the care provided by your team, access the following e-book, which provides a detailed exploration of improving nutrition for older people. Identify ways in which nutritional care can be improved to help prevent pressure ulcers. Download the Interdisciplinary Nutritional Management and Care for Older Adults: An Evidence-Based Practical Guide for Nurses, 2021 Springer <https://doi.org/10.1007/978-3-030-63892-4>.

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