**Midlands Burn Operational Delivery Network (MBODN)**

**Guideline for the Nutritional Management of Burn Injured Adults and Paediatrics**

**Date: January 2025**

**Review Date: January 2030**

**Purpose**

This guideline aims to assist burn care multidisciplinary teams (MDT) to deliver best possible nutritional and hydration care to burn injured patients and achieve best possible clinical and patient outcomes. Consistent implementation and consideration of this guideline will enhance decision making and help to ensure that the nutritional status of the patient is optimised and considered throughout their care journey. This guideline does not replace individual clinical judgement or local Trust policy but should guide the MDT on nutritional and hydration issues throughout the patient’s burn care journey. Reference should also be made to the latest British Burns Association national standards for provision of Adult and Paediatric burn care and outcomes.

**Development Process**

The 2025 update to this guideline was initiated and undertaken by the guideline review team listed below.

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Prior to conducting the update, members of the wider Midland Burn Operational Delivery Network (MBODN) were contacted and invited to take part. The reviewers have updated the guideline based on the current evidence base and their expert opinion. The revised guideline will be circulated to the wider MBODN for comment.

It is the opinion of the MBODN that this guideline represents a framework for current best practice.

There has not been specific patient involvement in the development of this guideline however all reviewers have direct patient contact in burn care.

The aim is to review this guideline every 5 years unless significant new evidence emerges in the intervening period.

The first version of this guideline was developed by a group of representatives from different professions within the MB ODN. The current reviewers would like to acknowledge their contribution. With thanks to: Megan Gallagher (Dietitian), Tracy Lovejoy (Dietitian), Holly Doyle (Dietitian), Vanessa Hopkins (Dietitian), Lily Valachou (Surgeon), Clare Thomas (Nurse), Claire Porter (Nurse).

**Target Users**

The target users for this guideline are all clinical staff involved in burn care in the MBODN, specifically:

· Dietitians and dietetic technicians or assistants

· Nursing staff

· Doctors and Surgeons

· Other allied health professionals

· Anaesthetists

The whole MDT, including the ward catering staff, are responsible for providing the best possible nutritional and hydration care to burn injured patients. Dietitians have a leading role in assessing patients’ individual nutritional requirements and intakes; formulating individual nutritional and dietetic care plans; monitoring progress, in addition to providing educational support to all members of the MDT on best nutritional practice.

**Importance of Nutrition for Burn Injured Patients**

The importance of nutrition in burn care is well recognised. Following burn injury, several pathophysiological pathways are initiated. This process is not fully understood, but the resultant state of hypermetabolism and hypercatabolism is unrivalled in its magnitude and duration.[[1]](#endnote-2) Adequate nutrition support is central in the management of these metabolic dysfunctions to limit the associated complications such as weight loss, muscle wasting, delayed wound healing and infection.

The burn-injured patient is nutritionally vulnerable for many reasons including, increased nutritional requirements, increased losses of protein and trace elements via wound exudate, repeated episodes of fasting for surgical procedures, pain, nausea, psychological distress, and side effects of medication.

The general aims of nutritional intervention are to:

· In adults, to limit total body weight loss to <10% of admission weight until wounds fully healed.

· In paediatrics, to maintain weight throughout recovery until wounds fully healed, to maintain normal growth and development.

· Preserve lean body mass

· Optimise wound healing and skin graft take

· Support the immune system

· Correct any pre-existing nutritional deficiencies

· Maintain bowel function

· Maintain gut integrity and reduce risk of bacterial translocation

**Definitions**

Paediatric = 16 years and younger

Adult = over 16 years old

Older adults = over 60 years old

The categories of burn injury are as per the Midlands Burn Care Network.

|  |  |  |
| --- | --- | --- |
| **Category of burn Injury (as per the Midlands Burn Care Network)** | | |
| **Minor** | **Moderate** | **Severe** |
| Children under 1 year old and ex-prematurity with any size burn may be at increased nutritional risk and referral to the dietitian should always be considered in this case. | | |
| Children > 1 year with burns <5% Total Body Surface Area (TBSA) | Children >1 year with burns 5-20% TBSA | Children >1 year with burns >20% TBSA |
| Adults <15% TBSA burns | Adults 15-30% TBSA burns with no significant co-morbidities | Adults >30% TBSA burns |
| Older Adults with <10% TBSA burns | Older adults 10-20% TBSA burns with no significant co-morbidities | Older adults with >20% TBSA burns |
| Patients with no significant co-morbidity | Minor but require surgical or complex wound management  Minor plus significant co-morbidity | Moderate but require surgical or complex wound management  Multiple co-morbidities  Inhalation injury |

