Evidence based practice guidelines for the dietetic management of adults with pressure injuries

Trans Tasman Dietetic Wound Care Group

Review 1: 2011

Endorsed by Dietitians New Zealand.

These guidelines have been independently reviewed by the Dietitians Association of Australia (DAA) and as a result are endorsed by the DAA.
## Contents

EXECUTIVE SUMMARY ...................................................................................................................... 3  
SUMMARY OF EVIDENCE BASED RECOMMENDATIONS ................................................................... 4  
Pressure injury nutrition treatment quick reference tool ................................................................. 6  

INTRODUCTION .................................................................................................................................. 8  
Background to Review 1: 2011 ............................................................................................................ 8  
Clinical background ............................................................................................................................. 9  
Purpose and scope .............................................................................................................................. 11  
Methods ............................................................................................................................................ 11  
Review process .................................................................................................................................. 14  
Applicability ....................................................................................................................................... 14  

EVIDENCE BASED STATEMENTS ...................................................................................................... 16  
Nutrition screening .............................................................................................................................. 16  
Dietetic assessment ............................................................................................................................. 17  
Obese patient assessment ................................................................................................................... 22  
Spinal cord injured patient assessment ............................................................................................. 23  
Nutrition goals, interventions and monitoring .................................................................................. 23  
Arginine ............................................................................................................................................ 26  
Monitoring ........................................................................................................................................... 28  
Cultural, legal and ethical considerations .......................................................................................... 32  

REFERENCES ..................................................................................................................................... 35  
Appendix 1: Author details .................................................................................................................. 40  
Appendix 2: 2011 Expert Review Panel ............................................................................................... 42  
Appendix 3: NHMRC Additional levels of evidence and grades of recommendations ..................... 43  
Appendix 4: Evidence summary of Arginine Supplement Trials ....................................................... 44  
Implementation Toolkit ....................................................................................................................... 46  
Example standard of care .................................................................................................................... 49  
Pressure injury DIETETIC quick reference guide ............................................................................ 54
EXECUTIVE SUMMARY

A pressure injury is a 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. A number of contributing or confounding factors are also associated with pressure injuries; the significance of these factors is yet to be elucidated. ¹ Severity of pressure injuries can range from small red areas to deep, full tissue thickness wounds. Malnutrition is an independent risk factor for pressure injury development. Due to the role of nutrition in many aspects of the healing process nutritional status has a major impact on the treatment of pressure injuries. Nutrition is implicated in the immune response set up by the body to reduce infection as well as the provision of nutrients to build new tissue and optimise circulation to the wound site. Presence of other conditions may affect nutrient requirements – for example infection, malabsorption, and chronic diseases such as diabetes or obesity. The nutrient requirements to heal a small stage 1 pressure injury vary considerably to the requirements of those needed to heal a necrotic stage 4 (severe) pressure injury, as would non-exudating versus highly exudating wounds. These issues, as well as the varying nutrient requirements at different stages of the wound healing process make nutritional review and monitoring essential.

This is the first review of Dietitians New Zealand (Dietitians NZ) evidence based practice guidelines for the dietetic management of adults with pressure injuries. The original guidelines, endorsed by Dietitians NZ in 2008, contained a review of research available until June 2006. This review document includes a review of available research published until January 2010. The recommendations made are designed to guide practice and assist in the decision making process that is undertaken when assessing and treating patients. A Trans-Tasman approach was taken for the review of these guidelines to facilitate use by New Zealand Registered Dietitians as well as Australian Accredited Practicing Dietitians.

The purpose of this document is to provide New Zealand Registered Dietitians and Australian Accredited Practising Dietitians with an evidence-based practice guideline to maximise the effectiveness of nutritional interventions in the healing of pressure injuries in adult patients. This document is to be used as a guideline only and does not replace individual patient assessment by a dietitian. These guidelines are based on a rigorous process to develop evidence based practice and practice based evidence guidelines.
### SUMMARY OF EVIDENCE BASED RECOMMENDATIONS

The guideline recommendations have been graded using the National Health and Medical Research Council (NHMRC) classification for grades of recommendations, which are as follows:

- **Level A**: Body of evidence can be trusted to guide practice.
- **Level B**: Body of evidence can be trusted to guide practice in most situations.
- **Level C**: Body of evidence provides some support for recommendation(s) but care should be taken in its application.
- **Level D**: Body of evidence is weak and recommendation(s) must be applied with caution.

#### 1. Nutrition screening

**Clinical question**

1. What nutrition screening process can be used to best identify adults at risk of poor healing of pressure injuries due to nutritional problems?

**Evidence-based recommendation**

Nutrition screening, using a validated tool for the appropriate clinical setting, should be undertaken on all adults with pressure injuries to identify those at risk of poor healing due to nutritional problems.

**NHMRC Grade of Recommendation:** B

#### 2. Nutrition assessment

**Clinical question**

2a. How should the nutritional status of adults with pressure injuries be assessed?

**Evidence-based recommendation**

The nutritional status of patients with pressure injuries should be assessed using weight, food intake measures, BMI, anthropometry and biochemistry to identify nutritional issues that may impact upon healing potential.

**NHMRC Grade of Recommendation:** C

As malnutrition impacts on healing potential, a validated nutrition assessment tool appropriate to the population in which it is to be applied should be used.

**NHMRC Grade of Recommendation:** B

**Clinical question**

2b. How should the nutritional requirements of obese patients with pressure injuries be determined?

**Practice recommendation**

Nutritional requirements of obese patients with pressure injuries should be calculated with caution, using weight, food intake measures, BMI, anthropometry and biochemistry.

**NHMRC Grade of Recommendation:** D

**Clinical question**

2c. How should the nutritional requirements of patients with spinal cord injuries (SCI) and pressure injuries be determined?

**Evidence-based recommendation**

Nutritional requirements of SCI patients with pressure injuries should be calculated with caution, using level of injury, unintentional weight loss, food intake measures, healthy weight range for persons with a SCI, anthropometry and biochemistry, other than BMI alone.

**NHMRC Grade of Recommendation:** C
### 3. Nutrition goals, interventions and monitoring

#### Clinical question
3a. What nutritional interventions should be implemented to assist the healing of pressure injuries?

**Evidence-based recommendation**
Nutritional interventions as per the evidence statements outlined should be implemented to assist healing of pressure injuries.

**NHMRC Grade of Recommendation:** C

#### Clinical question
3b. Should arginine containing nutritional supplements be used?

**Evidence-based recommendation**
Arginine containing supplements may be considered for patients who have a stage II or above pressure injury.

**NHMRC Grade of Recommendation:** C

Where arginine containing supplements are not available, treatment should follow according to recommendations in section 3a.

**NHMRC Grade of Recommendation:** C

#### Clinical question
3c. How should the nutritional status of adults with pressure injuries be monitored?

**Evidence-based recommendation**
Nutritional status should be re-assessed regularly following an individualised assessment plan (by a dietician), which includes an evaluation date.

**NHMRC Grade of Recommendation:** C
Pressure injury nutrition treatment quick reference tool

At all stages of care obtain consent, consider cultural, ethical and legal issues of providing nutrition support and ensure there is an ongoing care pathway with clear nutrition treatment goals.

1. Determine malnutrition risk using an appropriate, validated screening and assessment tool.
2. Identify stage of pressure ulcer.
3. Determine risk of delayed wound healing due to nutritional problems (see over page).

Probable low risk of delayed healing due to nutrition issues

4. Treatment

- Give basic wound healing / healthy eating information sheet to ensure appropriate, balanced diet.

Probable moderate risk of delayed healing due to nutrition issues

- Consider referring to dietitian for full nutritional assessment
- Goal intake: 1.25g protein/kg; 30-35kcal (125 – 145 kJ/kg); 30 – 35ml/kg fluid.
- Use high protein / high energy dietary fortification information.
- Supplement vitamins and minerals as necessary to achieve NRV’s.
- Possible benefit from oral nutritional supplements to achieve goal intakes. ** see arginine box below

Probable high risk of delayed healing due to nutrition issues

- Refer to dietitian for full nutritional assessment
- Goal intake: 1.5g protein/kg; 30-35kcal (125 – 145 kJ/kg); 30 – 35ml/kg fluid.
- Use high protein / high energy dietary fortification information.
- Supplement vitamins and minerals as necessary to achieve NRV’s.
- Probable benefit in using oral nutritional supplements to achieve goal intakes. ** see arginine box below

5. Monitor

As for previous step, plus:

- Consider protein or energy nutrient module if patient unable to meet goal intakes using diet +/- oral nutritional supplements.

If goal intakes are not being met by the above strategies then discuss other means of provision with medical team.

Arginine containing oral nutritional supplements

- Potential benefit of use with Stage ≥ 2 pressure injuries (over & above diet + standard oral nutritional supplements).
- Assess individual case with regards to current nutritional status, financial & access issues.

Treatment should continue through the steps opposite if any of these factors arise at review. As condition improves treatment steps can be reversed.

- No signs of wound improvement within 2-3 weeks of nutritional treatment
- Oral intake declines
- Not meeting nutritional goals
- Cannot manage oral nutritional supplements

If patient meeting nutritional goals or wound shows signs of improvement, then monitor patient according to patient need / professional discretion.

The above factors should be regularly monitored as long as pressure ulcer persists (by Dietetic or Nursing staff).
### Indicators of probable low risk of delayed healing due to nutrition problems
- Low risk of malnutrition as defined by a validated nutrition screening tool or nutritional assessment tool / individual Dietetic assessment.
- Stage 1 pressure injury plus normal range albumin levels and no reported unintentional weight loss.

### Indicators of probable moderate risk of delayed healing due to nutrition problems
- Moderate risk of malnutrition as defined by a validated nutrition screening tool or nutritional assessment tool / individual Dietetic assessment.

### Indicators of probable high risk of delayed healing due to nutrition problems
- Stage 1 or 2 pressure injury and BMI ≥ 21 if >65 years old / BMI ≥ 18.5 if < 65 years plus at least one of the following:
  - Unintentional weight loss, but less than 10% in 6 months or 7.5% in 3 months
  - Moderate risk of malnutrition as defined by a validated malnutrition screening tool
  - Patient reports more than ½ but less than full oral intake for ≥ 5 days
  - High risk of malnutrition as defined by a validated nutrition screening tool or nutritional assessment tool / individual Dietetic assessment.
- Stage 1 or 2 pressure injury plus at least one of the following:
  - BMI ≤20 if >65 years old / BMI ≤18.5 if <65 years
  - Unintentional weight loss, of more than 10% in 6 months or 7.5% in 3 months
  - BMI ≤20 (any age) AND unintentional weight loss as above
  - High risk of malnutrition as defined by a validated malnutrition screening tool
- Patient reports less than ½ oral intake for ≥ 5 days
- Stage 3 and 4 pressure injuries automatically rank as probable high risk of delayed healing due to nutritional problems.

Energy and protein can be increased through two methods. The best results can be seen when these methods are used in combinations.

<table>
<thead>
<tr>
<th>Small meals and snacks</th>
<th>Overall nutrient intake can be increased by having small, frequent meals and snacks that focus on high energy / high protein foods. 3 meals + 3 snacks can help to increase overall food intake in people who have small appetites.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Food fortification</strong></td>
<td>Nutrient density of foods can be increased by mixing high protein / energy foods in to other foods. This enables more energy and protein to be consumed for a small volume of food or drink.</td>
</tr>
<tr>
<td><strong>Examples of food fortification:</strong></td>
<td></td>
</tr>
</tbody>
</table>
| **Breakfast options** | Porridge / cereal + full cream milk + 1-2 tbsp cream + syrup / sugar  
Scrambled egg + cheese  
Egg + bacon  
| **Savory options** | Mashed potato + margarine + grated cheese  
Sandwich: Tuna + mayonnaise / ham + cheese / hummus + cream cheese  
Vegetables + cheese sauce  
Tinned or home made soup + cream + grated cheese  
| **Sweet options** | Instant desserts made with full cream milk  
Scone + cream / margarine / jam  
Add ice cream / cream / custard to desserts  
| **Drinks** | Full cream milk (fortify with 4 tbsp milk powder to 500ml milk)  
Use fortified milk in all – milk coffee, hot chocolate  
|  
| **Please contact your local dietitian for specific advice on interventions appropriate for your patient** |  

Dietitians are integral members of the multidisciplinary team approach to wound healing. It is important that a dietitian be consulted to ensure that nutrition intervention is relevant and done in a timely manner. This will assist in maximizing efficacy of the team interventions.
INTRODUCTION

1.1 Background to Review 1: 2011
This is the first review of Dietitians New Zealand (Dietitians NZ) evidence based practice guidelines for the dietetic management of adults with pressure injuries. The original guidelines, endorsed by Dietitians NZ in 2008, contained a review of research available until June 2006. This review document includes a review of available research published up until January 2010.

The review team for the 2011 update is a trans-Tasman group including members of Dietitians New Zealand (Dietitians NZ) and the Dietitians Association of Australia (DAA). The members of the review group were independent dietitians with an interest and working experience in the area of pressure injuries.

