Abstract
Old age, pressure ulcers and malnutrition may co-exist. Wounds in older people may already be slow to heal as a result of compromised skin integrity, which occurs as part of the normal ageing process. Malnutrition is also more common in older people, and evidence has shown that inadequate nutrition may lead to impaired and prolonged wound healing. This article explores the relationship between nutrition and wound healing, and promotes optimum nutrition in old age as an essential component of effective wound management.

Author
Sarah Helen Leaker
Staff nurse, outpatients department, Minehead Community Hospital, Somerset Partnership NHS Foundation Trust.
Correspondence to: sarahleaker@hotmail.co.uk

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The role of nutrition in preventing pressure ulcers


THE EUROPEAN PRESSURE ULCER Advisory Panel (EPUAP) and National Pressure Ulcer Advisory Panel (NPUAP) (2009) define a pressure ulcer as 'localised injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure, or pressure in combination with shear'. Pressure inhibits capillary blood flow to the skin and underlying tissue, resulting in cell death and ultimately tissue necrosis. Pressure ulcers are graded and characterised according to their severity (EPUAP and NPUAP 2009):

- Grade one – intact skin with erythema that does not blanch when touched.
- Grade two – partial thickness loss of the dermis presenting as a shallow red or pink ulcer.
- Grade three – full-thickness tissue loss, exposing subcutaneous fat. Slough may also be present.
- Grade four – full-thickness tissue loss, exposing bone, tendon or muscle (Figure 1).

The British Geriatrics Society (2009) reported that individuals aged 70-75 have double the incidence of pressure ulcers compared with those aged 55-69, and that more than two thirds of these individuals are female. Older people may be at increased risk of developing pressure ulcers as a result of reduced mobility, incontinence, diseases such as peripheral vascular disease, decreased immune function, poor perfusion, reduced mental alertness and inadequate nutrition (Castledine and Close 2009). As the skin ages, the epidermis thins and the dermis is reduced by 20%. There is also a reduction in elastin fibres, blood vessels, nerve endings and collagen, all of which may make individuals more vulnerable to developing chronic wounds, as well as impairing wound healing (Castledine and Close 2009).

Pressure ulcers can have a significant effect on an individual's quality of life, particularly in relation to social functioning. They can prevent people from carrying out daily activities and restrict mobility, and those who are embarrassed by the appearance and odour of their wounds may avoid social contact,
resulting in social isolation (Gorecki et al 2010). Self-efficacy and independence may also be affected, and individuals may demonstrate signs of anxiety and worry, self-consciousness and emotional distress. Pressure ulcers can be physiologically debilitating, causing pain and discomfort.

Debridement of dead tissue to assist wound healing often results in a high volume of exudate, which contributes to loss of protein because exudate contains nutrients, energy and growth factors for cell metabolism (Ashton et al 2008). Loss of protein through exudate may result in nutritional deficiencies and delayed wound healing.

**Malnutrition**

Links have been made between old age, malnutrition and the development of pressure ulcers (Mathus-Vliegen 2004). Good nutrition is essential for health, and plays an important role in preventing pressure ulcers and promoting wound healing (Todorovic 2002). A randomised controlled trial in Japan found that nutritional intervention enhanced wound healing directly in patients with pressure ulcers (Ohura et al 2011).

Malnutrition is defined as a ‘state of nutrition in which a deficiency or excess (or imbalance) of energy, protein and other nutrients causes measurable effects both on tissue/body structure and function’ (Abbas and Rudman 1993). Malnourishment may result from a combination of factors, including cardiac failure, catabolic or inflammatory illness, respiratory problems, difficulty chewing caused by ill-fitting dentures or no teeth, dysphagia, reduced sense of smell and taste, and/or medications (Raffoul et al 2006). Malnutrition has numerous effects, including (Johnston 2007):

- Impaired organ function, reducing the body’s oxygen supply.
- Impaired collagen synthesis, causing decreased tensile strength of the skin. In normal healing, collagen forms cross-links with other collagen and protein molecules, thereby increasing the tensile strength of the skin. Therefore, impaired collagen synthesis results in the wound being more prone to breakdown.
- Impaired immune function, increasing risk of infection.
- Reduced antioxidant activity, leading to increased free radical damage.