**Summary Table of Nutritional Management**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Minor** | **Moderate** | **Severe** |
| **Anthropometric monitoring** | Weight (kg) and length/height (cm or m) must be measured and documented within 24 hours of admission by nursing / ward staff.  Weight should be measured and documented weekly, unless clinical indication requires measurement to be taken more frequently.  Any factors which may affect weight accuracy should be documented e.g. dressings/oedema.  For paediatric patients plot measurements on growth chart (electronic or paper). | | |
| **Nutritional Screening and Dietetic Referral** | Patients should be nutritionally screened on admission using a validated nutrition screening tool in line with local Trust policy. This should be repeated weekly as a minimum or sooner if clinically indicated.  Any patient identified by nutrition screening as being at risk should be referred to the dietitian within 24 hours of the completed screen. | | |
|  | Regardless of nutrition screening score, all adult patients with >10%  TBSA burns and all paediatric patients with >5% TBSA burns should be referred to the dietitian.  Children <1 years and adults > 60 years are at increased nutritional risk and referral to the dietitian should always be considered for these patient groups.  The dietitian should assess in line with local service priorities. All resus burns to be seen within 1 working day from receipt of referral. | |
| **Dietetic Assessment** | The dietitian should assess in line with the British Dietetic Association Model and Process.[[2]](#endnote-3)  Dietetic recommendations should be documented in patient hospital records and discussed with MDT. | | |
| **Energy and Protein** | To assess energy requirements, use indirect calorimetry where available. Alternatively, use an appropriate predictive equation.[[3]](#endnote-4)  Protein requirements can be calculated using a range of 1.5g/kg-2g/kg body weight per day for adults and a range of 1.5-3.0g/kg body weight per day for children, dependent on age.iii | | |
| **Micronutrients and trace elements** | Routine trace element (copper, selenium, zinc) supplementation not indicated | Trace elements should be requested if patient is at increased risk of trace element deficiency e.g. long standing haemodialysis/ chronic malnutrition or if wounds are deteriorating without any obvious cause. | IV trace element supplementation should be given within 24hrs for at least the first 8 days post burn injury. The dietitian should advise if supplementation is to continue for >8 days. |
|  | Routine ascorbic acid supplementation not indicated | Trace element status measured on admission and then weekly until within normal range.  Oral or enteral supplementation of trace elements should be prescribed for adult and paediatric patients with injuries <30% TBSA, as per local Trust policy, if plasma levels are low following assessment by a dietitian. | |
| Adult patients should be supplemented with 500mg-1000mg ascorbic acid (vitamin C) per day starting within 24 hours post burn injury and discontinuing as per dietetic assessment.  The dietitian will assess paediatric patients to ensure the reference nutrient intake (RNI) for vitamin C intake is achieved as a minimum.  Where vitamin C is supplemented, it is recommended that it is gradually diminished over a 2–4-week period as rebound deficiency can occur post high dose supplementation.[[4]](#endnote-5) | |
| Vitamin D levels should be checked for all moderate and major burns. International guidelines recommend supplementation of vitamin D for burn-injured patients.  All exclusively breastfed babies and those receiving <500mls formula should receive 10mcg vitamin D supplementation daily. Children over 6 months old and up to 5 years old should receive an age-appropriate multivitamin supplement containing vitamin D. | | |
| Immuno-nutrition | Not currently indicated | | |
| Enteral Feeding | Enteral feeding not routinely indicated. Dietitian will advise if required. | For adults with injuries ≥15% TBSA and for paediatric patients with injuries ≥10% TBSA an enteral feeding tube should be placed and feeding commenced within 12 hours of admission.  Local guidelines on safe placement and management of enteral feeding tubes should be consulted.  Dietitian will provide a written regimen stating type, rate and volume of feed within 1 working day of receipt of referral.  It is recommended to have a burn-specific enteral feeding protocol for use until individualised assessment by a dietitian.  For severe burn injury ≥30% TBSA or pyloric dysfunction nasojejunal feeding should be considered.  For patients whose feeding tube is prone to being dislodged then a nasal sling/bridle/loop should be considered in accordance with local guidelines.  A gastrostomy tube should be considered for patients that require enteral feeding for longer than 4 weeks or when it is difficult to fix an NJ or NG tube (i.e. large facial burns). | |
| Parenteral Nutrition (PN) | Not routinely indicated.  All patients requiring PN should be referred to the Nutrition Support Team/Gastroenterology team as per local Trust policy.  Consideration of supplementary PN should be discussed as an MDT in cases where the oral or enteral route is deemed insufficient to achieve desired nutritional outcome. | | |
| Diet and Oral Nutritional Supplements | As per usual nursing care and local Trust policy | Accurate food and fluid balance charts to be completed daily by ward staff.  Dietitian to consider verbal and written advice to promote a high energy and high protein diet with consideration to international recommendations for dietary composition of 50-60% CHO, 20% protein and less than 30% fat.iii  Consideration should be given to adequate hydration.  Oral nutritional support products to be prescribed as indicated by the dietitian.  If snacks are available on ward, especially high protein, ward staff to offer these between meals. | |
| All patients who require assistance with feeding will be assisted by ward staff or volunteers at mealtimes and supplied with appropriate adaptive cutlery. Where appropriate, family and carers can also be involved in supporting patient feeding.  If swallowing concerns are identified, inform the nurse looking after the patient and refer to Speech and Language Therapy. | | |
| Bowel Management | All patients should have their bowel habits monitored and documented daily e.g. using a Stool monitoring chart. We would expect burn patients to open their bowels within 3-4 days of admission. Refer to Trust guidelines for recommended management of constipation.  Consideration should be given to prophylactic laxatives due to the high use of opioids in this patient group.  Where concerns persist beyond 3-4 days, refer to the dietitian for assessment and advice on fluid and fibre to optimise bowel management.  Dietary and fluid advice for bowel management should be a part of any written patient information offered to burn patients.  A bowel management system should be considered on an individual patient basis. | | |
| Anabolic Steroids | Not indicated | Where lead consultant decides to commence anabolic steroids, dietitian should assess to ensure adequate energy and protein intake.  Monitor liver function tests (LFTs) weekly while using anabolic steroids. If these are deranged discuss whether to discontinue use. | |
| Transfer | Dietitian should add relevant details to the rehab prescription and/or handover dietetic care plan to the receiving burn care service/dietitian within 1 working day of transfer.  Where the discharge intention is known, proactive handover is also encouraged to enable logistics to be efficiently planned to minimise interruptions to nutritional provision between settings. | | |
| Discharge | Written dietary information to be given by the dietitian if necessary.  If post-discharge use of oral nutritional support products or micronutrient supplements is indicated these should be arranged as per local Trust policy. Dietitian to write to GP with recommendations for prescription within 1 week of discharge.  Dietitian to consider outpatient follow up (internal or community).  If patient being discharged on home enteral feeding, dietitian to liaise with staff and patient to arrange safe discharge. | | |
| Outpatient | All patients should have their weight and height (length for paediatrics) monitored and documented by clinic staff at every consultant clinic appointment.  There should be a defined protocol for onward referral via outpatient dietetic services, GP or community dietetic services, subject to clinical need and local service provision. | | |
| Monitoring Nutrition Therapy | See suggested parameters for monitoring in section X below | | |

