Nutrition Care For Adults After Burn Injury: Evidence-Based, Practice-Informed Recommendations

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Burn injuries trigger profound metabolic, hormonal and inflammatory responses.[1] Patients with burns experience severe inflammation and oxidative stress, protracted hypermetabolism and catabolism that may persist for a year or more, changes in lipid and carbohydrate (CHO) metabolism, impaired insulin sensitivity, loss of lean body mass and impaired immune function.[2-4]

Appropriate, adequate and timely nutritional support is vital to recovery and the prevention of complications,[1-4] yet much of the literature specific to nutrition intervention for burns is primarily limited to observational studies, or small single centre randomized control trials (RCTs), with scarce large multi-centre RCTs. Guidelines put forth by various nutrition and burn care societies, based on both this small body of evidence and expert consensus, are not updated regularly and are often incomplete.

To better support clinicians, Registered Dietitians (RDs) from burn units across Canada conducted a thorough review of the literature and current best practices to create these comprehensive evidence-based and practice-informed recommendations for nutrition care after burn injury.

Editor's note: This article focuses on nutrition care following burn injury. More general information on the prevention and management of burns can be found in Chapter 8 of *Best Practice Recommendations For Skin Health and Wound Management 2025* (Wounds Canada).

RECOMMENDATIONS

Energy

The hypermetabolic response to burn injury is proportional to the size of the injury and in some cases calorie requirements will reach two times baseline levels.[1-4] This hypermetabolic state may be sustained for months or longer post burn.[1-4] In addition to the size, or Total Body Surface Area (TBSA) burned, the degree of the hypermetabolic response is also influenced by the ambient temperature, thermogenesis of nutrients, early wound excision and grafting, early provision of enteral nutrition support and the number of days that have passed since the injury occurred.[1-3]

Hypermetabolism of thermally injured patients is highly variable, and although total energy requirements cannot be precisely measured, indirect calorimetry (IC) is the gold standard for determining energy expenditure (EE).[1,3,4]

The application of an activity factor (AF) to the measured EE (MEE) will depend on the clinical circumstances.[5] For burn patients, consideration should be given to the frequency and duration of dressing changes, as well as engagement in physical activity and rehabilitation for which an AF of 10-30% will be needed to approximate total EE (TEE).[5] Assessing energy needs as precisely as possible is essential as both 'over' or 'under' feeding burn patients can negatively impact wound healing and increase the risk of infectious complications, as well as impair liver and respiratory function.[1-4] In the absence of IC, various equations are available for estimating energy requirements.

Forty-six equations for estimating energy requirements after thermal injury were reviewed by Dickerson et al. (2002) and none were found to be precise (within 15% of MEE).[6] Of the methods determined to be unbiased, the most precise were Milner, Zawacki and Xie.[6] Wang et al. (2024) assessed the bias and precision of 12 equations and found the Toronto equation to have the lowest bias and the Ireton-Jones (IJ) equation to be the most precise (within 10% of MEE).[7] Following the Toronto equation, the Harris Benedict equation (HBE) x 1.5 and the Milner equation were the least biased. HBE x 1.5 and the Toronto equation were the most precise after the IJ equation.[7] These and other commonly used equations are listed in Table 1.[6-9] When choosing an equation, or equations, to use, consider the population from which they were derived and the number of days post burn (DPB).

Macronutrients

Currently there are no evidence-based guidelines that outline the best distribution of macronutrients for burn patients. A review of the available literature suggests the following:[4,10,17]

1) Protein: 1.5-2.5 g/kg OR 20-25% of total calories
2) Fat: aim for less than or equal to 30% of total calories
3) CHO: ~ approximately 50% of calories with limit of 5-7g/kg/d preferred over fat as a calorie source

Clinical judgement should be used, particularly in the provision of protein. Higher protein intakes, up to 3.0 g/kg, may be indicated as TBSA burned increases. Renal function should be monitored for signs of azotemia.[2] (See Table 2.)

Micronutrients

Vitamin and mineral requirements are also elevated after burn injury due to hypermetabolism, losses from wounds, increased needs for wound healing and immune function, as well as increased antioxidant requirements in response to inflammation.[1,3,4] A multivitamin mineral supplement, given daily, is suggested for all burn patients regardless of the TBSA burned.[3,15] High dose supplementation for patients with TBSA burns greater than or equal to 20% is recommended for specific micronutrients and for others supplementation is cautioned. These recommendations are outlined in Table 3 and Table 4.