Malnutrition can impede healing by diminishing the tensile strength of injured skin, and increasing wound dehiscence and risk of infection (Brooker and Nicol 2011). Protein is essential for the maintenance and repair of tissues in the body. Wound healing occurs as a result of the formation of granulation tissue (Figure 2) and subsequent contraction of the wound, both of which require protein and energy. Malnutrition can result in the wasting of muscle mass and, where there is 30% loss of lean body mass, the body prioritises muscle maintenance over wound healing (Langemo et al 2006). Chronic pressure ulcers – wounds that remain unhealed for more than six weeks – become ensnared in a destructive phase of healing, whereby neutrophils undergo phagocytosis to rid the wound of bacteria. This process requires energy and patients will have increased protein and energy requirements. If these needs are not met through diet or supplementation, there will be reduced energy and protein available for wound healing (Mathus-Vliegen 2004).

**Nutrition and wound healing**

Of all the macronutrients, protein is particularly important because it is required for tissue synthesis and repair (Johnston 2007). Patients with chronic pressure ulcers may experience a continuous cycle in which they lose protein through excess exudate, resulting in decreased collagen development and delayed wound healing. Wound healing requires energy, mainly for collagen synthesis. Protein-energy malnutrition occurs when there is inadequate uptake of protein and energy, causing the body to break down and use protein for energy.

To prevent protein-energy malnutrition and enhance wound healing, the diet should include adequate protein and energy in the form of carbohydrate and fat. Carbohydrate, when broken down to form glucose, acts as a source of energy for cellular activity. Fat, which plays an important role in cell membrane synthesis, is also a source of energy and an essential component in the
formation of inflammatory mediators and clotting elements (Johnston 2007).

Many micronutrients are antioxidants and have a vital role in promoting collagen synthesis and enhancing the immune response. Free radicals – unstable molecules that can penetrate and damage healthy tissue – are formed in abundance in the ischaemic tissue of pressure ulcers. Some micronutrients such as selenium and the vitamins A, C and E have the ability to neutralise free radicals, thereby enhancing wound healing (Todorovic 2002). Micronutrients may also contribute to wound healing in the following ways (Johnston 2007):

- Vitamin A stimulates epithelialisation and the immune response by increasing the number of monocytes and macrophages.
- Vitamin C enhances iron absorption and increases resistance against infection by assisting the migration of white blood cells towards the wound.
- Copper has a role in collagen cross-linkage, which results in the rebuilding of tissue.
- Manganese has a role in tissue regeneration.
- Zinc is involved in fibroblast proliferation (rapid reproduction of cells found in connective tissue that synthesise collagen).
- Iron enhances oxygen delivery to the tissues.
- Vitamin K is essential for the synthesis of prothrombin in the liver and other proteins involved in blood clotting, which is necessary in the early stages of wound healing.

Fluid is also essential for health and in promoting wound healing. Lack of fluid causes dehydration, which disrupts cell metabolism and affects wound healing adversely (Brooker and Nicol 2011). Adequate fluid intake is essential to maintain blood flow to the tissues of the wound and to prevent further breakdown of skin (Todorovic 2002). The recommended intake of fluid is 30-35mL/kg of body weight (National Institute for Health and Care Excellence 2006).

However, patients with pressure ulcers may have additional fluid requirements because fluid may be lost through wound exudate. It is important to note that patients using pressure-relieving air mattresses may be more prone to sweating and may require additional fluid to compensate for fluid loss.