**Weight and Height Monitoring**

* Weight (kg) and height (cm or m) must be measured and documented within 24 hours of admission by nursing / ward staff.
* Weight should be measured and documented weekly, unless clinical indication requires measurement to be taken more frequently. For paediatric patients plot measurements on growth chart (electronic or paper).
* Any factors which may affect weight accuracy should be documented e.g. dressings/oedema.

An accurate weight is an essential part of the assessment of nutritional status and for the calculation of drug doses and fluid resuscitation. Weight must be measured and documented on admission and repeated on a weekly basis (as a minimum) with a clear date history. Appropriate and calibrated weighing scales must be available. If there is a genuine clinical reason why a patient cannot be weighed the reason for this should be documented and an estimate of weight should be clearly stated as such. Factors such as oedema secondary to fluid resuscitation, burns dressings and prosthetics can affect the accuracy of weights. Any factors which may affect weight accuracy should be documented along with the weight so that it can be interpreted correctly.

Other anthropometric measurements may also be considered, for example mid upper arm circumference (MUAC) but do not represent an alternative to an accurate weight.

Height is useful to interpret whether a weight is healthy and to monitor growth in children. A height (or length if < 2 years of age) must be measured/ estimated on admission by nursing staff.  For patients who cannot physically stand, measurement of ulna length or demi-span will provide an approximate height (using BAPEN MUST calculator).[[5]](#endnote-6)

For paediatric patients, weight and height should both be plotted by staff on a centile growth chart in the patient’s medical records (and in hand-held records if available).