Table 1: Equations for estimating energy expenditure for patients with burn injuries

Author or Method	Equation	Comments
Carlson	BMR x [0.89142 + (0.01335 x TBSA)] x BSA x 24 x AF	0-30 DPB (validated by Milner)
Curreri	25 x body weight (kg) + 40 x % TBSA	Tends to overestimate needs
HBE x 1.5	Male: 66.5 + (13.7 x Wt) + (5 x Ht) - (6.8 x age) Female:655 = (9.6 x Wt) + (1.8 x Ht) - (4.7 x age)	Not significantly different from MEE and one of the most accurate of the commonly used formulas
HBE x 2.0	Male: 66.5 + (13.7 x Wt) + (5 x Ht) - (6.8 x age) Female: 655 = (9.6 x Wt) + (1.8 x Ht) - (4.7 x age)	Tends to overestimate needs Stress factors ranging from 1.5 to 2.0, stratified based on TBSA, have been suggested and used in practice
Ireton-Jones (revised)	Spontaneously Breathing: 629-11(Age) + 25 (Wt) - 609 (O) Ventilator Dependent : 1784 – 11 (Age) + 5 (Wt) + 244(S) + 239 (T) + 804 (B)	O: obesity > BMI 27, T: trauma dx, B: burn dx Yes =1 No =0 S: sex. Male =1 Female = 0
Milner	(BMR x 24 x BSA) x (0.274 + 0.0079 x %TBSA - 0.004 x DPB) + (BMR x 24 x BSA)	Cumbersome to calculate Validated for 0-30 DPB and beyond
Toronto	REE = -4343 + (10.5 x TBSA) + (0.23 x kcal) + (0.84 x HBE) + (114 x T) - (4.5 x DPB)	kcal: calorie intake in the last 24 hrs T: temperature in degrees Celsius Cumbersome to calculate
Zawacki	RMR = 1440 x BSA (m2	Practical, easy to calculate Predominantly European males in study population
Xie	RMR= 1000 x BSA [m2] + (25 x % TBSA)	Practical, easy to calculate Equation derived from Chinese adults who may differ in body size compared to Western counterparts. May overestimate, most relevant in peak period of energy expenditure 1 week to 1 month post injury
TBSA = Total Body Surface Area burned, expressed as %. E.g. 25% TBSA BMR = 37 - [(age-20)/10] BSA = (W0.425 x H 0.725) x 0.007184		

Table 2: Summary of burn guideline macronutrient distribution recommendations

Guideline	Protein	Carbohydrates	Fat
ASPEN (2016)[10]	1.5-2 g/kg		
ESPEN (2013)[4]	1.5 -2.0 >2.2 g/kg /d with no additional benefit	55-60% of total kcal Should not exceed 5mg/kg/min or 7g/kg/d	35% vs 15% has negative impact on length of stay (LOS) and infection risk.
Galveston Burn Unit (2011)[11]	Protein losses can exceed 150 g /day (0.5 lbs muscle) 1.5-2 g/kg protein in adults	Minimum 2 g/kg/day Maximum 7 g/kg/day	<15% total kcal 2-3% linoleic acid to prevent essential fatty acid deficiency (EFAD)
ISBI (2016)[12]	1.5-2.0 g/kg	N/A	N/A
ISBI (2018)[13]	N/A	N/A	Provision of kcal should be done via CHO and protein rather than fat.
NSW Statewide Burn Injury Service (2011)[14]	1.5-3.0 g/kg IBW OR 20-25% of total kcal <15% 1.0-1.5 g/kg 15- 30% 1.5 g/kg 31-49% 1.5-2.0 g/kg 50+% 2.0-2.3 g/kg	50% of energy. Should not exceed 5-7 mg/kg/min	25-30% of total energy OR 15-20% of NPC
Midland Burn NHS (2018)[15]	1.5-2.0 g/kg	N/A	N/A
Ross Tilley Burn Center (2012)[16]	150 g/day of protein losses OR 20-25 g/m2 TBSA/day in severe burns 1.5-2 g/kg/day in adults	Maximum of 7 g/kg/day	2-4% of total calories from EFA
SEMICYUC - SENPE (2011)[17]	1.5-2.0 g/kg/d OR 20-25% total kcal 1.5g/kg/d is insufficient for +N-balance in first few days	4-5g/kg/d, not greater than 1400-1500 kcal/d from CHO	20-30% of NPC

