



Nutrition and Pressure Sores in the Elderly

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Pressure sores, or ulcers, are defined by the European Pressure Ulcer Advisory Panel (EPUAP) and National Pressure Ulcer Advisory Panel (NPUAP) as 'localized injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure, or pressure in combination with shear'.¹ Pressure sores negatively affect quality of life,² are painful and increase mortality.³ The high incidence of pressure sores places a burden on the NHS, yet nutritional intervention is one of the most cost effective strategies in clinical management.⁴ Both the role nutrition plays in prevention of pressure sores in at risk groups and the nutritional management of pressure sores once established will be discussed.

Scale of the problem

Data presented at the Patient Safety Congress in May 2013 indicated that in hospitals in England alone 186,617 people were harmed by pressure ulcers. More worryingly, 80 per cent of these were preventable.⁵ The National Patient Safety Agency (NPSA) suggests that up to 20 per cent of patients in hospitals and nursing and residential homes may be at risk, rising to 30 per cent of patients in the community.³ Pressure sores are an international health and economic threat, with costs estimated at over \$11 billion annually in the US.⁶

At risk groups

Older adults are at increased risk for developing pressure sores, and this risk increases with age.⁷ It is due to a variety of factors, such as

decreased mobility,⁷ increased levels of incontinence,⁷ and increased risk of malnutrition.⁸ Older adults are also at risk of neglect, and the development of a pressure sore can be a safeguarding concern as it may arise as a result of withholding necessities of life, such as adequate nutrition, medication, heat, ignoring physical care needs, or failure to provide access to appropriate health and social care needs.⁹ Dietitians, like all health and social care professionals, have a duty to ask any patient that may be at risk of developing pressure sores, whether they, their family or carers have noted if a pressure sore may be present. This is essential, not just to tailor their nutritional intervention, but to ensure that appropriate health (e.g. district nurse, tissue viability nurse) and social care (e.g. safeguarding) referrals are actioned.

NPUAP/EPUAP¹² advise early nutritional screening, as failure to manage malnutrition may precipitate pressure ulcer development and delay woundhealing.

Shahin *et al.*¹⁰ cross-sectional study in hospitals and nursing homes reported a significant relationship between pressure ulcers and BMI under 18.5kg/m², unintentional weight loss and a low nutritional intake. The regular use of nutritional screening tools, such as the Malnutrition Universal Screening Tool ('MUST')¹¹ to identify patients at risk of malnutrition, may therefore play a role in preventing pressure ulcers, by initiating nutritional interventions appropriate to nutritional risk. NPUAP/EPUAP¹² advise early nutritional screening, as failure to manage malnutrition may precipitate pressure ulcer development and delay wound healing.

Nutrition and wound care

The 2009 Joint American (NPUAP) and European (EPUAP)¹² guidance advise once a pressure sore has developed, that patients should be referred to a dietitian for early assessment of, and intervention for nutritional problems.

Energy

A review and meta-analysis in 2011 reinforced that there is an increase in resting energy expenditure in patients with pressure sores.¹³ This suggested an estimate of 30kcal/kg,¹³ which is in line with the 2009 NPUAP/EPUAP guidance of 30-35kcal/kg.¹²

Protein

Protein is often focused upon in wound care, as the resulting catabolic state means that there is increased need for protein for wound repair¹⁴ and protein plays a role in immune function.¹⁵ The EPUAP/NPUAP guidance advise a positive nitrogen balance must be achieved,¹² and suggest an increased requirement of 1.25-1.5g/kg.¹² This figure is also supported by the other European¹⁶ and Australasian¹⁷ guidance. Protein supplementation has been shown to improve wound healing.¹⁸ It is advised to monitor renal function.¹²

The conditionally-essential amino acid arginine has also been cited in many studies investigating the role of nutrition in wound healing, and *in vitro* studies have demonstrated improved wound healing with arginine, in particular with proline (which plays a role in collagen production), in rats with diabetes.¹⁹ A small Japanese study suggested lower arginine levels in enterally fed patients with pressure sores, although this clearly does not determine a cause-effect relationship. In the same study they did show an increased rate of healing in pressure sores with arginine supplementation.²⁰ NPUAP/EPUAP suggest that currently there is inadequate evidence to endorse specific arginine supplementation.¹²

Where energy and protein requirements cannot be met via regular diet, oral nutritional supplementation, or enteral or parenteral nutrition may be indicated to meet requirements.¹²

Micronutrients

Assessment of dietary micronutrient content is necessary to establish if there is any inadequacy in dietary intake. Vitamin and mineral supplementation may be required where the amount consumed is not sufficient, or there is a proven or suspected deficiency.¹² Many micronutrients have had specific attention for their postulated roles in wound

healing, in particular vitamin C and zinc, which will be further explored.