Table 1 Review group 2011

<table>
<thead>
<tr>
<th>Name</th>
<th>Position, Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lilliana Barone</td>
<td>Clinical Dietitian, Illawarra Shoalhaven Local Health District, Australia</td>
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<td>Elizabeth Carnachan</td>
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<td>Clinical Dietitian, Sydney Local Health District, Australia</td>
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<td>Professional Leader – Dietitian, Waitemata District Health Board, New Zealand</td>
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<td>Brielle Gosch</td>
<td>Clinical Dietitian, South Eastern Sydney Local Health District, Australia</td>
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<td>Kendall Ingram</td>
<td>Clinical Dietitian, South Eastern Sydney Local Health District, Australia</td>
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<td>Bridget Little</td>
<td>Nutrition &amp; Food Services Team Leader, Waitemata District Health Board, New Zealand</td>
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<td>Alex McClelland</td>
<td>Clinical Dietitian, South Eastern Sydney Local Health District, Australia</td>
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<td>Stephanie Morrison</td>
<td>Clinical Dietitian, Waitemata District Health Board (retired), New Zealand</td>
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<td>Katrina Pace</td>
<td>Clinical Dietitian, Waitemata District Health Board, New Zealand</td>
</tr>
</tbody>
</table>

For full author details see Appendix 1.
1.2 **Clinical background**

1.2.1 **What is a pressure injury?**
A pressure injury is 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. A number of contributing or confounding factors are also associated with pressure injuries; the significance of these factors is yet to be elucidated. 1 Severity of pressure injuries can range from small red areas to deep, full tissue thickness wounds. The National Pressure Ulcer Advisory Panel (NPUAP) and European Pressure Ulcer Advisory Panel (EPUAP) have recently combined their classification scales for the grading of pressure injuries. This scale is given in the toolkit section of these guidelines.

1.2.2 **Prevalence and incidence**
There is no published data for prevalence or incidence of pressure injuries in New Zealand. It is reasonable to assume that incidence rates would be similar to those found in other developed countries such as Australia, America and the United Kingdom.

Australian data suggests that in 2003 approximately 26.5% of patients occupying acute hospital beds had evidence of a pressure injury, with 12.7% of these being of stage 3 or 4 (the most severe forms). 3 The 2001 Australian Wound Management Association guidelines on pressure injuries 1 reported incidence within Australia of 5.4 – 15%. A recent report from Queensland, Australia estimates 33% of pressure injuries seen in public hospitals to be attributable to malnutrition. 5

Prevalence of pressure injuries in America has been reported as 10 – 18% of patients in acute care, 2.3 – 28% in long term care facilities, and 0 – 29% in home care. Incidence has been reported as 2.3 – 23.9% in long term care facilities, 0.4 – 38% in acute care, 0 – 17% in home care and 0 – 6% in rehabilitative care. 6 Data from the United Kingdom suggests a prevalence of 4 - 10% in acute care, 7 with as much as £2.1 billion spent each year on treating pressure injuries (approximately 4% of National Health Service expenditure). 8

Recent data from Australia indicates that the mean economic cost of pressure injuries due to malnutrition in acute care facilities is estimated to be AU$12,968,668. 5

1.2.3 **Risk factors**
The two key factors that affect pressure injury development are the intensity and duration of pressure being applied and the ability of the body to deal with that pressure. Blood circulation, capillary pressure, hydration, sheer and friction of the skin, moisture and skin condition all affect how the body can deal with the pressure being applied. 1

Pressure injuries can occur in anyone – child or adult, however they are more commonly seen in certain groups of people. Typically a higher incidence of pressure injuries can be seen in older people and those with limited mobility. In older people, risk can be increased due to reduced mobility and bed / wheelchair-bound status, or presence of chronic disease that may reduce mobility, affect circulation or reduce nutritional intake. Those with limited mobility include patients with spinal cord injuries. This is a high risk group due to reduction in muscle mass as well as reduced mobility. An increasing number of morbidly obese people are presenting with pressure areas due to poor circulation, skin friction and other metabolic conditions associated with morbid obesity.
1.2.4 Role of nutrition

Malnutrition is an independent risk factor for pressure injury development. Due to the role of nutrition in many aspects of the healing process, nutritional status has a major impact on the treatment of pressure injuries. Nutrition is implicated in the immune response set up by the body to reduce infection as well as the provision of nutrients to build new tissue and optimise circulation to the wound site. Presence of other conditions may affect nutrient requirements – for example, infection, malabsorption, and chronic diseases such as diabetes and obesity. The nutrient requirements to heal a small stage 1 pressure injury vary considerably to the requirements of those needed to heal a necrotic stage 4 (severe) pressure injury, as would non-exudating versus highly exudating wounds. These issues, as well as the varying nutrient requirements at different stages of the wound healing process, make nutritional review and monitoring essential. Unfortunately, there is a lack of evidence for specific nutrient requirements at different stages of pressure injuries.

There are limits as to how much nutrition interventions can assist in the healing of pressure injuries. Underlying conditions which affect blood supply to the pressure injury, infection, and how and why the pressure injury occurred in the first place may all impact on the extent to which nutrition can expedite healing. Individual patient goals for nutrition interventions may vary considerably given the causes and underlying disease process influencing the pressure injury, as well as the patient type (elderly, obese, reduced mobility etc). The multifactorial aspect of pressure injuries also makes it imperative for dietitians to be aware of, and work with (where possible) other health care professionals who have expertise in wound healing and pressure relief.

What must be ensured is that any potential reduction in healing that could be caused by malnutrition is identified and resolved.

In late 2009 the Dietitians Association of Australia (DAA) and Dietitians New Zealand (Dietitians NZ) endorsed the DAA Evidence Based Practice Guidelines for Nutritional Management of Malnutrition in Adult Patients across the Continuum of Care (Malnutrition Guidelines).9 It is important to note that these Malnutrition Guidelines may be used in conjunction with these Pressure Injury Guidelines. The Malnutrition Guidelines may be able to provide dietitians with more specific guidance on the use and applicability of general malnutrition screening and assessment tools, which would generally be appropriate for use with adults with pressure injuries. The Pressure Injury Guidelines working group recommends that evidence-based recommendations and practice points contained in these guidelines are read in conjunction with relevant complementary guidelines as determined by the individual dietitian.

The DAA Evidence-based guidelines for nutritional management of malnutrition in adult patients across the continuum of care9 (also endorsed by Dietitians New Zealand) use the International Statistical Classification of Disease and Related Health Problems (ICD-10-AM) definitions of malnutrition.10 It is these definitions of mild, moderate and severe malnutrition that are used within these guidelines.

- Malnutrition: In adults, malnutrition includes weight loss of at least 5%, with evidence of suboptimal intake resulting in subcutaneous fat loss and/or muscle wasting. If an observed weight is below the mean value of the reference population, there is a high probability of severe malnutrition if there is an observed value situated three or more standard deviations below the mean value of the reference population; a high probability of moderate malnutrition for an observed value located between two and less than three standard deviations below this mean; and a high probability of mild malnutrition for an observed value located between one and less than two standard deviations below this mean.
Excludes
Intestinal malabsorption (K90.-)
Nutritional anaemias (D50–D53)
Sequelae of protein-energy malnutrition (E64.0)
Starvation (T73.0)

- Mild protein-energy malnutrition: In adults, BMI < 18.5 kg/m2 or unintentional loss of weight (5–9%) with evidence of suboptimal intake resulting in mild loss of subcutaneous fat and/or mild muscle wasting.
- Moderate protein-energy malnutrition: In adults, BMI < 18.5 kg/m2 or unintentional loss of weight (5–9%) with evidence of suboptimal intake resulting in moderate loss of subcutaneous fat and/or moderate muscle wasting.
- Severe protein-energy malnutrition: In adults, BMI < 18.5 kg/m2 or unintentional loss of weight (>10%) with evidence of suboptimal intake resulting in severe loss of subcutaneous fat and/or severe muscle wasting.

1.3 Purpose and scope
The purpose of this document is to provide New Zealand Registered Dietitians (NZRD) and Australian Accredited Practising Dietitians (APD) with an evidence-based practice guideline to maximise the effectiveness of nutritional interventions in the healing of pressure injuries in adult patients.

The objective of these guidelines is to ensure that adults with pre-existing pressure injuries are appropriately screened, assessed, treated and monitored to maximise healing through recommendations relating to the provision of appropriate and adequate nutrients.

Implementation of these guidelines is expected to have the following health-benefit outcomes:
- Early identification of those at risk of poor healing of pressure injuries due to nutritional problems.
- Standardised nutrition assessment and monitoring of patients with pressure injuries
- Improved health outcomes for patients receiving optimal nutritional treatment
- A skilled workforce of dietitians working to best practice guidelines.
- Advocacy for patients to receive appropriate dietetic referral and interventions – both in staff resources and policy.

1.4 Methods
1.4.1 Guideline review process. Review 1 (2011)
See Appendix 2 for original guideline development process.

In 2009 a group was convened to review the 2008 guidelines. Although the original guidelines were endorsed by Dietitians NZ in 2008 the original literature review was for research up until July 2006. The original document had a three year period before first review. A Trans-Tasman approach was taken for these guidelines to facilitate use of the guidelines used by New Zealand Registered Dietitians (NZRD’s) as well as Australian Accredited Practicing Dietitians (APD’s). The original guidelines underwent a pilot phase. As there were no substantial clinical changes to the original guidelines the review document was not pilot tested by either New Zealand or Australian Dietitians. Both Dietitians NZ and DAA members were given opportunity to feedback on this document.

1.4.2 Review of clinical questions
The guidelines were developed using the American Dietetic Association’s Nutrition Care Process model (NCP) 11 to define the clinical questions. This is the framework adopted by the DAA.
As part of the 2011 review, the clinical questions considered in the original guidelines were reviewed by the group and changed as appropriate. See table 2.

### Table 2 Review of clinical questions

<table>
<thead>
<tr>
<th>2008 guidelines</th>
<th>2011 review</th>
</tr>
</thead>
<tbody>
<tr>
<td>How can patients at risk of poor wound healing due to nutritional problems best be identified?</td>
<td>What nutrition screening process can be used to best identify adults at risk of poor healing of pressure injuries due to nutritional problems?</td>
</tr>
<tr>
<td>How can patients at risk of poor wound healing due to nutritional problems best be assessed?</td>
<td>How should the nutritional status of adults with pressure injuries be assessed?</td>
</tr>
<tr>
<td>How should the nutritional requirements of obese patients with pressure injuries be calculated?</td>
<td>How should the nutritional requirements of obese patients with pressure injuries be determined?</td>
</tr>
<tr>
<td>What are the appropriate nutritional interventions that should be implemented to assist healing of pressure injuries?</td>
<td>What nutritional interventions should be implemented to assist the healing of pressure injuries?</td>
</tr>
<tr>
<td>What is the evidence for the use of arginine containing nutritional supplements?</td>
<td>Should arginine containing nutritional supplements be used?</td>
</tr>
<tr>
<td>What cultural, legal and ethical considerations should be taken into account by the dietitian coordinating nutritional interventions?</td>
<td>What cultural, legal and ethical considerations should be taken into account by the dietitian coordinating nutritional interventions?</td>
</tr>
</tbody>
</table>

### 1.4.3 Review of literature

Two published nutrition guidelines for the treatment and prevention of pressure injuries were identified and their evidence used as a basis for the original 2008 guideline. The literature search of the 2008 guidelines included documents up to and including July 2006. The literature search for this current review (Review 1; 2011) includes documents published up until January 2010. Search terms for the 2011 review can be seen in table 3. Table 4 documents the exclusion and inclusion criteria.
Table 3  Search terms

<table>
<thead>
<tr>
<th>Search number</th>
<th>Search term</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>Decubitus ulcer</td>
</tr>
<tr>
<td>#2</td>
<td>Pressure ulcer</td>
</tr>
<tr>
<td>#3</td>
<td>Pressure sore</td>
</tr>
<tr>
<td>#4</td>
<td>Malnutrition</td>
</tr>
<tr>
<td>#5</td>
<td>Nutrition</td>
</tr>
<tr>
<td>#6</td>
<td>Obesity</td>
</tr>
<tr>
<td>#7</td>
<td>Body mass index</td>
</tr>
<tr>
<td>#8</td>
<td>Arginine</td>
</tr>
<tr>
<td>#9</td>
<td>Protein</td>
</tr>
</tbody>
</table>

Searches:
- #1 OR #2 OR #3 AND #4
- #1 OR #2 OR #3 AND #5
- #1 OR #2 OR #3 AND #6
- #1 OR #2 OR #3 AND #7
- #1 OR #2 OR #3 AND #8
- #1 OR #2 OR #3 AND #9

Search engines:
- Pubmed
- Cinahl

Search term:
- Pressure ulcer / decubitus ulcer / pressure sore

Search engines:
- www.guidelines.gov (international guidelines clearinghouse)
- Cochrane database including Cochrane central register of control trials

Search limits:
- English
- Jan 2006 – Jan 2010 publish date

Table 4  Inclusion and exclusion criteria

<table>
<thead>
<tr>
<th>Inclusion criteria for literature search</th>
<th>Exclusion criteria literature search</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human studies</td>
<td>Animal studies</td>
</tr>
<tr>
<td>Adult</td>
<td>Children</td>
</tr>
<tr>
<td>Published in English language</td>
<td>Not published in English language</td>
</tr>
<tr>
<td>Published Jan 2006 – Jan 2010</td>
<td>Published prior to Jan 2006 / referenced in 2008</td>
</tr>
<tr>
<td>Pressure ulcer management / treatment of existing pressure ulcer</td>
<td>pressure ulcer guidelines.</td>
</tr>
<tr>
<td>Systematic review, where details given of methodology of review process.</td>
<td>Non-pressure ulcer wounds</td>
</tr>
<tr>
<td>Clinical guideline (published)</td>
<td>No nutrition-specific information contained</td>
</tr>
<tr>
<td>Research article (any type- qualitative / quantitative)</td>
<td>Pressure ulcer prevention</td>
</tr>
</tbody>
</table>

Exemptions / extenuating circumstances:
Where little / no research is found on the key clinical question, however there is a practice-review / substantial review paper available. This information may be included in the guidelines, as a “practice point / practice recommendation”.