ASPEN= American Society for Parenteral and Enteral Nutrition
ESPEN = European Society for Parenteral and Enteral Nutrition
ISBI = International Society for Burn Injury
NSW = State of New South Wales, Australia
SEMICYUC - SENPE = Spanish Society of Intensive Care Medicine and Coronary Units – Spanish Society of Parenteral and Enteral Nutrition

Table 3: Micronutrient supplementation for burns 20% TBSA or greater[18-21]

Vitamin/ Mineral	Function	Supplementation TBSA ≥20%	Monitoring
Copper (Cu)	Antioxidant Involved in collagen/elastin synthesis Deficiency leads to impaired wound healing Enteral zinc can cause copper deficiency as Cu and Zn compete for absorption	2-4 mg IV Cu for up to 4 weeks OR No supplementation unless deficient	Routine monitoring: Serum (S)-Cu every 2 weeks OR - On CRRT - Signs of poor wound healing Monitor CRP* Hold enteral Zn if Cu levels decline
Zinc (Zn)	Antioxidant Involved in protein syntheses and immune function Deficiency leads to impaired wound healing and immune function	40 mg IV Zn for up to 4 weeks OR 50 mg elemental zinc daily enteral/oral	Routine monitoring: S-Zinc every 2 weeks Monitor CRP* Discontinue supplementation when <10% TBSA wound remains open OR when serum values are normal Consider IV if enteral Zn supplementation results in low copper levels
Selenium (Se)	Antioxidant Component of selenoproteins involved in cell proliferation and apoptosis Deficiency associated with increased infection rates	200-400 mg IV for up to 4 weeks OR 200-400 mcg/d enteral selenium	Routine monitoring: S-Se every 2 weeks OR - On CRRT - Signs of poor wound healing/infection Monitor CRP* Discontinue supplementation when <10% TBSA wound remains open
Ascorbic Acid (Vitamin C)	Antioxidant Involved in collagen synthesis, capillary strength, and wound healing. Deficiency occurs in alcohol use, smoking, decreased vitamin C intake and increased excretion.	1000-1500 mg daily enteral/oral	Wean to 500 mg/d when <10% TBSA remains open and off CRRT.
Vitamin D	Involved in tissue function including immune system, skin, skeletal muscle, bone/mineral metabolism, and endocrine system. Deficiency correlates with low scar elasticity and reduced skin barrier function. Deficiency post burn impacts bone health. Excess supplementation can result in hypercalcemia	1000-3000 IU /d	Adjust dose based on 25 (OH)D levels Hold for increased Calcium levels

*Of note, plasma concentrations of micronutrients and trace elements are affected by inflammation, and this should be considered in the interpretation of lab values.

Table 4: Micronutrients not routinely supplemented for patients with burn injuries[20]

Vitamin/Mineral	Function	Supplementation TBSA ≥20%	Monitoring
Vitamin A	Deficiency is rare in North America; however, if deficiency occurs it can lead to impaired collagen synthesis and poor wound healing	Do not recommend routine Vitamin A supplementation If wound healing is impaired and pt is receiving corticosteroid therapy, consider 10,000-15,000 IU/d (enteral) for a maximum of 10 days.	Monitor S-Retinol with RBP (retinol binding protein)
Iron	Involved in oxygen binding, transport and metabolism, cellular respiration, and electron transport. Cofactor in collagen synthesis	Not typically supplemented Decrease after burn injury but return to normal without supplementation	Check iron panel in patients with microcytic anemia

Glutamine

Glutamine is a conditionally essential amino acid during periods of critical illness.[4,22,23] In the context of burns, glutamine is rapidly depleted from both muscle and plasma following injury.[1,23,24] Glutamine is an important fuel source for lymphocytes and enterocytes and is essential to maintaining gut integrity and supporting immune function.[1,4,23-25] In several single centered, randomized studies, enteral glutamine supplementation has been shown to have several benefits, such as:

1) Improved wound healing[23]
2) Reduced incidence of positive blood and/or wound cultures[22-24]
3) Decreased plasma endotoxins[23,25]
4) Decreased intestinal permeability[23,25]
5) Decreased hospital LOS.[22]

The only multicentered, randomized trial of enteral glutamine in burn patients did not look at the same outcomes as previous studies. The authors concluded glutamine did not reduce the time to discharge alive from hospital and resulted in no difference in six-month mortality, LOS, or incidence of bacteremia.[26] There was no harm reported in using glutamine at a dose of 0.5g/kg.[26]

Until more evidence is available, we recommend the use of oral or enteral glutamine be considered on a case-by-case basis.