**Nutritional Screening and Dietetic Referral**

* Patients should be nutritionally screened on admission using a validated nutrition screening tool in line with local Trust policy. This should be repeated weekly as a minimum or if clinically indicated sooner.
* Any patient identified by nutrition screening as being at risk should be referred to the dietitian within 24 hours of the completed screen or as contemporaneously as possible.
* Regardless of nutrition screening score, all adult patients with >10% TBSA burns and all paediatric patients with >5% TBSA burns should be referred to the dietitian. Children under 1 and adults over 60 are at increased nutritional risk and referral to the dietitian should always be considered for these patient groups.
* The dietitian should assess moderate and severe burn-injured patients within 1 working day of receipt of referral. All resus burns to be seen within 1 working day.

Nutrition screening tools provide a quick and straightforward assessment of risk of malnutrition which should prompt referral to a dietitian. Like any such tool they are not without flaws and the result will not accurately reflect nutrition risk for every patient. Clinical staff should always exercise their clinical judgement and refer to the dietitian for any patient for whom there are nutritional concerns. Further, nutrition screening tools are not specific for burn injury, hence regardless of the screening outcome staff should refer all adult patients with >10% TBSA burns and all paediatric patients with > 5% TBSA burns.

**Dietetic Assessment**

* The dietitian should carry out a full dietetic assessment in line with the British Dietetic Association Model and Process.ii
* Dietetic recommendations should be documented in patient hospital records and discussed with the MDT.

**Energy and Protein**

* To assess energy requirements, use indirect calorimetry where possible. Alternatively, use an appropriate predictive equation. iii
* Protein requirements can be calculated using a range of 1.5g / kg to 2g/ kg a day for adults and a range 1.5-3.0g/kg/d in children, dependent on age.iii

When estimating energy requirements in patients with severe burns, where possible indirect calorimetry should be used by the dietitian to avoid risk of both over- and underfeeding.iii If indirect calorimetry is used to assess requirements it should be repeated regularly as energy requirements will vary throughout the patient journey. If indirect calorimetry is unavailable, the dietitian should assess energy requirements using an appropriate predictive equation at each intervention, such as Toronto in adult patients and the Schofield or Hildreth equations in children, depending on age.[[6]](#endnote-7),[[7]](#endnote-8),[[8]](#endnote-9) Adjustment should be made in the case of obesity. International guidelines recommend the use of an adjusted body weight for this calculation.[[9]](#endnote-10) No predictive equation has demonstrated to be accurate in assessing energy requirements in this patient group and appropriate monitoring is essential.[[10]](#endnote-11)

Aim for high energy and high protein diet with consideration to international recommendations for dietary composition of 50-60% CHO, 20-25% protein and 15-30% fat.iii

Due to altered lipid metabolism during the hypermetabolic phase, evidence suggests avoiding oversupply of lipids. Oversupply of lipids may lead to accumulation of fatty acids in the liver and may negatively affect immune function.i

Dietitians should adjust nutritional plans to account for energy, carbohydrate and lipid provided from non–nutritional sources such as propofol and intravenous fluids.[[11]](#endnote-12)

Protein is required to support wound healing and to maintain organ systems. Protein catabolism is profound following burn injury. Evidence to guide protein targets is still emerging.[[12]](#endnote-13) It is suggested that protein requirements are calculated using the reference ranges quoted above.

Refer to local Trust refeeding guidelines or applicable national guidelines where refeeding syndrome is identified.

**Micronutrients and Trace Elements**

Several vitamins and trace elements play a role in wound healing and immune function and act as antioxidants. Many are depleted post burn injury and continue to be lost through wound exudate. More research from multicentre randomised controlled trials is needed specific to burns, regarding level and duration of supplementation. Measurement and supplementation regimens vary, and reference should be made to local Trust policy.

**Trace Elements**

* All adult and paediatric patients with moderate and severe burn injuries should have trace element status (copper, selenium and zinc) measured on admission and then weekly until normal.
* For adults and paediatric patients with severe burn injuries, IV trace element supplementation should be given within 24hrs for at least the first 8 days post burn injury. The dietitian should advise if supplementation is to continue for >8 days.
* Oral or enteral supplementation of trace elements should be prescribed for adult and paediatric patients with injuries < 30% TBSA, as per local Trust policy, if plasma levels are low following assessment by a dietitian.
* For specific doses and preparations reference should be made to local Trust policy or discussed with pharmacy.