Exclusion of research was not determined by the type of research, but whether it matched the population group and the related clinical question. Each research paper was appraised by two dietitians. If a consensus could not be reached, a third dietitian reviewed the literature to enable a recommendation to be made. Critical appraisal of the literature was undertaken using the critical appraisal tools promoted by the Critical Appraisal Skills Programme (Milton Keynes Primary Healthcare Trust 2002). The Appraisal for Guideline Research and Evaluation (AGREE) tool 14 was used to critically appraise any guidelines identified during the literature search. Types of studies
included were systematic reviews, randomised control trials, cohort studies and cross sectional studies.

One hundred and fifteen papers were found. Of these 62 papers were relevant to the clinical questions and went forward for critical appraisal and potential inclusion in the guidelines. Following critical appraisal a summary document was developed that formulated a response to the clinical question as determined by available research. The format used for this document was the New Zealand Guidelines Group (NZGG) recommended considered judgement form.

1.4.4 Levels of evidence and recommendation grades
Usually systematic reviews of randomised controlled trials are classed as the best source of clinical evidence, however nutrition-based research is often cross-sectional, qualitative or cohort studies.

In the original guidelines the evidence was graded using the levels of evidence and grades of recommendation score system developed by the Scottish Intercollegiate Network (SIGN) 2000. To facilitate use of these guidelines by Australian APD’s in Review 1; 2011 the levels of evidence and grades of recommendation have been revised to meet the National Health and Medical Research Council (NHMRC) (2005) grades (Appendix 3).

Where no clinical evidence exists, however there are expert opinions (either from the literature or in the clinical practice of the guideline authors) these have been documented as “practice points / practice recommendations” and references given where appropriate.

1.5 Review process
A multidisciplinary expert review panel was identified to independently appraise and review the guidelines. A formal appraisal tool (AGREE tool) was used by the expert review panel to appraise the guidelines, as well as receiving general comments. See Appendix 2 for expert review panel details. The guidelines have been open to Dietitians NZ and DAA members, and DAA allocated reviewers for comment at several stages during the development. Modifications to these guidelines have been undertaken in response to feedback received.

1.6 Applicability
The treatment target group is any adult who has one or more pre-existing pressure injury(s). By definition, those excluded are patients aged less than 16 years of age or who are under the care of a paediatric health care team. Other excluded groups are those for whom the dietary treatments outlined below would cause harm due to another pre-existing medical condition, or where a practice guideline exists that would more closely meet their medical and nutritional requirements.

Implementation of this guideline may be dependent on whether dietetic services are provided to those with pressure injuries.

This document is a review of the available evidence. The recommendations made are designed to guide practice and assist in the decision making process that is undertaken when treating patients. The evidence based recommendations are current at date of compilation and will undergo a regular review period. The next review date will be 2014. The 2014 review will include feedback on the guidelines from both Australian and New Zealand dietitians as well as patients, stakeholder review, and a full review of clinical questions.

This document is to be used as a guideline only and does not replace individual patient assessment by a dietitian.
1.7 Editorial independence

No group member was involved in the research or publication of papers included or excluded from the evidence based review. Expert review of the draft document has been undertaken by participants in published research, however their comments were limited to general comments on the document not on their own research.

These guidelines were developed by an independent group of dietitians who were not funded, and did not receive funding or incentives from any business, association or group other than regional District Health Boards, Dietitians NZ or DAA. The review group consisted of dietitians working within New Zealand and Australia whose clinical case loads included patients with chronic wounds.

1.8 Planned guideline review 2: 2014

It is expected that the next guideline review will occur in 2014. This review will follow a process similar to that outlined above. The 2014 review will include feedback on the guidelines from both Australian and New Zealand dietitians, as well as patients, stakeholder review and a full review of clinical questions.
EVIDENCE BASED STATEMENTS

Nutrition screening

1a: What nutrition screening process can be used to best identify adults at risk of poor healing of pressure injuries due to nutritional problems?

<table>
<thead>
<tr>
<th>Evidence statement</th>
<th>Level of evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Mini Nutritional Assessment short form (MNA-SF) is an effective screening tool to identify risk of malnutrition in older people with pressure injuries.</td>
<td>III-1 16-20</td>
</tr>
<tr>
<td>Due to the link between malnutrition and pressure injuries, nutrition screening using a validated screening tool should be undertaken on all adults with pressure injuries.</td>
<td>6,9,12,13,16,21</td>
</tr>
</tbody>
</table>

Recommendation

Nutrition screening, using a validated tool for the appropriate clinical setting, should be undertaken on all adults with pressure injuries to identify those at risk of poor healing due to nutritional problems.

NHMRC Grade of recommendation: B

Practice points

For evidence based guidelines on malnutrition screening tools please refer to the DAA evidence based guidelines for nutritional management of malnutrition in adult patients across the continuum of care 8 (also endorsed by the Dietitians NZ).

New Zealand only:

It should be noted that Dietitians NZ considers it unethical to implement nutrition screening if there are not the resources (such as staffing levels, equipment and funding) to intervene appropriately. The only exception is when short term screening is done as an audit to establish the level of need. Dietitians NZ consider it unethical to “ignore” a problem where there is clear evidence that a problem exists (e.g. the effect of malnutrition on healing).

Background:

Nutrition screening relates to identifying those who may be at risk of nutritional problems. The nutrition related screening processes should include state of hydration, malnutrition, BMI and presence of co morbidities 22.

The Mini Nutritional Assessment Short Form (MNA-SF)16-19,23 is the only nutrition-specific screening tool that has been validated for identifying nutritional problems in those with pressure injuries. The MNA-SF has only been validated in this context for use on older adults in the acute setting.

As it is recognised that malnutrition is a risk factor for non-healing of pressure injuries 20,23-25 it is recommended that dietitians refer to the DAA Evidence based guidelines for nutritional management of malnutrition in adult patients across the continuum of care 9 (also endorsed by Dietitians NZ) for information on appropriate nutrition screening tools.

Screening is a costly exercise, with regard to time, personnel, treatment and finances. The MNA-short form questionnaire has been validated for use by both Registered and Enrolled Nursing staff23 thus increasing the potential for screening to be undertaken by a variety of staff and reducing financial and resource impacts of screening.

The National Collaborating Centre for Acute Care guidelines for nutrition support in adults is an evidence-based guideline that covers all aspects of nutrition support in adults 27. The authors reviewed the cost-effectiveness of nutrition screening for malnutrition and found that it is likely to
be cost-effective only in older adults who are hospital inpatients. They recognise that the implementation of a nutrition screening programme has huge resource implications of both financial and personnel cost.

The focus of many nutrition screening tools is on underweight and unintentional weight loss leading to malnutrition. It should be recognised that morbid obesity (although not necessarily overweight or obesity) also increases the risk of pressure injury development, which in turn has a significant impact on intensive care morbidity and length of stay.  

### Dietetic assessment

#### 2a: How should the nutritional status of adults with pressure injuries be assessed?

<table>
<thead>
<tr>
<th>Evidence statement</th>
<th>Level of evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>As malnutrition is often evident in people with pressure injuries it is appropriate to use a validated malnutrition assessment tool.</td>
<td>II (^9)</td>
</tr>
<tr>
<td>Primary goals of the nutritional treatment of adults with existing pressure injuries or at risk of developing pressure injuries should be the identification of nutrient deficiencies and the provision of adequate nutrients to prevent or reverse malnutrition, and to enhance the healing process.</td>
<td>III-3 (^1,12,13,25,66)</td>
</tr>
<tr>
<td>As a minimum, assessment should include regular weighing of patients (or other anthropometric measurements as an alternative if weighing is not possible) and documentation of food and fluid intake (using a food and fluid diary or food and fluid recall methods).</td>
<td>I (^6,12,13)</td>
</tr>
<tr>
<td>Any anthropometric measurement that involves a measure of height should be interpreted with caution.</td>
<td>II (^29-31)</td>
</tr>
<tr>
<td>BMI should be used in combination with other assessment measures (for example calculations of percentage weight loss, triceps skin fold thickness, mid arm circumference, mid calf circumference, biochemistry, nutritional history) to gain a more accurate impression of nutritional status, especially in older people.</td>
<td>IV (^24,30,32-37)</td>
</tr>
<tr>
<td>When interpreted in the appropriate clinical context, albumin and prealbumin can give an indication of nitrogen balance and body protein stores. Both are a good indication of morbidity and an improvement can show reduction in morbidity. This is especially useful where morbidity influences nutritional intake.</td>
<td>III-1 (^38)</td>
</tr>
</tbody>
</table>

**Recommendation**

The nutritional status of patients with pressure injuries should be assessed using weight, food intake measures, BMI, anthropometry and biochemistry to identify nutritional issues that may impact upon healing potential.

**NHMRC Grade of recommendation: C**

As malnutrition impacts on healing potential a validated nutrition assessment tool appropriate to the population in which it is to be applied should be used.

**NHMRC Grade of recommendation: B**
2a: How should the nutritional status of adults with pressure injuries be assessed? cont

**Practice points**

For more detailed information on validated malnutrition assessment processes please refer to the DAA evidence based guidelines for nutritional management of malnutrition in adult patients across the continuum of care

The following biochemical tests should be considered when assessing the nutritional status (including hydration) of patients with pressure injuries: Electrolytes, Creatinine, Urea, Albumin / Pre-Albumin, C Reactive Protein, Total Protein, Transferrin, Cholesterol, Haemoglobin, Vitamin B12, Iron and Folate.

See also Pressure injury nutrition treatment flow chart in Toolkit section.

**Background:**

Nutrition assessment relates to the assessment of an individual’s nutritional risk factors and nutritional requirements.

Although nutrition recommendations are often based on expert opinion, best practice guidelines and smaller studies, there is widespread agreement in the literature that an association exists between poor nutrition and pressure injury development and healing.\(^{21,24,42}\) Indications are that nutrition support can reverse or prevent the progression of pressure injuries in conjunction with other appropriate medical and nursing interventions.

Malnutrition is considered to be an independent risk factor associated with severity and prevalence of pressure injury development.\(^{21,24-26}\) The American Medical Directors Association evidence based clinical guidelines\(^ {42}\) state that under-nutrition, malnutrition and hydration deficits impairs the healing of an existing pressure injury. It therefore seems logical to address weight loss and nutritional intake as part of nutritional treatment of patients with pressure injuries.\(^ {21}\)

As it is recognised that malnutrition is a risk factor for non-healing of pressure injuries\(^ {21,24-26}\) it is recommended that dietitians refer to the DAA Evidence Based Guidelines for Nutritional Management of Malnutrition in Adult Patients Across the Continuum of Care\(^ {9}\) (also endorsed by Dietitians New Zealand) for information on nutrition assessment and validated nutrition assessment tools.

These parameters along with pressure injury stage have been used to formulate a treatment algorithm that can be used to guide nutrition interventions.

The inclusion of BMI < 18.5 kg/m\(^2\) is based on WHO criteria. However, in all settings clients with a higher BMI may be malnourished. The Mini Nutrition Assessment (MNA) tool acknowledges a higher BMI cut off for older adults\(^ {44}\) and a number of studies support a higher BMI range for older adults.\(^ {45-47}\) Unintentional weight loss is a better predictor of malnutrition than a weight or BMI at a single time point. There is evidence to suggest that weight loss of 5% annually is predictive of poor outcomes in older adults in acute and community settings.\(^ {48-50}\) For weight loss, a timeframe of 3 to 6 months is the consensus opinion however clinical professional judgement should be used.\(^ {9}\)

Dietary intake assessment using food and fluid records and recall methods are the cornerstone of nutritional assessment.\(^ {9,51}\) The use of anthropometric measurements when determining nutritional status is an integral part of clinician assessment. It is important that those measurements taken are accurate, especially when combined with other factors. Height is a commonly used measurement in
the assessment of nutritional status. It is acknowledged that there are many difficulties in measuring height, especially in those over the age of 65 years or those who are immobile. Accurate measurement of actual height or other body measurement such as demispan, ulna length or knee-height that can be used to calculate height may be affected by co-morbidities such as rotator cuff injury, arthritis, kyphosis, inability to stand or acute illness. Dietitians NZ and DAA accept that there may be limitations to these measurements, but that they may help to give the clinician an indication of other clinical parameters.  

Body Mass Index (BMI) classification applies to adults aged 18 to 65 years. BMI is a measure of how ideal weight is for height. There have been many studies that indicate the ideal BMI ranges for adults younger than 65 years are not appropriate for those aged over 65 years. BMI results should also be interpreted with care when used in nutritional assessment for older people as there is potential for over-estimation of height, based on measurement technique, and therefore may cause an inaccurate BMI reading. Although the ranges of healthy, overweight and obese BMI are different for European, Maori and Pacific Island people, and Asian and Indian people, all are classified as being underweight if they have a BMI of <18.5.