Vitamin C

Vitamin C plays a role in collagen structure formation, immune function and is a known antioxidant. A Dutch randomised control trial did not conclude a significant difference in pressure sore healing between those receiving 500mg and 10mg in the control group.²¹ This study only recruited 88 patients and is amongst a handful of studies that looks only at vitamin C, as many studies are confounded by the provision of multiple nutrients. Routine administration of vitamin C is not endorsed. Despite the poor quality of this evidence, Alaghanti *et al.*²² reiterate that vitamin C deficiency remains a forgotten ailment in modern medicine, yet many with alcohol dependency, older adults living alone or in institutions and, in particular, those in social deprivation may be at risk. Where patients have had little health or social care interaction prior to presentation with pressure sores, safeguarding may be a consideration. It may be prudent, despite the difficulty in obtaining a sample, to verify serum ascorbic acid levels in certain sub groups of patients with pressure sores, in case specific correction is required.

Zinc

Whilst there may remain common practices of giving zinc as a blanket measure for any patient with a pressure sore, closer inspection of scientific literature provides little robust evidence to support this action. Serenekos⁸ review of the literature found the studies available have very small sample sizes, and that often no significant difference in wound healing was observed in the presence of zinc supplementation. Caution should be heeded in providing a blanket prescription, as this is not without risk, such as the potential to cause copper deficiency, alter calcium and magnesium absorption, cause gastrointestinal disturbances and may produce higher HbA1c results.²³ A small paper that compared 25 patients with 100mg zinc supplementation to a group of 43 controls with pressure sores, also recorded an increase in infections requiring antibiotic treatment in the group treated with zinc. Although the small study size does limit translation to clinical practice, it further highlights the need to objectively assess zinc status.²⁴ Levels of zinc less than 60 µg/dL are generally considered indicative of deficiency, and the NPUAP guidance suggests to give supplementation only where there is a deficiency.¹² Further high quality research is required to determine if zinc plays a role in wound healing.

Disease specific oral nutritional supplementation

Whilst not readily available in the UK currently, there are wealth of studies involving disease specific oral nutritional supplementation (ONS), mainly comprising of arginine, vitamin C and zinc. The Agency for Healthcare Research and Quality¹⁸ summarised much of the data up until 2012 on disease specific ONS to be of poor quality due to study design. An online article, due to be published in the Journal of Human Nutrition and Dietetics,

reports on a pragmatic randomised study in Australia which found that there was a significant improvement in wound healing with the standard oral nutritional supplement versus the disease specific ONS.²⁵ The authors suggest the use of standard ONS to be more beneficial in wound healing, although it is important to note that they also recorded data for subjects who had wounds not defined as pressure sores.

Fluid

Ensuring adequate fluid is necessary to prevent further skin breakdown. Dietitians and other healthcare professionals must account for pyrexia, any fluid losses via the wound, fluid losses by perspiration, watery stools or vomit when calculating fluid requirements. UK²⁶ and US²⁷ guidance suggests 30-35ml/kg for those over and under 65 respectively. Whilst some guidelines suggest the use of biochemical measures, such as serum sodium and serum osmolality to monitor hydration status,¹² this may be impractical to regularly arrange in the community setting. Skin turgor and urine output¹² may be more pragmatic measures in the community. These are also measures which non-medical staff, such as relatives or care assistants, can be trained to monitor and report upon – for example, when community healthcare professionals may not be reviewing on a daily basis.

Enteral feeding, dysphagia, feeding position and pressure sores

Patients who are receiving enteral tube feeding are recommended to be upright whilst feeding to prevent reflux, aspiration and tube displacement. For patients that are able to eat orally, similar positioning advice forms part of a speech and language therapist's (SLTs) 'General Safe Swallow recommendations' to prevent aspiration risk.²⁸ This advice may, however, be in contradiction to recommendations for patients with pressure sores, such as avoiding an upright position, and the use of

turning charts to regularly move a patient to prevent them remaining in one position. A multi-disciplinary approach amongst doctors, nurses, dietitians, SLTs, tissue viability, and, where appropriate, palliative care teams is needed to decide an appropriate balance between risks and symptoms of these two seemingly polar recommendations.

Outcome measures in pressure sores

When measuring outcomes in the nutritional treatment of pressure sores, as well as meeting specific dietary goals to achieve adequate energy or protein intake, markers such as a reduction in the use of dressings, frequency of dressing changes and incidence of infection may be used to measure efficacy of dietary intervention.²⁷ A validated tool, such as 'PUSH' (Pressure Ulcer Score for Healing),²⁹ may also be of benefit to objectively measure the healing of the pressure ulcer.

Ongoing research

Whilst there is evidence to lead some nutritional interventions in pressure sore management, it remains that there is still much unknown about the role nutrition and hydration plays, in particular, which exact macro and micro nutrient composition of the diet may be most beneficial. Many reviews criticise current published papers for their small sample size and poor methodology. In the UK, the University of York hosts the James Lind Alliance Partnership and, in conjunction with patients, carers and healthcare professionals, in 2013 they determined their 'Top 12 Pressure Ulcer Uncertainties',³⁰ listed 10th is the question: 'Does improving diet and hydration promote pressure ulcer healing?' They now aim to stimulate further research in this area. A more international consensus may be reached when NPUAP and EPUAP, in conjunction with other international organisations, collaborate to replace their current guidance (originally produced in 2009), which is due for release in 2014. This document will further guide clinical practice in this area.

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