Monitoring

Ongoing monitoring of the nutrition care plan's adequacy and success includes frequent evaluation of the following parameters:

1) *Indirect Calorimetry*
   a. Considered the gold standard for assessing energy requirements.
   b. Weekly measurements recommended as needs are ever changing due to surgery, mechanical ventilation, medications and daily care Occupational Therapist [OT] and Physical Therapist [PT]).[11,27]
   c. Include appropriate activity factor based on mobility (discuss with OT/PT).[5]

2) *Nutrient Intake*
   a. Early provision of oral +/- enteral nutrition (EN) is warranted due to high metabolic demands of burn patients (within the first 4-24hrs of injury[1-4]).
   b. Measure nutrient intake via daily calorie counts.
   c. Identify potential barriers to adequate oral intake such as pain, gastrointestinal dysfunction, dysphagia, fatigue, deconditioning and functional limitations.[28] Discuss management strategies with the team.
   d. If oral intake is <50% of estimated/measured needs, then recommend EN.
   e. Standard enteral formulas are appropriate for burn patients.[4] Choose the formula or combination of formulas that best meets the nutritional needs of the patient and consider post-pyloric EN if the patient experiences gastric intolerance.[1,3,4]

f. The goal is to meet 100% of needs through EN or a combination of EN and oral diet.
g. When transitioning to oral feeds, consider nocturnal feeds.
h. It is appropriate to discontinue EN support when the patient is meeting at least 75% of estimated/measured needs.
i. Oral and enteral nutrition are preferred over parenteral nutrition (PN) to maintain gut integrity, prevent bacterial translocation and support immune function;[1-4] however, PN can be used for burn patients with dysfunctional gastrointestinal tracts.[1,3,4]
j. The risks and benefits of early initiation of PN should be discussed daily with the interdisciplinary team when EN is contraindicated or not tolerated.[29]

3) *Anthropometrics/Body Weight*

a. Document weight used: Stated pre-burn weight, actual weight or adjusted weight.
b. Consider 'stated pre-burn weight' (if possible, obtain from patient or family) versus 'actual or measured weight' obtained on admission as weight is often confounded secondary to fluid status (affected by fluid resuscitation and fluid shifts).
c. Consider patient's body habitus (physique, body build, muscle mass) before adjusting weight. BMI is not a measure of adiposity and does not differentiate between adipose tissue and lean body mass. A physical assessment should be used to determine if using an adjusted body weight is appropriate for patients with BMI > 30.
d. Measure weekly and monitor long term trends vs day-to-day variations, particularly in the rehab phase of burn care.
e. Weight gain is usually reflective of changes in fluid status.[30]
f. The goal is to minimize weight loss to prevent loss of >10% pre-burn body weight.[30,31]
g. Factors to consider while weighing a patient for the purpose of consistency:
   i. Bed scale vs. stand-up scale
   ii. Dressings (on or off)
   iii. Blankets, pillows, catheter/FMS bags
   iv. Tare / zero the bed scale.

4) *Nutrition Focused Physical Exam/Subjective Global Assessment*

a. Carry out on burn patients, when feasible, as you would all other hospitalized patients according to hospital practice.
b. Monitor loss of subcutaneous fat and loss of lean body mass (inevitable due to immobility/catabolism).
c. Future considerations for body composition monitoring include the use of: BIA (Bioelectrical impedance), DEXA (Dual-Energy X-Ray Absorptiometry), Ultrasound.

5) *Wound Healing*

a. Open communication with members of the burn team (i.e., burn surgeon/residents/nursing) re: burn size, depth, location and progression of wound healing (i.e. graft take and granulation).
b. Participate in daily/weekly rounds, view photos, attend dressing changes to better understand the burn wound healing process.

6) *Functional Capacity*

a. Communicate with OT/PT re: frequency and intensity of mobilization/rehabilitation. This will determine the activity factor added to estimated or measured energy needs.
b. If available, use of hand dynamometer to measure hand grip strength is a predictor of physical, functional and nutritional status.[32]

7) *Biochemical Parameters*

a. General Chemistry.
b. Acute phase proteins (albumin, pre-albumin, CRP). Observe the trends in the context of inflammation. More useful in the recovery phase vs the acute phase.
c. Micronutrients: zinc, selenium, copper (see micronutrient section).
d. Consider nitrogen balance studies.