<table>
<thead>
<tr>
<th>Classification</th>
<th>European BMI (kg/m²)</th>
<th>Maori / Pacific Island BMI (kg/m²)</th>
<th>Asian / Indian BMI (kg/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>&lt;18.5</td>
<td>&lt;18.5</td>
<td>&lt;18.5</td>
</tr>
<tr>
<td>Healthy range</td>
<td>18.5 – 25</td>
<td>18.5 – 26</td>
<td>18.5 – 23</td>
</tr>
<tr>
<td>Overweight</td>
<td>25 – 30</td>
<td>26 – 32</td>
<td>23 – 25</td>
</tr>
<tr>
<td>Obese</td>
<td>&gt;30</td>
<td>&gt;32</td>
<td>&gt;25</td>
</tr>
</tbody>
</table>

Biochemical results often help assess and monitor patients’ status. As these tests are often suggestive of several conditions rather than a single determinant it is recommended that they should only be interpreted as appropriate to the clinical context that the patient presents with. This reason also provides explanation as to why there is little good evidence to show that certain biochemical tests should definitely be performed on patients with pressure injuries.

Research and expert opinion suggest that the following biochemical tests may be performed on patients with pressure injuries to assist in nutritional assessment. It should be noted that, as with all biochemistry, results may also be affected by other disease conditions occurring concurrently with pressure injuries.
<table>
<thead>
<tr>
<th>Biochemical test</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albumin (&amp; Prealbumin) – serum</td>
<td>When interpreted in the appropriate clinical context, albumin and prealbumin can give an indication of nitrogen balance and body protein stores. Both are a good indication of morbidity and an improvement can show reduction in morbidity. This is especially useful where morbidity influences nutritional intake. As prealbumin has a shorter half-life than albumin (2-3 days) it can be used to monitor protein status on a weekly basis, rather than monthly for albumin. Albumin and prealbumin are acute phase reactants and should not be used to assess nutritional status in the acute phase situation. However, patients with pressure injuries are not always in an acute phase.</td>
</tr>
<tr>
<td>C Reactive Protein – serum</td>
<td>Indicator of inflammation; allows more educated interpretation of serum albumin and prealbumin levels.</td>
</tr>
<tr>
<td>Total Protein – serum</td>
<td>Indicator of total body protein stores and allows more educated interpretation of long term protein levels.</td>
</tr>
<tr>
<td>Transferrin – serum</td>
<td>Transferrin is a more sensitive indicator of protein stores than albumin due to its half life of 8 – 10 days. Transferrin is often a preferable test to Prealbumin as it is more readily available. False low results may be seen in patients taking antibiotics.</td>
</tr>
<tr>
<td>Cholesterol – serum</td>
<td>Low cholesterol may be an indicator of malnutrition in older adults.</td>
</tr>
<tr>
<td>Haemoglobin – serum</td>
<td>Anaemia is common in patients with pressure injuries, and can adversely affect healing. Reversing anaemia can help improve blood flow to the injury, thus aiding healing.</td>
</tr>
<tr>
<td>Vitamin B&lt;sub&gt;12&lt;/sub&gt; – serum</td>
<td>Deficiency of Vitamin B&lt;sub&gt;12&lt;/sub&gt; is relatively common in those aged over 65 years. Deficiency can result in anaemia.</td>
</tr>
<tr>
<td>Folate – serum</td>
<td>Folate deficiency is also a common cause of anaemia in adults, and especially those aged over 65 years.</td>
</tr>
<tr>
<td>Iron – serum</td>
<td>Iron deficiency may also be a cause of anaemia, therefore reducing healing of pressure injuries.</td>
</tr>
</tbody>
</table>

Further biochemistry should be requested as appropriate to patient’s clinical needs and circumstances.

As stage 3 and 4 pressure injuries often involve nutrient losses through exudates (water and protein) and require additional nutrition to aid healing, this will put the patient at risk of malnutrition even if weight loss or low BMI are not seen.
### 2b: How should the nutritional requirements of obese patients with pressure injuries be determined?

<table>
<thead>
<tr>
<th>Practice points</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>• BMI and percentage unintentional weight loss scores in nutrition and screening should be interpreted with caution as they may miss malnutrition masked by obesity.</td>
<td>57</td>
</tr>
<tr>
<td>• Albumin and / or Pre-albumin should be used to screen obese patients with delayed wound healing to help give an indication of body protein stores.</td>
<td>29,47,58</td>
</tr>
<tr>
<td>• Guidelines from an authoritative source, such as PENG (Parenteral and Enteral Nutrition Group) guidelines should be used for the calculation of energy requirements for obese patients.</td>
<td>39,59</td>
</tr>
</tbody>
</table>

**Recommendation**

Nutritional requirements of obese patients with pressure injuries should be determined with caution, using weight, food intake measures, BMI, anthropometry and biochemistry.

**NHMRC Grade of recommendation: D**

### Background:

Obese patients are at risk of delayed wound healing due to reduction in oxygen and nutrient perfusion as a result of the cardiovascular effects of obesity. Hypoventilation is common in obese patients which causes a reduction in tissue oxygenation. Moisture and micro organism collection in the skin folds seen in patients with obesity can also increase the risk of infections and decrease skin integrity. There is also a reduced vascularity in adipose tissues. Obesity can induce venous hypertension which can lead to vascular injury development.

If a nutrition screening tool is used that relies heavily on body mass index or percentage weight loss, then obese patients who are at risk of malnutrition may not be detected. It is possible for an obese patient to have depleted lean body mass and protein stores whilst maintaining considerable adipose mass. In determining nutritional status total weight is irrelevant – it is the body’s functional compartmental weight that is important. Albumin and prealbumin can give an indication of nitrogen balance and body protein stores that may be useful in assessing obese patients with pressure injuries.

Using actual weight when calculating energy needs for wound healing can significantly overestimate requirements. Several sources suggest use of an adjusted weight, however there seems to be issues with insufficient data to support recommendations for calculation of nutritional intake in obese patients. Guidelines based on best available evidence have been released by PENG (Parenteral and Enteral Nutrition Group, British Dietetic Association) for calculations of nutritional requirements in obese patients.
**PENG calculations of requirements for obese patients (ie BMI >30)**

Either use 50% adjusted body weight for calculation of energy requirements, or use the following:

- For non-stressed patients, calculate requirements as normal and subtract 400-1,000 kcal (1,672 – 4,182 Kj) for a decrease in energy stores.
- For mildly to moderately stressed patients, feed to BMR, calculated using actual weight. The omission of stress and mobility factors will avoid the adverse effects of overfeeding.
- For severely stressed patients, it might be necessary to add a stress factor to BMR.

Use actual body weight for calculation of protein and fluid.

50% adjusted body weight = (current weight - ideal body weight )x 0.5 + ideal body weight

The focus of many nutrition screening tools is on underweight and unintentional weight loss leading to malnutrition. It should be recognised that morbid obesity (although not necessarily overweight or obesity) also increases the risk of pressure injury development, which in turn has a significant impact on intensive care length of stay and morbidity. 

### 2c: How should the nutritional requirements of patients with spinal cord injuries (SCI) and pressure injuries be determined?

<table>
<thead>
<tr>
<th>Evidence statement</th>
<th>Level of evidence</th>
</tr>
</thead>
</table>
| Patients with SCI and pressure injuries are a nutritionally at-risk subgroup of the general population with pressure injuries, and should be assessed early in their injury. Assessment for patients with SCI and pressure injuries should be the same as for patients without SCI: dietary intake, anthropometric measurements, biochemistry. Nutritional calculations should be adapted to meet specific needs of those with SCI (where research available). | IV  
| Recommendation                                                                 |                   |
| Nutritional requirements of SCI patients with pressure injuries should be determined with caution, using level of injury, unintentional weight loss, food intake measures, healthy weight range for persons with a SCI, anthropometry and biochemistry, other than BMI alone. |                   |
| **NHMRC Grade of recommendation:** C                                              |                   |
| Practice point                                                                   | Reference 63      |
| Anthropometric results should be interpreted with caution in those with SCI and pressure injuries. |                   |

**Background:**

Due to injury, anthropometric results should be interpreted with caution when assessing patients with SCI. The following weight adjustments have been recommended to compensate for muscle atrophy. These adjustments have not been validated but are suggested to give dietitians an indication of how weight alters due to SCI.

- For long-term paraplegics, subtract 4.5 to 7 kg from the guideline for a given height and frame size.
- For long-term tetraplegics, subtract 7 to 9 kg from the recommended guideline.

For any other anthropometric results should be interpreted with caution as they do not take into account skin compression, fluid status, recent changes in nutritional intake or other physiological changes that occur in patients with SCI. 

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22
Studies have indicated the predictive nature of CRP, iron status and albumin with respect to the development of pressure injuries in SCI patients. In persons with chronic inflammatory status, as indicated by CRP, iron utilisation is inhibited as is the hepatic synthesis of albumin. Persons with SCI may have chronic inflammation.

ENERGY REQUIREMENTS: Healthy SCI individuals commonly have lower energy needs than people without SCI. This is most likely due to the accompanying decreased physical activity and muscle atrophy. Patients with SCI and pressure injuries have higher energy needs than those with SCI alone. The following energy expenditure calculations have been suggested for those with paraplegia and tetraplegia:

| Paraplegic: | 25.9 ± 1.2 kcal/kg of body weight/day (with pressure injuries) |
| Tetraplegic: | 24.3 ± 1.1 kcal/kg of body weight/day (with pressure injuries) |

PROTEIN, MICRONUTRIENT AND FLUID REQUIREMENTS: Protein, micronutrient and fluid requirements should be calculated as if for patients without SCI as there is lack of evidence suggesting otherwise. There should be specific note that SCI patients are particularly at risk of dehydration and should have their hydration status monitored closely.

**Nutrition goals, interventions and monitoring**

3a: What nutritional interventions should be implemented to assist the healing of pressure injuries?

<table>
<thead>
<tr>
<th>Evidence statement</th>
<th>Level of evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy requirements should be calculated as 30-35kcal/kg/day (125-145kJ/kg/day). (Pressure injuries can lead to a hypermetabolic state). Adjust formula based on weight loss, weight gain or level of obesity. Individuals who are underweight or who have had significant unintentional weight loss may need additional calories to cease weight loss and/or to regain lost weight.</td>
<td>III-2 1,12,13,21,25,43,66</td>
</tr>
<tr>
<td>Protein requirements should be calculated as 1.25 - 1.5g/kg/day to prevent/minimise muscle wastage. (It should be noted that protein intakes above 2g/kg/day may negatively impact upon renal and hepatic function, and may lead to dehydration).</td>
<td>III-2 1,6,12,13,21,25,43,67</td>
</tr>
<tr>
<td>Fluid requirements should be calculated as 30-35ml/kg/day or 1ml/kcal/day. Provide additional fluid for individuals with dehydration: elevated temperature, vomiting, profuse sweating, diarrhoea or heavily draining wounds.</td>
<td>III-2 1,6,12,13,21,24,43,66</td>
</tr>
<tr>
<td>Nutritional interventions should start with modification of current dietary intake, and progress to the use of oral nutritional supplements, before the consideration of enteral support. A general multivitamin and mineral preparation is suggested for use with patients who are moderate to high risk of malnutrition, where adequate intake of micronutrients is not provided from dietary sources.</td>
<td>III-3 9,12,21,43,57,69</td>
</tr>
</tbody>
</table>

**Recommendation**

Nutritional interventions as per the evidence statements outlined above should be implemented to assist healing of pressure injuries.

**NHMRC Grade of recommendation: C**

See also Pressure injury nutrition treatment flow chart in Toolkit section.
Background:
There appears to be practice-based evidence consensus as to the amount of energy, protein and fluid to be prescribed for patients with pressure injuries, although substantial research often does not exist to back this up. Nutrient requirements should be reassessed throughout the healing cycle of the wound as requirements may change significantly over time, however there is little evidence to quantify these changes. Requirements for smaller injuries may differ from larger injuries, as will requirements for exudating versus non-exudating wounds. Unfortunately there is a lack evidence for specific nutrition requirements at different stages of pressure injuries. The treatment algorithm given in the Toolkit section attempts to give guidance as to how to apply these recommendations to practice.

ENERGY REQUIREMENTS: Energy is essential for pressure injury healing. The provision of adequate energy promotes anabolism, nitrogen and collagen synthesis and healing. Dietary restrictions should be revised and modified (liberalised) when limitations result in decreased food and fluid intake. These adjustments should be managed by a dietitian.

One case control study found that patients with pressure sores had higher resting energy expenditure than patients without pressure sores, thereby indicating a hypermetabolic state. Two systematic reviews and one guideline recommend energy requirements are calculated as 30-35kcal/kg/day. A randomised controlled trial by Olofsson using a multi-factorial approach, including nutrition intervention of high protein meals providing 30kcal/kg, showed that pressure injury development in the intervention group was half as much as in the control group. Although there are limitations with this study, it showed that nutrition, as part of a multi-factorial approach to pressure injury prevention, can be beneficial. Stratton & Elia (1999) present in a systematic review of oral nutrition supplementation evidence for the use of dietary modifications prior to the use of nutritional supplements when treating malnutrition in community dwelling adults. Research by Raffoul (2006) emphasised the need for nutrition supplements to meet the nutritional needs of those with chronic leg and pressure injuries. Hommel (2007) showed that the implementation of a seven step evidence based clinical pathway for patients admitted with a fractured neck of femur, led to a significant 50% reduction in the development of pressure injuries. The administration of a nutritional supplement (in the form of a wound specific supplement), was one of the steps included. Another study also administered a wound specific supplement and found that the study group had a significant reduction in pressure injury area and amount of exudate. ESPEN guidelines on enteral nutrition in Geriatrics by Volkert (2006) recommend that oral nutrition supplements (particularly high protein supplements), can reduce the risk of developing pressure injuries. Although, these studies have their limitations, such as multi-factorial design, small sample sizes and scant information on dietary intake, expert opinion is that nutrition plays an important role in the prevention and healing of pressure injuries.