It is often a challenge to persuade an older person to achieve adequate fluid intake, however this may be possible by offering extra cups of tea or coffee, or providing alternative sources of hydration such as soup, custard, jelly, ice cream, and Horlicks or Bovril drinks.

Assessing nutritional status

Nurses have a duty of care and responsibility to assess the nutritional status of patients regularly and ensure that their food and fluid intake needs are being met. Nutritional status is measured using the evidence-based Malnutrition Universal Screening Tool (MUST), which takes into consideration the patient’s height, weight, body mass index (BMI) and recent unplanned weight loss to determine the overall risk score and category of malnutrition (BAPEN 2012). Older people are at risk of malnutrition if they have a BMI below 24 (Mathus-Vliegen 2004), and malnutrition is indicated by a BMI of less than 20, or by unintentional weight loss of more than 5% during the previous three to six months (Johnston 2007).

The MUST assessment should be done within a few hours of the patient being admitted to hospital. If the patient has difficulty standing unaided or mobility is restricted, it may be possible to record weight by assisting the individual to use sit-on scales or a hoist with a scale attachment. Height may also be recorded by measuring the length of the ulna (BAPEN 2012). Height and weight measurements are used to calculate the individual’s BMI, providing an indicator of his or her nutritional status.

Quantifying nutritional status is important because it provides a means to measure progress or identify any deterioration. However, it is also important to conduct a visual assessment of the patient, observing for signs of malnourishment and dehydration, including oedema, fatigue, weakness and confusion, oral problems such as ill-fitting dentures, lack of teeth or loose teeth, difficulty swallowing, dry mouth, ‘tenting’ of the skin, cracked lips, dark-coloured urine and/or sunken eyes.

Optimum nutrition

Developing a therapeutic relationship and communicating effectively with patients is important to achieve the best possible recovery and progress. The nurse should ensure that patients understand the importance of good nutrition, particularly in relation to preventing pressure ulcers and improving wound healing. Malnutrition in the hospital setting may be prevented by using strategies such as red-coloured trays to identify patients requiring practical assistance with eating and/or drinking. Protected mealtimes should also be respected. This involves prioritising nutrition by allowing patients to eat their meals without being disrupted by visitors or non-urgent clinical activity. Hospital meals are
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provided usually by an in-house catering service, and are planned to include all the necessary nutrients for a balanced diet (Hospital Caterers Association 2013). However, all patients are permitted choice and may decide that they will not consume all the food that they are served. This can mean that individuals may not be consuming adequate levels of nutrients.

Other methods of ensuring effective nutritional and fluid intake include assisting patients into a position conducive to swallowing safely and comfortably; ensuring snacks are available throughout the day and that those with a lack of appetite eat little and often; implementing food charts to ensure accurate documentation of intake; and using fluid charts to record input and output to calculate fluid balance.

Where appropriate, patients should be referred to a dietician with the specialist knowledge and skills to recognise and accommodate specific nutritional needs. If deemed necessary, a fortified diet, for example adding milk powder, cheese or extra sugar to a meal, or nutritional supplements can be prescribed. The medical team and pharmacists should be consulted where the patient’s medication requires review. This is important because some medications may suppress appetite. Patients should be monitored carefully to evaluate the effect of their nutritional plan of care, with treatment continued or modified as appropriate.

Patients undergoing general anaesthesia for surgery will be nil by mouth to minimise the risk of aspiration pneumonitis (Royal College of Nursing 2005). To reduce the effect of surgery on the patient’s nutritional status, it may be necessary to schedule surgery so that the individual does not have to be nil by mouth for unnecessarily long periods.

Conclusion

Hospitalised patients benefit from nursing care that offers close supervision, provision of good nutrition in a controlled environment, and the opportunity for education about the importance of nutrition. Maintaining nutritional status and preventing malnutrition aims to ensure that energy, protein and other micronutrients are available to prevent pressure ulcer development or where these are already present, enhance wound healing NS.

References

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