8) Pertinent Medications

a. Some medications may negatively impact gastrointestinal (GI) function and lead to interruptions in oral or enteral nutrition, placing the patient in a calorie deficit.
    i. Pain medications/analgesics/narcotics - may lead to constipation
    ii. Antibiotics – may lead to nausea or diarrhea.
b. Some medications may be used to treat GI symptoms that are impairing nutrient intake/ digestion/absorption leading to improved nutritional status.
    i. Anti-secretory agents/antacids
    ii. GI motility agents/antinauseants
    iii. Laxatives/Stool softeners
    iv. Discuss bowel regime with the team.
c. Hyperglycemia is detrimental to wound healing.
    i. Insulin or oral hypoglycemic agents may be needed to achieve blood glucose targets
    ii. Discuss blood glucose management with the team.

Conclusion

Nutrition is an integral part of recovery from burn injuries. Providing adequate calories, protein and micronutrients is essential to support wound healing and reduce the risk of complications associated with over or under feeding. These evidence-based, practice-informed recommendations are intended to guide Registered Dietitians in the development and ongoing evaluation of individualized nutritional care plans for burn patients.

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References

1. Clark A, Imran J, Madni T, Wolf SE. Nutrition and metabolism in burn patients. Burns Trauma. 2017 Apr 17;5:11.
2. Jeschke MG. Postburn hypermetabolism: past, present, and future. J Burn Care Res. 2016 Mar-Apr;37(2):86-96.
3. Rollins C, Huettner F, Neumeister MW. Clinician's guide to nutritional therapy following major burn injury. Clin Plast Surg. 2017 Jul;44(3):555-566.
4. Rousseau AF, Losser MR, Ichai C, Berger MM. ESPEN endorsed recommendations: nutritional therapy in major burns. Clin Nutr. 2013 Aug;32(4):497-502.
5. Berger MM, De Waele E, Gramlich L, Jin J, Pantet O, Pichard C, et al. How to interpret and apply the results of indirect calorimetry studies: a case-based tutorial. Clin Nutr ESPEN. 2024 Oct;63:856-869.
6. Dickerson RN, Gervasio JM, Riley ML, Murrell JE, Hickerson WL, Kudsk KA, et al. Accuracy of predictive methods to estimate resting energy expenditure of thermally-injured patients. JPEN J Parenter Enteral Nutr. 2002 Jan-Feb;26(1):17-29.
7. Wang Y, Jiang J, Liu M, Liu H, Shen T, Han C, et al. Estimates of resting energy expenditure using predictive equations in adults with severe burns: a systematic review and meta-analysis. JPEN J Parenter Enteral Nutr. 2024 Apr;48(3):267-274
8. Ireton-Jones C, Jones JD. Improved equations for predicting energy expenditure in patients: the Ireton-Jones Equations. Nutr Clin Pract. 2002 Feb;17(1):29-31.
9. Shields BA, Doty KA, Chung KK, Wade CE, Aden JK, Wolf SE. Determination of resting energy expenditure after severe burn. J Burn Care Res. 2013 Jan-Feb;34(1):e22-8.