PROTEIN: It is undisputed that protein is critical for wound healing. Evidence suggests that protein requirements are higher in patients with pressure injuries. A systematic review by Reddy (2008) found that protein supplementation in long term care residents may be beneficial; however there appears to be a consensus that protein intakes above 2g/kg/day may negatively impact upon renal and hepatic function and increase risk of dehydration. Evidence suggests that between 1.25-1.5g/kg protein is necessary to achieve positive nitrogen balance in patients with pressure injuries. In a randomised controlled trial by Lee (2006), protein intakes of 1.4g/kg resulted in a statistically significant improvement in PUSH (pressure injury scale for healing) scores after 8 weeks. Wound exudate typically contains a range of proteins including albumin. The loss of protein from wound exudate can impact on the rate of healing and metabolic demand. If there is large exudate...
losses, protein requirements may be greater and the higher range of protein should be considered. Monitoring biochemical indices will assist in ensuring adequate protein is being given.

FLUID: Hydration affects both healing process and skin turgor, therefore it is important to provide and encourage adequate fluid intake. Additional fluid may also be required with higher protein intakes (especially so in the elderly)\(^6\). Evidence supports 30-35ml/kg or 1ml/kcal fluid per day\(^{12,13,21,43}\).

VITAMIN AND MINERALS (MICRONUTRIENTS): General micronutrient deficiencies are common in those with chronic healing problems and those with pressure injuries. These are seen as part of the general picture of malnutrition. Evidence suggests that patients with pressure injuries may have low serum levels of micronutrients including zinc and vitamin C. There is consensus in the evidence that vitamin and mineral supplementation is only necessary and of potential benefit if a deficiency is present or suspected.\(^{1,6,21,42,51,67,70,71}\) Micronutrients should be supplemented, as need indicates, to levels recommended by the Nutrient Reference Values (NRV) for Australia and New Zealand.

NUTRITION SUPPORT: Evidence shows that nutrition support (usually in the form of enteral nutrition), could be considered if dietary intake remains inadequate despite the modification of dietary intake and the use of oral nutritional supplements.\(^{5,9,21,43}\)

<table>
<thead>
<tr>
<th>Evidence statement</th>
<th>Level of evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment with arginine-containing nutritional supplements may be more effective than treatment by standard high protein / high energy diet alone.</td>
<td>II(^{41,78,88,89})</td>
</tr>
<tr>
<td>Current research seems to indicate that if improvements in wound healing are going to be seen, an improvement should be seen between two and three weeks of commencing an arginine-containing nutritional supplement.</td>
<td>II(^{41,78,88,89})</td>
</tr>
<tr>
<td>Caution should be taken when using arginine with patients in intensive care units and those with infection.</td>
<td>IV(^{79})</td>
</tr>
</tbody>
</table>

Recommendation
Arginine containing supplements may be considered for patients who have a stage II or above pressure injury.

**NHMRC Grade of recommendation: C**
Where arginine containing supplements are not available, treatment should follow according to recommendations in section 3a.

**NHMRC Grade of recommendation: C**

**Practice Point:**
Use of arginine containing oral nutritional supplements may not be funded by local health providers. Prior to recommending these products to patients information about potential financial implications should be discussed where funding is not available. Dietitians are encouraged to liaise with community colleagues (such as social workers, nurses, etc.) to assist the client to find appropriate methods of funding, where required.

*See appendix 4 for evidence summary of arginine containing supplement research*
**Background:**

Over recent years there has been an increase in awareness of the potential role of arginine in the healing of wounds. Arginine is an amino acid that has been shown to be important in collagen deposition and protein accumulation at wound sites. Arginine has been shown to be non-essential in normal growth and development, but becomes essential after trauma. Excluding arginine from the diet does not have a negative impact on healthy individuals, but does affect those who are undergoing growth or tissue repair.

It has been found that to be able to complete its functions arginine must be in the form of L-arginine. Arginine acts as a precursor to ornithine, which in turn is a substrate for proline, glutamate and polyamine. It is also involved in synthesising nitric oxide. Arginine can be used by macrophages and endothelial cells to produce nitric oxide. Fibroblast nitric oxide can support collagen synthesis, endothelial nitric oxide affects angiogenesis, and macrophage nitric oxide is cytostatic to bacteria.

Several studies have shown that an arginine enriched diet can increase wound tensile strength. Arginine has also been shown to have a beneficial impact on cardiovascular disease, by its action on blood pressure, blood flow and cholesterol metabolism. Arginine has an inverse relationship with blood pressure. Blood flow to peripheral tissues also seems to improve with arginine supplementation. Supplementation with arginine has been shown to be beneficial to diabetes control by improving peripheral and hepatic insulin sensitivity.

However, other research has given conflicting results. Studies by Stechmiller et al indicate that supplementation with 8.5g L-arginine in syrup form for 10 weeks does not increase serum nitric oxide levels in frail, older people with possible inflammatory conditions. Langkamp-Henken et al found that mitogen-induced lymphocyte proliferation in elderly nursing home residents with pressure injuries was not increased by arginine supplementation at 0g, 8.5g or 17g of supplementation.

To date, the only patient-based research of arginine-enriched oral supplements has been performed on patients with pressure injuries. Two RCT studies and 3 Cohort studies all indicate that there are benefits to arginine containing nutritional supplements that surpass healing seen in stage II pressure injuries or above when using high protein / high calorie diets, or standard unmodified diets. Unfortunately there is no consistency in the statistical significance seen with the results, and study population numbers remain small. However the benefits to using arginine containing supplements do seem to be greater than using high protein supplements alone. We feel that the above recommendations can be made, but with a lower recommendation grade than in previous guidelines.

Although research indicates that arginine is well tolerated by patients, and patients given arginine-enriched nutritional supplements have not experienced any side-effects or reactions, there is awareness that there is a potential risk for patients as nitric oxide may be involved in the development of sepsis and inflammation.

We therefore must conclude that there is a great need for research specifically into the use of arginine-containing nutritional supplements that investigates benefits, potential harm, and cost and resource issues. In the meantime, research does seem to indicate that there is a potential benefit in using arginine-containing nutritional supplements in patients where there is a stage II or higher pressure injury.
3c: How should the nutritional status of adults with pressure injuries be monitored?

<table>
<thead>
<tr>
<th>Evidence statement</th>
<th>Level of evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biochemical test should be reviewed to the monitor impact of nutrition support and overall clinical status.</td>
<td>III-1 12,18,41</td>
</tr>
</tbody>
</table>

**Recommendation**

Nutritional status should be re-assessed regularly following an individualised assessment plan (by a dietitian), which includes an evaluation date.

**NHMRC recommendation:** C

**Practice points**

- Food and fluid intake should be reviewed to monitor actual intake and modify interventions as required.
- Anthropometry should be reviewed to monitor the impact of nutrition support and to allow alteration of treatment as necessary.
- Wound healing status should be monitored with close liaison with other health care professionals trained in this area.
- Patient goals and quality of life should be monitored to ensure all interventions are done with the consent of the patient / whānau, and meets their wishes.

**References**

6,41

6,12,13,21

24

**Background:**

Monitoring patient status is a key area in Dietetic management. The 2006 NICE guidelines for oral, enteral and parenteral nutrition support 27 identify three key objectives of monitoring nutrition interventions:

1. To ensure nutrition support is provided safely, and to detect and treat clinical complications as early and effectively as possible.
2. To assess the extent to which nutritional objectives have been reached.
3. To alter the type of nutrition support, or the components of the regimen, to improve its effectiveness and to minimise or prevent metabolic complications.

A variety of methods can be used to monitor nutrition interventions. Disease process and wound status may require careful interpretation of the results of monitoring parameters, especially biochemistry results.

The frequency of monitoring and parameters for monitoring may be affected by many issues, such as wound status (stage of pressure injury, exudate, presence of infection etc), underlying disease conditions, availability of equipment and test results, abnormal results, clinical setting and the availability of staff 27. It should also be noted that these parameters may incur additional costs to service.

The following tables suggest parameters that can be monitored to determine improvement in nutritional status. Nutrient requirements should be reassessed throughout the healing cycle of the wound as requirements may change significantly over time. The degree to which suggested outcome measures can be achieved will vary considerably due to the healing process of the pressure injury, the health status of the patient and other conditions affecting the pressure area (such as moisture, sheer, pressure relieving devices). The suggested outcome measures are given to assist dietitians in their clinical practice to determine outcome measures on a case-by-case basis.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Suggested frequency of monitoring</th>
<th>Rationale</th>
<th>Suggested outcome measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutrition intake</td>
<td></td>
<td>Aim to meet nutritional needs to maximise wound healing potential.</td>
<td>Nutritional needs are being met.</td>
</tr>
<tr>
<td>Food record / diet history / 24 hour recall</td>
<td>Inpatient: daily until stable /</td>
<td>Allows objective measurement of quantity of nutrients taken. Allows alteration of treatment as necessary.</td>
<td>Records show actual intake is improving to meet nutritional requirements.</td>
</tr>
<tr>
<td></td>
<td>improvement seen. Outpatient:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>weekly review until stable /</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>improvement seen (not necessarily face-to-face contact). Both inpatient &amp; outpatient: repeat food chart as indicated by patient condition.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inpatient: daily initially, reducing to twice weekly when stable. Outpatient: at visits</td>
<td>To ensure that patient is receiving adequate oral intake or correct volume of feed. To allow troubleshooting.</td>
<td>Actual intake improves to meet nutritional requirements.</td>
</tr>
<tr>
<td>Actual oral / enteral nutrition intake</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repeat nutrition assessment / screening tool</td>
<td>As indicated by screening tool or assessment action plan.</td>
<td>Allows changes in nutritional status to be measured objectively over time.</td>
<td>Nutrition assessment / screening shows improved score.</td>
</tr>
<tr>
<td>Hydration</td>
<td></td>
<td>Aim to reduce impact of dehydration on skin condition &amp; wound healing.</td>
<td>Fluid requirements are being met</td>
</tr>
<tr>
<td>Fluid balance charts / Self reporting</td>
<td>Inpatient: daily initially, reducing to twice weekly when stable. Outpatient: at visits</td>
<td>To reduce the risk of patient becoming over / under-hydrated.</td>
<td>Records show actual intake is improving to meet fluid requirements.</td>
</tr>
</tbody>
</table>

*Table continues over page*
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Suggested frequency of monitoring</th>
<th>Rationale</th>
<th>Suggested outcome measure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Biochemistry</strong></td>
<td></td>
<td>To monitor impact of nutrition support and overall clinical status.</td>
<td>Biochemistry improves (this will be reliant also on other disease conditions).</td>
</tr>
<tr>
<td><strong>Albumin / prealbumin – serum</strong></td>
<td>Baseline. Every 2-3 days for prealbumin if abnormal baseline. Every 20 days for albumin. Until stable.</td>
<td>When interpreted in the appropriate clinical context, albumin and prealbumin can give an indication of nitrogen balance and body protein stores. Both are a good indication of morbidity and an improvement can show reduction in morbidity. This is especially useful where morbidity influences nutritional intake. As prealbumin has a shorter half-life than albumin (2-3 days) it can be used to monitor protein status on a weekly basis, rather than monthly for albumin.</td>
<td></td>
</tr>
<tr>
<td><strong>C Reactive protein – serum</strong></td>
<td>Baseline. Then 2-3 times weekly if abnormal, until stable.</td>
<td>Indicator of inflammation; allows more educated interpretation of serum albumin and prealbumin levels.</td>
<td></td>
</tr>
<tr>
<td><strong>Total protein – serum</strong></td>
<td>Baseline.</td>
<td>Indicator of total body protein stores and allows more educated interpretation of long term protein levels.</td>
<td></td>
</tr>
<tr>
<td><strong>Transferrin – serum</strong></td>
<td>Baseline Every 8 – 10 days if abnormal.</td>
<td>Transferrin is a more sensitive indicator of protein stores than albumin due to its half life of 8 – 10 days. Transferrin is often a preferable test to Prealbumin as it is more readily available. False low results may be seen in patients taking antibiotics.</td>
<td></td>
</tr>
<tr>
<td><strong>Cholesterol</strong></td>
<td>Baseline.</td>
<td>A reduced cholesterol level may be indicative of poor nutritional status.</td>
<td></td>
</tr>
<tr>
<td><strong>Haemoglobin – serum</strong></td>
<td>Baseline.</td>
<td>Anaemia is common in patients with pressure injuries, and can adversely affect healing. Reversing anaemia can help improve blood flow to the injury, thus aiding healing.</td>
<td></td>
</tr>
<tr>
<td><strong>Vitamin B12 – serum</strong></td>
<td>Baseline.</td>
<td>Deficiency of Vitamin B₁₂ is relatively common in those aged over 65 years. Deficiency can result in anaemia.</td>
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<table>
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<th>Suggested frequency of monitoring</th>
<th>Rationale</th>
<th>Suggested outcome measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biochemistry continued</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Folate – serum</td>
<td>Baseline.</td>
<td>Folate deficiency is also a common cause of anaemia in adults, and especially those aged over 65 years.</td>
<td></td>
</tr>
<tr>
<td>Iron – serum</td>
<td>Baseline.</td>
<td>Iron deficiency may also be a cause of anaemia, therefore reducing healing of pressure injuries.</td>
<td></td>
</tr>
<tr>
<td>Urea &amp; creatinine</td>
<td>Baseline then daily until stable</td>
<td>Monitor for potential protein overload.</td>
<td></td>
</tr>
<tr>
<td>Anthropometry</td>
<td></td>
<td>To monitor impact of nutrition support. To allow alteration of treatment as necessary.</td>
<td>Stabilisation or improvement in anthropometry is observed.</td>
</tr>
<tr>
<td>Weight</td>
<td>Daily if concerns regarding fluid balance, otherwise weekly reducing to monthly</td>
<td>To assess ongoing nutritional status. To allow minimisation of weight loss, but weight gain may not be seen due to healing requirements.</td>
<td></td>
</tr>
<tr>
<td>Body mass index</td>
<td>Start of treatment and then monthly</td>
<td>To assess ongoing nutritional status. To allow alteration of treatment as necessary.</td>
<td></td>
</tr>
<tr>
<td>Triceps skin fold</td>
<td>Monthly, if weight cannot be obtained or is difficult to interpret</td>
<td>To assess ongoing nutritional status. To allow alteration of treatment as necessary.</td>
<td></td>
</tr>
<tr>
<td>Mid arm circumference</td>
<td>Monthly, if weight cannot be obtained or is difficult to interpret</td>
<td>To assess ongoing nutritional status. To allow alteration of treatment as necessary.</td>
<td></td>
</tr>
<tr>
<td>Mid calf circumference</td>
<td>Monthly, if weight cannot be obtained or is difficult to interpret</td>
<td>To assess ongoing nutritional status. To allow alteration of treatment as necessary.</td>
<td></td>
</tr>
<tr>
<td>Wound</td>
<td></td>
<td>To monitor impact of nutrition support. To allow alteration of treatment as necessary.</td>
<td>Wound status improves (this will be reliant also on other disease conditions).</td>
</tr>
<tr>
<td>Wound healing</td>
<td>Frequency dictated by nursing / medical team.</td>
<td>Many wound healing monitoring tools are available. These range from simple measurements taken of the wound size to internationally validated tools such as the PUSH tool.</td>
<td>Wound assessment tool shows improved score.</td>
</tr>
<tr>
<td>Pressure injury risk</td>
<td>Frequency dictated by nursing / medical team.</td>
<td>Ongoing risk assessment tools such as Waterlow or Braden tools.</td>
<td>Wound screening tool shows improved score.</td>
</tr>
</tbody>
</table>