Copper, selenium, and zinc are essential trace elements as they cannot be synthesised in the body. They are particularly important to burn care as they are components of many enzymes which play roles in oxidative stress, wound healing including collagen cross-linking, and immune function.[[13]](#endnote-14)

Supplementation of trace elements in burn injured patients has demonstrated a reduction in pulmonary infections, wound infections and a potential to reduce length of stay.[[14]](#endnote-15) Evidence is sparce and limitations include small sample sizes and variations in dose, combinations and method of supplementation making pooling results challenging. Further, serum measurements are influenced by inflammatory status and results which indicate deficiency may not be representative of genuine whole-body deficits.[[15]](#endnote-16) However, international guidelines recommend supplementing trace elements as follows: for 7-8 days for burns >20-40%, for 2 weeks for burns 40 -60%, for 30 days for burns > 60%.iii  Trace element levels should be closely monitored  and stopped if readings are in excess of the reference range.

In a systematic review of trace element supplementation, no adverse effects were identified, and it was recognised that trace element supplementation is a relatively low-cost intervention which confers positive effects.xi

**Vitamin C (ascorbic acid)**

* All adult patients with moderate or severe burn injury should be supplemented with 500-1000mg ascorbic acid (vitamin C) per day starting within 24 hours post burn injury and discontinuing as per dietetic assessment.
* The dietitian will assess all paediatric patients with moderate or severe burns to ensure the RNI for vitamin C intake is achieved as a minimum.

Vitamin C is a powerful antioxidant with a role in collagen synthesis and wound healing, immune function and enhancing absorption of non-haem iron.x

Vitamin C levels are depleted post burn injury and requirements remain raised during the acute phase.xiii It is therefore recommended to supplement vitamin C for adult patients with moderate and severe burn injuries.

There have been promising indications that high dose vitamin C supplementation could reduce fluid resuscitation requirements and, consequently, oedema. However more data is needed before clinical recommendations can be made in this respect.[[16]](#endnote-17)

Where vitamin C is supplemented, it is recommended that it is gradually diminished over a 2–4-week period as rebound deficiency can occur post high dose supplementation.iv

**Vitamin D**

* Vitamin D levels should be checked for all moderate and major burns. International guidelines recommend supplementation of vitamin D for burn injured patients.iii
* All exclusively breastfed babies and those receiving <500mls formula should receive 10 mcg/µg vitamin D supplementation daily. Those over 6 months old should and up to 5 years old children should receive an age-appropriate multivitamin supplement containing vitamin D.xiv

Vitamin D deficiency impairs the absorption of dietary calcium and phosphorus, which can lead to bone deformities in children and bone pain and tenderness due to osteomalacia in adults. It also has a role in muscle function and immunity.x A significant proportion of the UK population have low vitamin D levels, hence NHS advice for adults and children over 4 years old is to consider a daily supplement of 10mcg/µg vitamin D during the autumn and winter months.[[17]](#endnote-18) Vitamin D is synthesised from direct sunlight and some population groups are at additional risk of deficiency including people who are not outdoors often e.g. care home residents, people who cover their skin when outdoors and people with dark skin tone.xivBurn injured patients are at increased risk of deficiency due to reduced exposure to sunlight and reduced synthesis of vitamin D in scar tissue.i Vitamin D deficiency is associated with lower bone mineral density and increased prevalence of long bone fractures as well as low scar elasticity and decreased skin barrier function.[[18]](#endnote-19),[[19]](#endnote-20)

**Immuno-nutrition:**

Supplementation with the amino acid glutamine was previous indicated in burn-injured patients. A multi-centre randomized controlled trial in 2022 concluded that there was no benefit to glutamine supplementation in this patient group and so it is no longer indicated.[[20]](#endnote-21)

The amino acid arginine has also been investigated however current evidence does not support its use in burn injured patients.iii

**Enteral feeding**

* For adults with moderate and severe burn injuries ≥15% TBSA and for paediatric patients with ≥10% TBSA burn injuries an enteral feeding tube should be placed and feeding commenced within 12 hours of admission. Local guidelines on safe placement and management of enteral feeding tubes should be consulted.
* Dietitian will provide a written regimen stating type, rate and volume of feed within 1 working day of receipt of referral.
* It is recommended to have a burn-specific enteral feeding protocol for use until individualised assessment by a dietitian.
* For severe burn injury ≥30% or pyloric dysfunction nasojejunal feeding should be considered
* For patients whose feeding tube is prone to being dislodged then a nasal sling/bridle/loop should be considered.
* A gastrostomy tube should be considered for patients that require prolonged enteral feeding or when it is difficult to fix an NJ or NG tube (i.e. large facial burns).

