Enteral Nutrition: Burns

What Is Providing Enteral Nutrition for Burn Patients?

› Patients with burn injuries are in a hypermetabolic state which puts them at high risk for malnutrition. The hypermetabolic state caused by increased energy expenditure, catabolism, and loss of lean body mass can make a patient more vulnerable to bacterial infections, organ failure, and delayed wound healing. Nutrition support via the administration of enteral nutrition (EN) is an essential component in the management of this patient population. Lavrentieva et al. report, "Early enteral feeding has been shown to decrease the hypercatabolic response, decrease the release of catecholamines, glucagons, and weight loss, improve calorie intake and protein retention, stimulate insulin secretion, and shorten the length of hospital stay in patients with burn injuries"

• Keeping a patient in a warm environment and the use of a neuromuscular blockade coupled with the patient’s age and nutritional status can reduce energy expenditure
• Wound size, protein catabolism, pancreatitis, pain, fever, mechanical ventilation, physical therapy, corticosteroids, and vasoactive agents can increase energy expenditure

› EN is preferred to total parental nutrition (TPN). EN uses the gut which stimulates mucosal blood flow, maintains mucosal integrity, and reduces the risk for bacterial translocation by maintaining the gut barrier. There are some guidelines that recommend the use of TPN to supplement EN until goal tube feeding rates are reached but this issue remains controversial

› Numerous studies done on patients in intensive care units demonstrate that EN is often interrupted which can prevent a patient from achieving the full nutrition prescription. The most common causes for feeding interruption include: tube malfunction, bedside procedures, dressing changes, feeding intolerance, planned extubation, nurse or physician directed interruptions, or surgery

› Research indicates that EN formulas higher in carbohydrate and protein while lower in fat provide optimum support during recovery. This composition is not available commercially and must be prepared at the hospital. However, preparation of specialized formulas can increase risk for bacterial contamination during the mixing process. Limited research is available on maximum hang time of hospital prepared formulas in a hyperthermal environment often used for burn patients

› It is important to continually assess a burn patient’s nutritional status to prevent underfeeding or overfeeding. Complications of overfeeding include: increased production of CO2, fatty liver, azotemia, hyperglycemia, or accumulation of body fat. Underfeeding can accelerate muscle wasting, place the patient at risk for malnutrition, delay wound healing, and put the patient at an increased risk for infection

› Changes in body weight is often not a good predictor of nutritional status in burn patients. Fluid resuscitation and fluid shifts can add as much as 20kg to a patient’s weight. Increases in total body water can last for weeks after the injury and can mask muscle mass loss if a patient is not carefully monitored. Daily weight checks are important in patient care but should be analyzed as part of a long term trend

› Currently there is no set parameters that is universally accepted to monitor nutritional status. A survey of 46 burn centers indicated that the most commonly used nutritional parameters are body weight, serum albumin, nitrogen balance, transferrin, and prealbumin

• An obese burn patient may experience exaggerated inflammation, severe insulin resistance which further exacerbates the use of protein and carbohydrate for energy,
higher metabolic rates, and more rapid muscle wasting. Research has shown that obese patients lose muscle mass very quickly while preserving fat mass.

- The use of indirect calorimetry and formulas for estimating caloric requirements remains controversial. None of the static formulas are able to account for the major differences in energy expenditures between patients. Limited research is available on the success of indirect calorimetry in predicting energy needs in burn patients. Saffle et al. suggest that either method can be successfully used in burn units with an experienced multidisciplinary team.

- Supplementing EN with glutamine has been shown to help preserve gut-associated immune function and reduce intestinal permeability following injury. Research has shown that providing 25g/kg/day glutamine in EN or TPN was associated with reduced infections, improved visceral protein levels, reduced mortality, and shorter length of stay. Clinical trials are ongoing and supplementing with glutamine is considered safe.

- Arginine is being studied as a supplement in EN to improve wound healing. Further studies are needed to determine safe dosing and regular supplementation is not recommended at this time. Branch-chain amino acids supplementation is not recommended.

What: The American Burn Association practice guidelines state that appropriate nutrition support in burn patients is critical to improve wound healing, recovery from the burn injury, and to reduce the consequences of hypermetabolism.

How: The American Society for Parenteral and Enteral Nutrition (ASPEN) and the Society of Critical Care Medicine (SCCM) recommend that EN begin within the first 24-48 hours following admission. The goal EN rate should be achieved by 72 hours post admission. A patient should receive greater than 50-65% of calories in the first week of hospitalization. Feeds are typically administered continuously over a 24-hour period. More research is needed to support specific recommendations on preferred delivery rates. It is important to monitor the patient for weight changes and resting energy expenditure while in the burn unit. Glucose is the preferred energy substrate for healing wounds and spare protein in several metabolic pathways. Carbohydrates should represent about 50% of total calories provided. Current protein recommendations for adult patients is 1.5-2.0g/kg/day and up to 3.0 g/kg/day in children. Lipids should compromise no more than 15% of total calories.