*Table continues over page*
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Suggested frequency of monitoring</th>
<th>Rationale</th>
<th>Suggested outcome measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient</td>
<td></td>
<td>To ensure all interventions are done with the consent of the patient / whānau, and meets their needs, goals and wishes.</td>
<td></td>
</tr>
<tr>
<td>Are goals being met?</td>
<td>Inpatient: daily initially, reducing to twice weekly. Outpatient: at each visit (2 weekly) then monthly.</td>
<td>To ensure that treatment is appropriate to overall care of patient.</td>
<td>Specific patient-centered goals are met.</td>
</tr>
<tr>
<td>Are goals still appropriate?</td>
<td>Inpatient: daily initially, reducing to twice weekly and then monthly. Outpatient: at each visit.</td>
<td>To ensure that treatment is appropriate to overall care of patient.</td>
<td></td>
</tr>
<tr>
<td>Quality of life, self rated health and wellbeing</td>
<td>Baseline. Review as per protocol (if using validated tool), or at usual monitoring appointments.</td>
<td>To monitor patient quality of life and use information to adapt treatment as needed.</td>
<td>Screening questions show improvement in health and wellbeing.</td>
</tr>
</tbody>
</table>

### Cultural, legal and ethical considerations

**What cultural, legal and ethical considerations should be taken in to account by the New Zealand Registered Dietitian co-ordinating nutritional interventions?**

<table>
<thead>
<tr>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>All dietitians should ensure that they adhere to Treaty of Waitangi and Tikanga principles as part of their clinical practice. All dietitians should practice within the legal and ethical boundaries of the profession.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Practice points</th>
</tr>
</thead>
<tbody>
<tr>
<td>All dietitians will take responsibility for adhering to their workplace guidance on Tikanga and bicultural policy.</td>
</tr>
<tr>
<td>Whānau, family or carers will be invited to be involved with dietetic assessment and intervention, at the wishes of the patient.</td>
</tr>
<tr>
<td>Whānau, family or carers will be actively encouraged and supported in the assessment and intervention process.</td>
</tr>
<tr>
<td>Quality of life of the patient and carer will be taken into consideration when offering treatment recommendations.</td>
</tr>
<tr>
<td>At all times the dietitian works within their remit as set out in the New Zealand Dietitians Board Code of Conduct.</td>
</tr>
<tr>
<td>The dietitian will take into account cultural identity and Treaty of Waitangi considerations when treating patients.</td>
</tr>
<tr>
<td>Any ethical and legal considerations should be discussed with the patient and his/her family / whānau.</td>
</tr>
<tr>
<td>Any legal considerations should be discussed with the relevant medical and legal teams associated with the patient’s treatment provider.</td>
</tr>
<tr>
<td>Any ethical considerations should be discussed with the relevant medical team involved in the care of the patient, and the dietetic clinical supervisor.</td>
</tr>
<tr>
<td>Patients and Whānau, family or carers should be provided with information that is appropriate to their culture and level of education</td>
</tr>
</tbody>
</table>

**Background:**

All dietitians should also refer to their individual workplace guidance on Tikanga and bicultural policy.

It is an integral part of care to ensure the wairua (spiritual), hinengaro (psychological) and tinana (physical) wellbeing of tāngata māuiui (Māori consumers/patients) and their whānau (family and extended family group). As soon as tāngata māuiui (Māori consumers/patients) and their whānau are involved with a healthcare service they are deemed to be in a state of noa (being beyond one’s own physical and/or spiritual power) e.g. disempowered. Acknowledging a person’s rites/rights and respecting their beliefs restores the tapu (well being/empowerment) of tāngata māuiui and their whānau (e.g. permission is always asked for and an explanation given prior to any intervention).

If informed consent and compliance with Tikanga is not carried out in a respectful manner during the care of tāngata māuiui then a mahi hē (offence) has been committed. This is regardless of how small the mahi hē may appear. Another action is then required to correct the mahi hē to bring about muru hē (restoration and healing)³².

Non-Māori tend to introduce themselves to their patients by their names and title/profession. For Māori it is very important to know “who the family is”. When introducing themselves to the Māori patient / whānau, the non-Māori health professional will more effectively bridge the gap and gain the trust of their Māori patients if they share something of themselves e.g. how they arrived in New
Zealand, their birthplace and/or family background. Care must be taken to pronounce and spell the patient’s name correctly – if unsure, ask. Before commencing the assessment and intervention it is important to obtain informed consent and to explain the process carefully.

In addition, dietitians need to be particularly mindful of the particular customs surrounding food and food preparation.

- Food should never be passed over the head.
- Tea towels are only used for drying dishes.
- Water containers should only be used for this purpose.
- Never sit on tables or workbenches.

Only food/medication for human consumption should be kept in fridges/freezers with other foods. The specific roles of certain foods and plants in traditional Māori medicine.

The National Collaborating Centre for Acute Care guidelines for nutrition support in adults states that “decisions which involve the withholding or withdrawing of nutrition support require a consideration of both ethical and legal principles (including the Human Rights Act 1998)”. It also notes the following points that should be included as part of dietetic interventions for older adults at risk of malnutrition:

- A valid consent must be obtained before starting treatment for a patient. For consent to be valid it must be given voluntarily, by an appropriately informed person who has the capacity to consent.
- The competent adult has the absolute right to decide what treatment he/she does or does not wish to receive even where refusal may result in the death of the patient.
- “Best interests” are not confined to “medical best interests” and are not necessarily the same as the wishes of the patient.
- If an illness is regarded as being in the terminal phase and the treatment plan is to provide only compassionate and palliative care, artificial supply of nutrients or fluid need only be given to relieve symptoms and such provision should not necessarily be used to prolong survival.
What cultural, legal and ethical considerations should be taken into account by the Australian Practising Dietitian co-ordinating nutritional interventions?

**Recommendation**

All dietitians should ensure that they adhere to workplace guidance on diversity health policies as part of their clinical practice. All dietitians should practice within the legal and ethical boundaries of the profession.

**Practice Points**

All dietitians will take responsibility for adhering to their workplace guidance on diversity health policies.

Family or carers will be invited to be involved with dietetic assessment and intervention, at the wishes of the patient.

Family or carers will be actively encouraged and supported in the assessment and intervention process.

Quality of life of the patient and carer will be taken into consideration when offering treatment recommendations.

At all times the dietitian works within their remit as set out in the Dietitians Association of Australia Code of Professional Conduct.

The dietitian will take into account cultural identity considerations when treating patients.

Any ethical and legal considerations should be discussed with the patient and his/her family.

Any legal considerations should be discussed with the relevant medical and legal teams associated with the patient’s treatment provider.

Any ethical considerations should be discussed with the relevant medical team involved in the care of the patient, and the dietetic clinical supervisor.

Patients should be provided with information that is appropriate to their culture and level of education.

**Background:**

Currently there are no Australian guidelines for legal and ethical considerations for nutrition support in adults. The most recent review of this topic is presented in the National Collaborating Centre for Acute Care, Nutrition support in adults document. Although this information is UK specific, it is suggested that dietitians review this information and act according to these recommendations and any set out specifically by the Dietitians Association of Australia.

The National Collaborating Centre for Acute Care guidelines for nutrition support in adults states that “decisions which involve the withholding or withdrawing of nutrition support require a consideration of both ethical and legal principles (including the Human Rights Act 1998).” It also notes the following points that should be included as part of dietetic interventions for older adults at risk of malnutrition:

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References


American Medical Directors Association (AMDA). Pressure ulcers in the long-term care setting. Columbia (MD): American Medical Directors Association (AMDA), 2008


Henderson 2005 The bigger the healthier: are the limits of BMI risk changing over time? Economics and Human Biology Dec 3 (3) 339-366.


Beck AM, Ovesen L. At which Body Mass Index and Degree of Weight Loss should Hospitalised Elderly Patients Be Considered At Nutritional Risk? Clin Nutr 1998; 17:195-8


Registered nurses association of Ontario. Assessment and management of stage I to IV pressure ulcers. Toronto, Canada: Registered nurses association of Ontario. 2007


68. Stratton, RJ, Elia, M A critical, systematic analysis of the use of oral nutritional supplements in the community. 1999 Clinical Nutrition; 18 (supplement 2):29-84
78. Cereda et al Disease specific versus standard nutritional support for the treatment of pressure ulcers in institutionalised older adults: a RCT. JAGS:2009;57;1395 – 1402


92. Auckland District Health Board Policy. Tikanga Recommended Best Practice. 2003
## Appendix 1: Author details

<table>
<thead>
<tr>
<th>Name</th>
<th>Specialties</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
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<td>Nurse Maude,</td>
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<tr>
<td>Services, Waitemata</td>
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<tr>
<td>District Health Board,</td>
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<tr>
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<td></td>
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<tr>
<td>Nutrition &amp; Food Services Team Leader, Waitakere Hospital, Waitemata District Health Board, Auckland</td>
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<table>
<thead>
<tr>
<th>Name</th>
<th>Specialties</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alex McClelland</strong></td>
<td>Clinical Educator - Dietetics</td>
<td><a href="mailto:Alex.McClelland@sesiahs.health.nsw.gov.au">Alex.McClelland@sesiahs.health.nsw.gov.au</a></td>
</tr>
<tr>
<td>APD</td>
<td>Trauma, Neurosurgery</td>
<td></td>
</tr>
<tr>
<td>Dietitian, South Eastern Sydney Local Health District</td>
<td>Wound Care</td>
<td></td>
</tr>
<tr>
<td><strong>Stephanie Morrison</strong></td>
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</tr>
<tr>
<td>NZRD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinical Dietitian, North Shore Hospital, Waitemata District Health Board, Auckland</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Susan Nelan</strong></td>
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</tr>
<tr>
<td>APD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senior Clinical Dietitian, Spinal Pressure Care Clinic, South Eastern Sydney Local Health District</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Katrina Pace</strong></td>
<td>Malnutrition, Geriatrics</td>
<td><a href="mailto:katrinapace@gmail.com">katrinapace@gmail.com</a></td>
</tr>
<tr>
<td>NZRD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinical Dietitian, North Shore Hospital, Waitemata District Health Board, Auckland</td>
<td>Wound care, Quality Assurance</td>
<td></td>
</tr>
</tbody>
</table>

Acknowledgement is also given to Kylie Richardson, APD, Clinical Dietitian, South Eastern Sydney Local Health Network
## Appendix 2: 2011 Expert Review Panel