Enteral feeding allows delivery of essential nutrients to support weight maintenance and wound healing and has also been shown to support the maintenance of the gut mucosa, reduce bacterial translocation and improve immune function.i If commenced early, it has been shown to reduce catabolic hormones and the hypermetabolic response.iii If early enteral nutrition is not initiated and patient has aggressive fluid resuscitation it can cause generalised oedema including gut oedema and therefore increase the risk of paralytic ileus.iii For all these reasons, patients with moderate or severe burn injuries should have an enteral feeding tube placed. Patients with a smaller %TBSA burn may also require enteral feeding depending upon the adequacy of their oral intake or pre-existing nutritional status. Tube feeding may be indicated in other at-risk patients (e.g. those with facial burns or pre-existing malnutrition). Advice should be sought on an individual basis from a dietitian and discussed with MDT.

The dietitian will assess and provide a tailored feeding regimen to meet the patient’s individual needs. In general, higher protein infant formula or tube feeds are recommended.i It is recommended to have a burn-specific enteral feeding protocol for use until individualised assessment by a dietitian.[[21]](#endnote-22)

Local policy and anaesthetic advice should be followed when managing enteral feeding in line with theatre trips. Consideration should be given to anticipated periods of nil by mouth and the dietitian should devise feeding regimens that take account of any reduced feeding hours. Some burn services continue feeding through theatre e.g. in patients with NJ tubes to minimise losses.

Jejunal feeding may have the benefit of avoiding need for pre and intraoperative fasting. Naso-jejunal feeding may be indicated in the following situations:

* Injuries of 30% TBSA or greater
* Injuries of > 15% up to 30% TBSA where frequent theatre visits are anticipated
* Confirmed gastric stasis
* Poor tolerance to gastric feeding (e.g. high gastric aspirates, frequent vomiting)
* Unable to pass an NG tube therefore an NJ tube can be passed whilst in theatre

Care must be taken to avoid aggressive enteral nutrition when patient is still being stabilised due to risk of non-obstructive bowel necrosis. Patients at increased risk include those experiencing severe trauma shock, on high doses of vasopressors, hypovolaemic, experiencing bowel dysmotility. [[22]](#endnote-23)

Delays to patients receiving adequate nutrition can be caused by frequent replacing of NG tube. This can also cause more distress to the patient. Studies have been carried out, mainly in stroke patients, suggesting advantages to using NG tubes with a nasal sling/bridle/loop.[[23]](#endnote-24)

NGT feeding is generally considered a short-term form of nutritional support. NICE guidelines advise gastrostomy should be considered for patients requiring enteral feeding > 4 weeks.[[24]](#endnote-25) It may be suitable for burn injured patients who require prolonged enteral feeding to have a gastrostomy placed to improve patient comfort and nutrient and fluid delivery. However, the decision should be made by the MDT in the context of the patient’s surgical treatment and rehabilitation plan.

Indication for weaning feeds will need to be considered by the MDT on an individual basis. However, possible indications include surgeons advise burn fully/almost completely healed, patient showing strong interest in diet and eating significant amounts of diet and/or oral nutrition support products.

**Parenteral Nutrition (PN)**

* Enteral nutrition should be considered the route of choice for the nutritional support of all burn patients, with functioning gastrointestinal tracts. PN should only be considered if enteral feeding fails or is insufficient to meet full estimated nutritional requirements.iii
* All patients requiring PN should be referred to the Nutrition Support Team /Gastroenterology team as per local Trust policy.
* Consideration of supplemental PN should be discussed as an MDT in cases where the oral or enteral route is deemed insufficient to achieve desired nutritional outcome.
* If PN is indicated, if appropriate, trophic feeding should be given to maintain gut integrity and reduce risk of bacterial translocation.