Where: Patients with burn injuries receive initial enteral nutrition in the inpatient hospital setting. Ongoing enteral nutrition may be provided in a rehabilitation center or even in the home setting depending on the patient's treatment and ability to meet energy needs with oral feeding.

Who: The enteral nutrition plan is recommended by a registered dietitian who should be a part of a multidisciplinary team including physicians and nurses.

What Is the Desired Outcome of Providing Enteral Nutrition to Burn Patients?

- Maintain lean body mass
- Limit protein wasting and fat accretion
- Enhance wound healing
- Tolerance of enteral nutrition prescription
- Reduce the number of interruptions in feeding due to intolerance, nursing procedures, or other medical procedures
- Reduce risk of organ dysfunction and infection

Why Is Providing Enteral Nutrition in Burn Patients Important?

- Enteral nutrition in burn patients is critical to meet the unique energy demands of burn injury, which creates a hypermetabolic state, and reduce risk of potentially life-threatening complications associated with malnutrition and muscle wasting.

Facts and Figures

- Children aged 0-4 years have the highest incidence of burn injuries based on worldwide studies. The trauma can occur within seconds and can be from something as simple as a hot beverage left unattended.
- The American Burn Association groups burns into minor, moderate, and severe categories. The metabolic rate increases with burn size.
- Between 2003 and 2012, the survival rate for burn victims was 96.7%, according to the American Burn Association.

What You Need to Know Before Providing Enteral Nutrition in Burn Patients

- It is important to estimate the nutritional status of the patient prior to sustaining the burn injury. Older patients have a higher incidence of malnutrition at the time of injury making adequate nutrition even more critical.
- Children do not have the energy reserves that adults have and have greater metabolic requirements than adults per unit of weight due to the energy needed to sustain growth and activity.
**How to Perform**

› Gather patient education materials, as needed
› Perform hand hygiene and don PPE, as needed
› Identify the patient according to facility protocol
› Establish privacy by closing the door to the patient’s room and/or drawing the curtain surrounding the patient’s bed
› Introduce yourself to the patient and family member(s), if present; explain your clinical role; assess the coping ability of the patient and the family and for knowledge deficits and anxiety regarding enteral nutrition

  • Determine if the patient/family requires special considerations regarding communication (e.g., due to illiteracy, language barriers, or deafness); make arrangements to meet these needs if they are present
  • Use professional certified medical interpreters, either in person or via phone, when language barriers exist
› Explain some of the common complications that may arise with a feeding tube (e.g., clogged tube, inadvertent tube removal); answer any questions and provide emotional support as needed
› Explain to the non-sedated patient and/or the patient’s family the specific medical reasons why a feeding tube is needed and the goals of enteral feeding (e.g., reducing risk of malnutrition, meeting increased calorie demands)
› Update the patient's plan of care, as appropriate, and document the following in the patient's medical record:
  • Date and time education was provided
  • Description of the specific education provided
  • Patient assessment information
  • Any unexpected events or outcomes, interventions performed, and whether or not the treating clinician was notified
  • All patient/family member education, including topics presented, response to education provided, need for follow-up education, and details of any barriers to communication and/or techniques that promoted successful communication

**Other Nutritional Interventions That May Be Necessary Before or After Providing Enteral Nutrition in Burn Patients**

› The extubated, non-sedated patient should be continually assessed for their ability to meet their calorie needs with a full oral diet
› A patient’s energy demands may increase as the patient begins physical therapy so ongoing assessment is critical to prevent underfeeding

**What to Expect After Providing Enteral Nutrition in Burn Patients**

› Tolerance of feeding regimen
› Meet the patient’s dynamic energy needs
› Enhanced wound healing

**Red Flags**

› A sudden development of feeding intolerance is strongly associated with the development of sepsis
› Protein or calorie deficiency may present as a persistent low pre-albumin level in the presence of normalizing C-reactive proteins

**What Do I Need to Tell the Patient/Patient’s Family?**

› EN provided via a feeding tube is required to meet the very specific energy needs of a patient with a burn injury
› Meeting the patient’s energy needs is crucial to enhance wound healing, reduce the risk of malnutrition, maintain immune system function, and reduce the risk of organ dysfunction
› The EN feeding regimen will change over time as the patient’s energy needs change as recovery progresses
› Depending on the extent of the injury, EN may be used as a sole source of nutrition or may be used to supplement oral feeding
› The length of time that EN will be needed is based on the severity of the burn injury and the speed of recovery
References