<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gaynor Baker</td>
<td>Dietitian, Burwood Spinal Unit, Canterbury, New Zealand</td>
</tr>
<tr>
<td>Debbie Blanchfield</td>
<td>Clinical Nurse Consultant in Wound Care for South Eastern Sydney Illawarra Health, - Southern Hospital Group, Australia</td>
</tr>
<tr>
<td>Shelley Hargadon</td>
<td>Dietitian, Burwood Spinal Unit, Canterbury, New Zealand</td>
</tr>
<tr>
<td>Jan Hill</td>
<td>Team Leader, Nutrition and Dietetics, Royal Brisbane and Women’s Hospital, Pressure Ulcer Prevention Program Manager, Patient Safety Centre, Queensland Health, Australia</td>
</tr>
<tr>
<td>Dr Bon San Bonne Lee</td>
<td>MBBS, FAFRM(RACP), MHA, MMed (ClinEpi), GCert (IT), PhDStaff Specialist of Wales Spinal Unit, Prince of Wales Hospital, Sydney Australia. Senior Research Officer, Prince of Wales Medical Research Institute (POWMRI) Conjoint Senior Lecturer, Faculty of Public Health, University of New South Wales Visiting Fellow, Centre for Clinical Governance Research in Health, University of New South Wales, Australia</td>
</tr>
<tr>
<td>Mary-Ellen Posthauer</td>
<td>RD, CD, LD. Registered Dietitian (USA) and President of MEP Healthcare Dietary Services. Past President of the National Pressure Ulcer Advisory Panel (NPUAP). Chairman of the Nutrition Guidelines task force for the NPUAP/EPUAP guidelines committee. Current Secretary of NPUAP. Editorial Advisory Board member of Advances in Skin and Wound Care. United States.</td>
</tr>
<tr>
<td>Stephen Ratcliffe</td>
<td>APD, Dietitian and Redesigning Care Program Manager at Peninsula Health, Australia</td>
</tr>
<tr>
<td>Louise Strickland</td>
<td>APD, Dietitian, Spinal and Spinal Plastics Service (pressure ulcer management) Royal North Shore Hospital, Sydney, Australia</td>
</tr>
<tr>
<td>Carol Tweed</td>
<td>Nurse, Msc, Bsc. Wellington Coordinator for the New Zealand Wound Care Society (NZWCS) and joint chair for the NZWCS pressure ulcer working party, New Zealand.</td>
</tr>
</tbody>
</table>
## Appendix 3: NHMRC Additional levels of evidence and grades of recommendations for developers of guidelines pilot program 2005

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Diagnostic accuracy</th>
<th>Prognosis</th>
<th>Aetiology*</th>
<th>Screening Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>A systematic review of level II studies</td>
<td>A systematic review of level II studies</td>
<td>A systematic review of level II studies</td>
<td>A systematic review of level II studies</td>
</tr>
<tr>
<td>II</td>
<td>A randomised controlled trial</td>
<td>A study of test accuracy with: an independent, blinded comparison with a valid reference standard, among consecutive persons with a defined clinical presentation</td>
<td>A prospective cohort study</td>
<td>A randomised controlled trial</td>
</tr>
<tr>
<td>III-1</td>
<td>A pseudo-randomised controlled trial (i.e. alternate allocation or some other method)</td>
<td>A study of test accuracy with: an independent, blinded comparison with a valid reference standard, among non-consecutive persons with a defined clinical presentation</td>
<td>All or none</td>
<td>A pseudo-randomised controlled trial (i.e. alternate allocation or some other method)</td>
</tr>
<tr>
<td>III-2</td>
<td>A comparative study with concurrent controls: non-randomised, experimental trial, cohort study, case-control study, interrupted time series with a control group</td>
<td>A comparison with reference standard that does not meet the criteria required for Level II and III-1 evidence</td>
<td>Analysis of prognostic factors amongst persons in a single arm of a randomised controlled trial</td>
<td>A comparative study with concurrent controls: non-randomised, experimental trial, cohort study, case-control study</td>
</tr>
<tr>
<td>III-3</td>
<td>A comparative study without concurrent controls: historical control study, two or more single arm study, interrupted time series without a parallel control group</td>
<td>Diagnostic case-control study</td>
<td>A retrospective cohort study</td>
<td>A comparative study without concurrent controls: historical control study, two or more single arm study</td>
</tr>
<tr>
<td>IV</td>
<td>Case series with either post-test or pre-test/post-test outcomes</td>
<td>Study of diagnostic yield (no reference standard)</td>
<td>Case series, or cohort study of persons at different stages of disease</td>
<td>Case series</td>
</tr>
</tbody>
</table>

*If it is only possible and/or ethical to determine a casual relationship using observational evidence, then the ‘aetiology’ hierarchy of evidence should be used*
## Appendix 4: Evidence summary of Arginine Supplement Trials

<table>
<thead>
<tr>
<th>Reference</th>
<th>Design</th>
<th>Sample</th>
<th>Objective</th>
<th>Conclusions</th>
<th>Evidence Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benati G, Delveccio S, Cilla D, Pedone V. Impact on pressure ulcer healing of an arginine-enriched nutritional solution in patients with severe cognitive impairment. Arch of Gerontol Geriat 2001; suppl 7: 43 – 47.</td>
<td>RCT</td>
<td>36 in-patients with severe cognitive impairment</td>
<td>To determine the impact on pressure ulcer healing of a high protein calorie solution enriched with arginine, zinc and antioxidants, in patients with severe cognitive impairment and a reduced oral food intake.</td>
<td>II</td>
<td></td>
</tr>
<tr>
<td>Frias Soriano LF et al. The effectiveness of oral nutritional supplementation in the healing of pressure injuries. J Wound Care 2004; 13:319-322</td>
<td>Open, prospective intervention study</td>
<td>39 inpatients</td>
<td>To investigate the effectiveness of an oral nutritional supplement rich in protein and enriched with arginine, vitamin C and zinc on the healing of grade III and IV pressure injuries.</td>
<td>III-3</td>
<td></td>
</tr>
<tr>
<td>Desneves KJ, Todorovic BE, Casar A, Crowe TC. Treatment with supplementary arginine, vitamin C and zinc in patients with pressure injuries: A randomised controlled trial. Clin Nutr 2005; 24: 979 – 987.</td>
<td>RCT</td>
<td>16 in patients with stage 2 or greater pressure injuries</td>
<td>To investigate the nutritional status of patients diagnosed with pre-existing pressure injuries and to determine whether nutrients putatively implicated in pressure ulcer healing (arginine, vitamin C and zinc) will improve pressure ulcer healing.</td>
<td>II</td>
<td></td>
</tr>
<tr>
<td>Reference</td>
<td>Design</td>
<td>Sample</td>
<td>Objective</td>
<td>Conclusions</td>
<td>Evidence Levels</td>
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<td>-----------------</td>
</tr>
<tr>
<td>Cereda et al</td>
<td>RCT</td>
<td>28 patients over 65 years in long term care facilities 30kcal/day +/- 400ml arginine product</td>
<td>To evaluate the use of a disease-specific nutrition treatment enriched in protein, arginine, zinc and vitamin C and to compare it with a standard protocol for improving the rate of pressure ulcer healing.</td>
<td>Showed no benefit of oral diet alone (30kcal/kg 1.5g pr/kg) Good study. Reasonable design. Small sample size. Similar results to other studies.</td>
<td>II</td>
</tr>
</tbody>
</table>
Implementation Toolkit

The example standard of care and quick reference guide are designed to be printed directly from this document, hence the repetition of the treatment algorithm.

Useful information can be found on the following websites:

- **www.npuap.org**  National Pressure Ulcer Advisory Panel (USA). It contains policy and educational information.
- **www.epuap.com**  European Pressure Ulcer Advisory Panel. It contains policy and educational information.
- **www.nwcs.org.nz**  New Zealand Wound Care Society.
- **www.globalwoundacademy.com**  Run by Smith & Nephew, a company specialising in wound dressings. The wound academy runs an online tutorial for wound healing.
- **www.mna-elderly.com**  Mini Nutrition Assessment (MNA) tool.
- **www.dietitians.org.nz**  Dietitians New Zealand website.
- **www.daa.asn.au**  Dietitians Association of Australia website.
**NPUAP / EPUAP Pressure ulcer classification system**.¹

<table>
<thead>
<tr>
<th>Pressure Ulcer</th>
<th>A pressure ulcer is 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. A number of contributing or confounding factors are also associated with pressure ulcers; the significance of these factors is yet to be elucidated.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category/Stage I: Non-blanchable redness of intact skin</td>
<td>Intact skin with non-blanchable erythema of a localised area usually over a bony prominence. Discoloration of the skin, warmth, oedema, hardness or pain may also be present. Darkly pigmented skin may not have visible blanching. <strong>Further description:</strong> The area may be painful, firm, soft, warmer or cooler as compared to adjacent tissue. Category/Stage I may be difficult to detect in individuals with dark skin tones. May indicate “at risk” persons.</td>
</tr>
<tr>
<td>Category/Stage II: Partial thickness skin loss or blister</td>
<td>Partial thickness loss of dermis presenting as a shallow open ulcer with a red pink wound bed, without slough. May also present as an intact or open/ruptured serum-filled or sero-sanguinous filled blister. <strong>Further description:</strong> Presents as a shiny or dry shallow ulcer without slough or bruising. This category/stage should not be used to describe skin tears, tape burns, incontinence associated dermatitis, maceration or excoriation.</td>
</tr>
<tr>
<td>Category/Stage III: Full thickness skin loss (fat visible)</td>
<td>Full thickness tissue loss. Subcutaneous fat may be visible but bone, tendon or muscle are not exposed. Some slough may be present. <strong>May</strong> include undermining and tunnelling. <strong>Further description:</strong> The depth of a Category/Stage III pressure ulcer varies by anatomical location. The bridge of the nose, ear, occiput and malleolus do not have (adipose) subcutaneous tissue and Category/Stage III ulcers can be shallow. In contrast, areas of significant adiposity can develop extremely deep Category/Stage III pressure ulcers. Bone/tendon is not visible or directly palpable.</td>
</tr>
<tr>
<td>Category/Stage IV: Full thickness tissue loss (muscle/bone visible)</td>
<td>Full thickness tissue loss with exposed bone, tendon or muscle. Slough or eschar may be present. Often include undermining and tunneling. <strong>Further description:</strong> The depth of a Category/Stage IV pressure ulcer varies by anatomical location. The bridge of the nose, ear, occiput and malleolus do not have (adipose) subcutaneous tissue and these ulcers can be shallow. Category/Stage IV ulcers can extend into muscle and/or supporting structures (e.g., fascia, tendon or joint capsule) making osteomyelitis or osteitis likely to occur. Exposed bone/muscle is visible or directly palpable.</td>
</tr>
<tr>
<td>Additional categories for the USA</td>
<td></td>
</tr>
<tr>
<td>Unstageable/ Unclassified: Full thickness skin or tissue loss – depth unknown</td>
<td>Full thickness tissue loss in which actual depth of the ulcer is completely obscured by slough (yellow, tan, gray, green or brown) and/or eschar (tan, brown or black) in the wound bed. <strong>Further description:</strong> Until enough slough and/or eschar are removed to expose the base of the wound, the true depth cannot be determined; but it will be either a Category/Stage III or IV. Stable (dry, adherent, intact without erythema or fluctuance) eschar on the heels serves as “the body’s natural (biological) cover” and should not be removed.</td>
</tr>
<tr>
<td>Suspected Deep Tissue Injury-depth unknown</td>
<td>Purple or maroon localised area of discoloured intact skin or blood-filled blister due to damage of underlying soft tissue from pressure and/or shear. <strong>Further description:</strong> The area may be preceded by tissue that is painful, firm, mushy, boggy, warmer or cooler as compared to adjacent tissue. Deep tissue injury may be difficult to detect in individuals with dark skin tones. Evolution may include a thin blister over a dark wound bed. The wound may further evolve and become covered by thin eschar. Evolution may be rapid exposing additional layers of tissue even with treatment.</td>
</tr>
<tr>
<td>Suspected deep tissue injury</td>
<td>Purple or maroon localised area of discoloured intact skin or blood-filled blister due to damage of underlying soft tissue from pressure and/or shear. The area may be preceded by tissue that is painful, firm, mushy, boggy, warmer or cooler as compared to adjacent tissue. Deep tissue injury may be difficult to detect in individuals with dark skin tones. Evolution may include a thin blister over a dark wound bed. The wound may further evolve and become covered by thin eschar. Evolution may be rapid exposing additional layers of tissue even with optimal treatment.</td>
</tr>
</tbody>
</table>

Illustrations of NPUAP pressure ulcer stages (taken from [www.npuap.org](http://www.npuap.org)): |
**Example standard of care**

A Dietetic “Standard of Care” or SOC is any document used to support the clinical reasoning and delivery of dietetic care. A SOC states what day-to-day care should be given when caring for clients with a named condition. The SOC should be a clear and concise process that a dietitian can follow to implement best practice. The process described in a SOC is one that should be given to the majority of patients. If any deviation needs to be taken from the SOC after an individual case assessment by a dietitian then this deviation and rationale for it should be documented.

This is an example SOC based on the evidence based practice guidelines for the Dietetic management of adults with pressure injuries. Review 1: 2011. Many District Health Boards or Health Services will have their own format for SOC / procedures. This example contains many of the common features seen in SOC. Dietitians may use this SOC example to assist in the implementation of these guidelines.

**Criteria for appropriate use**

This SOC will be used where there is:
- patient referral to the dietitian for assessment due to pre existing pressure injury.
- patient referral to dietitian for individual assessment of nutrition concerns relating to inadequate nutrient intake and poor wound healing.
- diagnostic indicators of malnutrition / increased risk of malnutrition, or
- a nutrition diagnosis has been made relating to inadequate energy and protein intake.

**Scope**

For use by a Registered Dietitian with adults with existing pressure injury(s).