**Diet and Oral Nutritional Supplements**

* Accurate food and fluid charts to be completed daily by ward staff as per local Trust care plans or dietitian advice.
* Dietitian to consider verbal and written advice to promote a high energy and high protein diet with consideration to international recommendations for dietary composition of 50-60% CHO, 20% protein and less than 30% fat.iii
* Oral nutrition support products to be prescribed as indicated by the dietitian.
* Consideration should be given to adequate hydration.
* If snacks are available on ward, especially high protein, ward staff to offer these between meals.
* All patients who require assistance with feeding will be assisted by ward staff or volunteers at mealtimes and supplied with appropriate adaptive cutlery. Where appropriate, family and carers can also be involved in supporting patient feeding. Refer to Occupational therapy for advice if required.
* If swallowing concerns are identified refer to speech and language therapy.

The whole MDT and the ward catering staff are responsible for providing the best possible nutritional care to burn injured patients. An important part of this is ensuring all staff involved in supporting burn patients nutritional care, receive regular support and updated training from the dietitian to maintain best practice, care and staff competence and confidence.

All patients are to have access to and receive an appropriate diet to enable wound healing and to promote independent self-feeding where possible. For some patients monitoring of dietary intake is vital, as this enables the dietitian to formulate individual nutritional and dietetic care plans and monitor nutritional progress.

**Bowel Management**

* All patients should have their bowel habits monitored and documented daily e.g. using a stool monitoring chart. We would expect burn patients to open their bowels within 3-4 days of admission. Refer to Trust guidelines for recommended management of constipation.
* Consideration should be given to prophylactic laxatives.
* Where concerns persist beyond 3-4 days, refer to the dietitian for assessment and advice on fluid and fibre to optimise bowel management.
* Dietary and fluid advice for bowel management should be a part of any written patient information offered to burns patients.
* A bowel management system should be considered on an individual patient basis.
* Fibre-enriched feed should be considered as first line in this patient group.iii

A bowel management system should be considered on an individual patient basis.These systems can be used to divert stool to avoid soiling of wounds or dressings, reduce the risk of infection and contribute to patient comfort and dignity.These systems are not recommended for use in paediatric patients but may be considered on an individual basis for older adolescent patients. Appropriate time to removal should be considered regularly and in line with local Trust policy to minimise the risk of longer-term faecal incontinence.

Bowel changes are a common symptom following burn injury and patients should be encouraged to discuss any concerns with the MDT.

Patients with diarrhoea should have a stool sample sent for microbial analysis to exclude infective causes as per local Trust Guidance and consideration of side-effects of medication.

There is insufficient evidence to recommend the routine use of probiotics for the bowel management of the burn injured patient.

**Anabolic Steroids**

The catabolic response to a severe burn, leads to a rapid loss of body weight, including lean body mass. This process of net protein loss is attenuated but not prevented by optimum nutrition, early wound closure, and physical therapy.i

Historically, anabolic steroids have been used. Oxandralone is the most widely studied anabolic steroid and it has been shown to improve burn wound healing, promote weight gain and reduce length of stay.[[25]](#endnote-26) Similar effects have been seen in paediatrics.

In 2023, the Food and Drug Administration in the USA withdrew oxandrolone from sale.[[26]](#endnote-27)

Where the lead consultant decides to commence anabolic steroids, the following should be considered:

Anabolic steroids should not be administered until patients are established on their goal feeding regimen as otherwise the energy and protein intake will be inadequate for this type of therapy.

The dietitian must be made aware of any patient where anabolic steroids (e.g. Nandrolone) are being considered so that adequate energy and protein intake can be ensured.Protein requirements can be calculated using the protein requirements within this document.

Oxandrolone may cause increased hepatic enzymes so where it is used, LFTs should be monitored.

Weight should be measured and reviewed weekly as there is a risk of excessive weight gain for patients on anabolic steroids.

**Transfer**

Dietitian should add relevant details to the rehab prescription where in use and/or handover dietetic care plan to the receiving burn care service / dietitian within one working day of transfer.Where the discharge intention is known, proactive handover is also encouraged to enable logistics to be efficiently planned to minimise interruptions to nutritional provision between settings.

**Discharge**

* Written dietary information to be given by the dietitian if necessary.
* If post-discharge use of oral nutritional support products or micronutrient supplements is indicated these should be arranged as per local Trust policy. Dietitian to write to GP with recommendations for prescription within 1 week of discharge.
* Dietitian to consider outpatient follow up (internal or community) subject to clinical need and local provision.
* If patient being discharged on home enteral feeding, dietitian to liaise with staff and patient to arrange safe discharge.