**Associated documents**


**Definitions**

<table>
<thead>
<tr>
<th>Malnutrition</th>
<th>An imbalance in nutritional intake resulting in nutrient deficiencies.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutrient module</td>
<td>Oral supplements that contain usually only one major nutrient (e.g. fat, carbohydrate or protein).</td>
</tr>
<tr>
<td>Oral supplement</td>
<td>High energy nutritional drinks that contain a variety of nutrients, vitamins and minerals. These may be in the form of nutritional drinks that are generally not nutritionally complete; or in the form of Pharmacy only drinks that are generally (but not exclusively) nutritionally complete.</td>
</tr>
<tr>
<td>Pressure Injury</td>
<td>Also known as decubitus ulcers, pressure ulcers and pressure sores. An area of localized damage to the skin and / or underlying tissue caused by pressure or shear and / or a combination of these.</td>
</tr>
<tr>
<td>Pressure Injury Stage 1 (Non-blanchable erythema)</td>
<td>Non-blanchable erythema of the intact skin. Discolouration of the skin, warmth, oedema, induration or hardness may also be used as indicators, particularly on individuals with darker skin.</td>
</tr>
<tr>
<td>Pressure Injury Stage 2 (Blister)</td>
<td>Partial thickness skin loss involving epidermis, dermis, or both. The injury is superficial and presents clinically as an abrasion or blister.</td>
</tr>
<tr>
<td>Pressure Injury Stage 3 (Superficial injury)</td>
<td>Full thickness skin loss involving damage necrosis of subcutaneous tissue that may extend down to, but not through, underlying fascia.</td>
</tr>
<tr>
<td>Pressure Injury Stage 4 (Deep Injury)</td>
<td>Extensive destruction, tissue necrosis, or damage to muscle, bone or supporting structures with or without full thickness skin loss.</td>
</tr>
</tbody>
</table>
Goals of nutrition care / Nutrition care outcomes

The nutrition care outcomes of this SOC are to maximize healing potential by:

- Identifying potential nutrient deficiencies
- Providing adequate nutrients to prevent / treat malnutrition (taking into account cause of malnutrition, patient goals and medical prognosis) and promote healing.

Assessment

The aim of dietetic assessment are to:

- Identify reduced healing potential due to malnutrition.
- Identify the reasons for malnutrition / increased risk of malnutrition.
- Enable an appropriate nutrition diagnosis to be made.
- Enable an appropriate and individualised nutrition care plan to be established.

Assessment parameters (clinical indicators of malnutrition)

- All patients will be weighed twice weekly (inpatients) or monthly (community-based patients). Where patient is unable to be weighed other anthropometric data will be collected (e.g. MUAC, TSF, calf circumference).
- Any anthropometric measurement that involves a measure of height should be interpreted with caution.
- Body Mass Index (BMI) will be used in combination with other assessment measures (for example calculations of percentage weight loss, triceps skin fold thickness, mid calf circumference, mid arm circumference, biochemistry, nutritional history) to gain a more accurate impression of nutritional status, especially in older people.
- The following factors will be used to indicate risk of existing malnutrition and nutritional risk:
  - BMI \( \leq 18.5 \)
  - Unintentional weight loss \( \geq 10\% \) in 3-6 months
  - BMI \( \leq 20 \) and unintentional weight loss of \( \geq 5\% \) in 3-6 months
- The following biochemical tests will be considered when assessing the nutritional status of patients with pressure injuries: Albumin / Pre-Albumin, C-Reactive Protein, Total Protein, Transferrin, Cholesterol, Haemoglobin, Vitamin B12, Iron and Folate.

Assessment parameters (reasons for malnutrition / increased risk of malnutrition)

- Assessment will include documented food intake as either food diary or food recall / diet history.
- Client history
- Wound history

Clinical notes will be completed in line with current policy.
The following intervention plans are recommended for patients identified as at risk of malnutrition affecting healing potential.

- Energy requirement will be calculated as 30 – 35kcal / kg / day (125 – 145 kJ / kg / day).
- Protein requirements will be calculated as 1.25 – 1.5g / kg / day to ensure positive nitrogen balance. (It should be noted that protein intakes above 2g / kg / day may negatively impact upon renal and hepatic function, especially in adults over 65 years old).
- Fluid requirements will be calculated as 30 – 35ml / kg / day or 1ml / kcal / day.
- A general multivitamin and mineral preparation is suggested for use with patients who are at moderate to high risk of malnutrition, where adequate intake of micronutrients is not provided from dietary sources.
- Where used, micronutrient supplementation should be given in the form of a general multivitamin and mineral preparation, unless specific tests (biochemical or dietary analysis) suggest that there is a deficiency of a single nutrient, in which case single micronutrient supplementation is warranted.

Nutrition interventions should start with modification of current dietary intake, and progress to the use of oral nutritional supplements, before the consideration of enteral support (see treatment flowchart: management of pressure injuries in adults).

BMI and percentage unintentional weight loss are interpreted with caution.

Albumin and / or Pre-albumin are used to screen obese patients with delayed wound healing.

PENG (Parenteral and Enteral Nutrition Group) guidelines are used for the calculation of energy requirements for obese patients.

Either a 50% adjusted body weight is used for calculation of energy requirements, or the following calculations:

- For non-stressed patients, calculate requirements as normal and subtract 400-1,000 kcal (1,672 – 4,182 KJ) for a decrease in energy stores.
- For mildly to moderately stressed patients, feed to BMR, calculated using actual weight. The omission of stress and mobility factors will avoid the adverse effects of overfeeding.
- For severely stressed patients, it might be necessary to add a stress factor to BMR.

50% adjusted body weight = (current weight - ideal body weight )x 0.5 + ideal body weight
Other requirements (fluid, protein, micronutrients) should be based on actual body weight.
Special consideration:
Spinal cord injury

Anthropometric results should be interpreted with caution.

For long-term paraplegics, subtract 4.5 to 7 kg from the guideline for a given height and frame size
For long-term tetraplegics, subtract 7 to 9 kg from the recommended guideline.

Energy requirements should be calculated as:
- Paraplegic: $25.9 \pm 1.2 \text{ kcal/kg of body weight/day (with pressure injuries)}$
- Tetraplegic: $24.3 \pm 1.1 \text{ kcal/kg of body weight/day (with pressure injuries)}$

Protein and fluid requirements should be calculated as for other patients with pressure injuries.

Special considerations:
Arginine

Use of arginine-containing oral supplement may be indicated where initial assessment shows that the patient is managing adequate dietary protein, yet the stage 2 or greater pressure injury shows no signs of healing.

Current research seems to indicate that if improvements in wound healing are going to be seen, then an improvement should be seen within two or three weeks of commencing an arginine-containing oral supplement.

Education
Written high protein dietary advice should be provided.

Monitoring
The following factors should be monitored during treatment:
Biochemistry
- Albumin / Prealbumin / Transferrin / CRP
- Cholesterol
- Vitamin B$_12$ / Iron / Haemoglobin / Iron

Weight (weight loss may indicate nutrient needs not being met)
Oral intake (food charts / self reporting)
Fluid balance (fluid balance charts / biochemistry / daily weight)
Wound status including infection & exudates
Anthropometry as indicated
Patient goals and compliance

Follow up
Inpatients:
Minimum twice weekly until nutritionally stable, then weekly as required.
Community / Outpatients:
First review 2-3 weeks after initial assessment, then every 3-4 weeks as required. Reviews may be via telephone or in person.
Treatment should continue through the steps documented on the treatment flowchart: management of pressure injuries in adults if any of these factors arise at review.
- No signs of wound improvement within 2-3 weeks of treatment
- Oral intake declines
- Not meeting nutritional goals
• Cannot manage nutritional supplements

If patient meeting nutritional goals or wound shows signs of improvement, then monitor patient according to patient need / professional discretion. Nutritional status should be regularly monitored as long as pressure injury persists (by Dietetic or Nursing staff).

**Discharge**

A discharge letter will be sent to the patients GP advising results of nutrition intervention and recommendations for GP / community review. Where applicable special authority application details will be forwarded to the patients GP.
**Pressure injury DIETETIC quick reference guide**  
P1 of 2

**At all stages of care** obtain consent, consider cultural, ethical and legal issues of providing nutrition support and ensure there is an ongoing care pathway with clear nutrition treatment goals.

4. Determine malnutrition risk using an appropriate, validated screening and assessment tool.
5. Identify stage of pressure ulcer.
6. Determine risk of delayed wound healing due to nutritional problems (see over page).

---

### 4. Treatment

- **Probable low risk of delayed healing due to nutrition issues**
  - Give basic wound healing / healthy eating information sheet to ensure appropriate, balanced diet.
  - Consider referring to dietitian for full nutritional assessment
  - Goal intake: 1.25g protein/kg; 30-35kcal (125 – 145 kJ/kg); 30 – 35ml/kg fluid.
  - Use high protein / high energy dietary fortification information.
  - Supplement vitamins and minerals as necessary to achieve NRV's.
  - Possible benefit from oral nutritional supplements to achieve goal intakes. **see arginine box below**

- **Probable moderate risk of delayed healing due to nutrition issues**
  - Refer to dietitian for full nutritional assessment
  - Goal intake: 1.5g protein/kg; 30-35kcal (125 – 145 kJ/kg); 30 – 35ml/kg fluid.
  - Use high protein / high energy dietary fortification information.
  - Supplement vitamins and minerals as necessary to achieve NRV's.
  - Probable benefit in using oral nutritional supplements to achieve goal intakes. **see arginine box below**

- **Probable high risk of delayed healing due to nutrition issues**
  - As for previous step, plus:
    - Consider protein or energy nutrient module if patient unable to meet goal intakes using diet +/- oral nutritional supplements.
  - If goal intakes are not being met by the above strategies then discuss other means of provision with medical team.

### 5. Monitor

- Treatment should continue through the steps opposite if any of these factors arise at review. As condition improves treatment steps can be reversed.
  - No signs of wound improvement within 2-3 weeks of nutritional treatment
  - Oral intake declines
  - Not meeting nutritional goals
  - Cannot manage oral nutritional supplements

If patient meeting nutritional goals or wound shows signs of improvement, then monitor patient according to patient need / professional discretion.

The above factors should be regularly monitored as long as pressure ulcer persists (by Dietetic or Nursing staff).

---

**Arginine containing oral nutritional supplements**

- Potential benefit of use with Stage ≥ 2 pressure injuries (over & above diet + standard oral nutritional supplements).
- Assess individual case with regards to current nutritional status, financial & access issues.
Indicators of probable low risk of delayed healing due to nutrition problems

- Low risk of malnutrition as defined by a validated nutrition screening tool or nutritional assessment tool / individual Dietetic assessment.
- Stage 1 pressure injury plus normal range albumin levels and no reported unintentional weight loss.

Indicators of probable moderate risk of delayed healing due to nutrition problems

- Moderate risk of malnutrition as defined by a validated nutrition screening tool or nutritional assessment tool / individual Dietetic assessment.

Indicators of probable high risk of delayed healing due to nutrition problems

- Stage 1 or 2 pressure injury and BMI ≥ 21 if >65 years old / BMI ≥ 18.5 if < 65 years plus at least one of the following:
  - Unintentional weight loss, but less than 10% in 6 months or 7.5% in 3 months
  - Moderate risk of malnutrition as defined by a validated malnutrition screening tool
  - Patient reports more than ½ but less than full oral intake for ≥ 5 days
  - High risk of malnutrition as defined by a validated nutrition screening tool or nutritional assessment tool / individual Dietetic assessment.
- Stage 1 or 2 pressure injury plus at least one of the following:
  - BMI ≤ 20 if >65 years old / BMI ≤ 18.5 if < 65 years
  - Unintentional weight loss, of more than 10% in 6 months or 7.5% in 3 months
  - BMI ≤ 20 (any age) AND unintentional weight loss as above
  - High risk of malnutrition as defined by a validated malnutrition screening tool
  - Patient reports less than ½ oral intake for ≥ 5 days
- Stage 3 and 4 pressure injuries automatically rank as probable high risk of delayed healing due to nutritional problems.

Definitions:

<table>
<thead>
<tr>
<th>Nutrient module</th>
<th>Oral supplements that contain usually only one major nutrient (e.g. fat, carbohydrate or protein).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral nutritional supplement (ONS)</td>
<td>High energy nutritional drinks that contain a variety of nutrients, vitamins and minerals. These may be in the form of nutritional drinks that are generally not nutritionally complete; or in the form of Pharmacy only drinks that are generally (but not exclusively) nutritionally complete.</td>
</tr>
</tbody>
</table>

Requirements:

<table>
<thead>
<tr>
<th>Energy</th>
<th>Protein</th>
<th>Fluid</th>
<th>Vitamin / minerals</th>
</tr>
</thead>
<tbody>
<tr>
<td>30–35 kcal/kg</td>
<td>1.25 – 1.5g /kg</td>
<td>30 –35ml / kg / day or 1ml / kcal / day</td>
<td>Supplement as needed to NRV levels.</td>
</tr>
<tr>
<td>125 – 145 kJ/kg</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Calculations: Adjustments for obesity:

PENG calculations of requirements for obese patients (ie BMI >30)

Either use 50% adjusted body weight for calculation of energy requirements, or use the following:

- For non-stressed patients, calculate requirements as normal and subtract 400-1,000 kcal (1,672 – 4,182 Kj) for a decrease in energy stores.
- For mildly to moderately stressed patients, feed to BMR, calculated using actual weight. The omission of stress and mobility factors will avoid the adverse effects of overfeeding.
- For severely stressed patients, it might be necessary to add a stress factor to BMR.

Other requirements (fluid, protein, micronutrients) should be based on actual body weight.

50% adjusted body weight = (current weight - ideal body weight) x 0.5 + ideal body weight

Calculations: Adjustments for spinal cord injury:

BMI adjustments:

For long-term paraplegics, subtract 4.5 to 7 kg from the guideline for a given height and frame size
For long-term tetraplegics, subtract 7 to 9 kg from the recommended guideline.

Energy expenditure calculations:

Paraplegic: 25.9 ± 1.2 kcal/kg of body weight/day (with pressure injuries)
Tetraplegic: 24.3 ± 1.1 kcal/kg of body weight/day (with pressure injuries)