The nutritional impact of burn injury can continue beyond admission. For example, the hypermetabolic response is associated with an increased requirement of energy and protein that can last for years after burn injury.i

Patients should be encouraged on discharge to monitor their own weight. If they notice a change to their weight, they should be encouraged to discuss that with the burns team or their GP. Nursing/Ward staff to weigh patient on discharge and document.

Written dietary information, with contact details, should be given by the dietitian as appropriate.

If post discharge use of oral nutritional support products or micronutrient supplements indicated, supplies for home to be arranged as per local Trust policy. Dietitian to write to GP within 1 week of discharge with recommendations for prescription, monitoring and cessation.

Dietitian to consider outpatient follow up (internal or community) subject to clinical need and local provision.

If patient is being discharged on home enteral feeding, dietitian to liaise with staff and patient to arrange training, feed delivery and TTO (depending upon local Trust policy).

Once fully healed and poor appetite is not a concern, patients should be encouraged to consume a varied, balanced diet following basic healthy eating principles to avoid any unnecessary weight gain and ensure good future health.

**Outpatient Care**

All patients should have their weight and height (length for paediatrics) monitored by clinic staff at every consultant, nursing or dietetic clinic appointment. Patients should be asked whether they have any nutritional concerns.

All Burn Services should ensure that clinic staff have adequate nutritional training to recognise nutritional related problems and should have a defined protocol for onward referral via outpatient dietetic services, GP or community dietetic services, subject to clinical need and local service provision.

It is the opinion of this group that all patients with moderate and major burn injuries should have their vitamin D status checked yearly post discharge. This can be requested by the Dietitian to the patient’s consultant or GP, with a view to optimising bone health status longer term, minimise risk of bone fractures and negative outcomes on growth.

**Monitoring Nutritional Therapy**

Any nutritional therapy should be monitored to:

* Ensure nutrition and hydration support is provided safely, and to detect and treat clinical complications as early and effectively as possible.
* Assess the extent to which nutrition and hydration objectives have been achieved.
* Alter the type of nutrition support, or the components of the regimen, to improve its effectiveness and to minimise or prevent metabolic complications as well as to optimise resource allocation.

NICE make recommendations for adults receiving oral nutritional support, enteral tube feeding and parental nutrition, but these are not specific to burn care.xix Care in interpreting laboratory tests is highlighted by NICE when patients are subject to the effects of the acute phase response or systemic inflammatory response syndrome.

Albumin is not considered a marker of malnutrition and is of limited value in monitoring because of its long half-life and because of its extra cellular fluid distribution, which makes it reflective of hydration and clinical condition rather than nutritional status.

All patients should be monitored using a variety of parameters as per their nutritional care and monitoring plan involving the whole MDT. Specific to burn care a variety of biochemical and non-biochemical parameters have been suggested for patients with burn injuries >15% TBSA, as detailed below. Suggested frequencies are indicated but this will vary by patient and be directed by lead consultant.

|  |  |
| --- | --- |
| **Parameter** | **Frequency** |
| Serum urea and electrolytes | Daily reducing to weekly |
| Glucose | 4 hourly during first 24 hours, thereafter, as indicated |
| Serum albumin | Twice weekly reducing to weekly |
| C-Reactive Protein | Twice weekly reducing to weekly |
| Liver Function Tests (LFTs) | Twice weekly reducing to weekly |
| Calcium  Magnesium  Phosphate | Twice weekly reducing to weekly  PO4 daily for first week, then weekly; |
| Haemoglobin & White Cell Count | Twice weekly |
| Trace Elements (Cu, Se, Zn) | On admission and then weekly |
| Vitamin D | One off for at risk groups |

**Non-Biochemical Monitoring Parameters for Post-Burn Injured Patients.**

Below is suggested monitoring but not possible with all patients due to dressing, function etc.

|  |  |
| --- | --- |
| **Parameter** | **Frequency** |
| Body Weight | Weekly |
| Hand-grip strength | Weekly |
| Mid-arm and calf circumference | Weekly |
| Height/length | Weekly |
| TBSA left to heal | At changes of dressings |
| Graft sites | At changes of dressings |

**Burn Injury Database (iBID)**

It is expected that the dietitian is aware of relevant nutritional data that is collected and assumes responsibility for the accuracy of that by liaising with the data collector e.g. to ensure baseline anthropometrics are accurate.

**Editorial Independence**

These guidelines have been produced without funding or influence from any external body. All members of the development group declare that they have no conflicts of interest related to any aspect of these guidelines.

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