10. McClave SA, Taylor BE, Martindale RG, Warren MM, Johnson DR, Braunschweig C, et al.; Society of Critical Care Medicine; American Society for Parenteral and Enteral Nutrition. Guidelines for the provision and assessment of nutrition support therapy in the adult critically ill patient: Society of Critical Care Medicine (SCCM) and American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.). JPEN J Parenter Enteral Nutr. 2016 Feb;40(2):159-211.
11. Rodriguez NA, Jeschke MG, Williams FN, Kamolz LP, Herndon DN. Nutrition in burns: Galveston contributions. JPEN J Parenter Enteral Nutr. 2011 Nov;35(6):704-14.
12. ISBI Practice Guidelines Committee; Steering Subcommittee; Advisory Subcommittee. ISBI Practice Guidelines for Burn Care. Burns. 2016 Aug;42(5):953-1021.
13. ISBI Practice Guidelines Committee; Advisory Subcommittee; Steering Subcommittee. ISBI Practice Guidelines for Burn Care, Part 2. Burns. 2018 Nov;44(7):1617-1706.
14. NSW Agency for Clinical Innovation. Clinical Practice Guidelines Nutrition Burn Patient Management NSW Statewide Burn Injury Service. Chatswood (NSW): Agency for Clinical Innovation; c2011 [cited 2022 Nov 30]. 40 p. Available from: https://aci.health.nsw.gov.au/__data/assets/pdf_file/0009/162639/ACI-Clinical-practice-guidelines-nutrition-burn-patient-management.pdf
15. Midland Burn Operational Delivery Network. The Nutrition and Dietetic Journey for the Burn Injured Patient within the Midland Burn Operational Delivery Network: Guidelines for the Nutritional Management Of Adults and Paediatrics. [place unknown]: National Health Service; 2011. [updated 2018 Jun; cited 2023 Jan 5]. Available from: https://nebula.wsimg.
16. Hall KL, Shahrokhi S, Jeschke MG. Enteral nutrition support in burn care: a review of current recommendations as instituted in the Ross Tilley Burn Centre. Nutrients. 2012 Oct 29;4(11):1554-65.
17. de Lorenzo AG, Leyba CO, Sanchez SM. Guidelines for specialized nutritional and metabolic support in the critically-ill patient. Update. Consensus SEMICYUC-SENPE: Critically-ill burnt patient. Nutrición Hospitalaria. 2011;26(2):59-62.
18. Berger MM, Shenkin A, Schweinlin A, Amrein K, Augsburger M, Biesalski HK, et al. ESPEN micronutrient guideline. Clin Nutr. 2022 Jun;41(6):1357-1424.
19. Ghadimi E, Rahbar R, Jafarzade E, Mansoori A. Effects of vitamin D3 supplementation on the recovery of hospitalized burn patients: a randomized double-blind controlled trial. BMC Nutr. 2025 Feb 10;11(1):37
20. Shields BA, Nordlund M, Pruskowski KA, Cancio LC. Burns. In: Roberts KM, Estes-Doetsch H, Nahikian-Nelms M. Pocket guide to micronutrient management. Chicago (IL): Academy of Nutrition and Dietetics; 2024. p 311-30.
21. Pantet O, Stoecklin P, Charrière M, Voirol P, Vernay A, Berger MM. Trace element repletion following severe burn injury: A dose-finding cohort study. Clin Nutr. 2019 Feb;38(1):246-251.
22. Pattanshetti VM, Powar RS, Godhi AS, Metgud SC. Enteral glutamine supplementation reducing infectious morbidity in burns patients: a randomised controlled trial. Indian J Surg. 2009 Aug;71(4):193-7.
23. Zhou YP, Jiang ZM, Sun YH, Wang XR, Ma EL, Wilmore D. The effect of supplemental enteral glutamine on plasma levels, gut function, and outcome in severe burns: a randomized, double-blind, controlled clinical trial. JPEN J Parenter Enteral Nutr. 2003 Jul-Aug;27(4):241-5.
24. Garrel D, Patenaude J, Nedelec B, Samson L, Dorais J, Champoux J, et al. Decreased mortality and infectious morbidity in adult burn patients given enteral glutamine supplements: a prospective, controlled, randomized clinical trial. Crit Care Med. 2003 Oct;31(10):2444-9.
25. Peng X, Yan H, You Z, Wang P, Wang S. Effects of enteral supplementation with glutamine granules on intestinal mucosal barrier function in severe burned patients. Burns. 2004 Mar;30(2):135-9.
26. Heyland DK, Wibbenmeyer L, Pollack J, Friedman B, Turgeon AF, Eshraghi N, et al.; RE-ENERGIZE Trial Team. A randomized trial of enteral glutamine for treatment of burn injuries. N Engl J Med. 2022 Sep 15;387(11):1001-1010.
27. Kuvvet Yoldaş T, Atalay A, Demirağ K, Uyar M, Çankayalı İ. Changes in energy expenditure determined by indirect calorimetry in severe burn patients during the acute phase. Cureus. 2023 Oct 9;15(10):e46705.
28. Dimander J, Andersson A, Huss F, Lindqvist C. Nutritional interventions and barriers for patients early after burn injury: A retrospective evaluation of medical records. Clinical Nutrition Open Science. 2025 Aug 1;62:218-32.
29. Singer P, Blaser AR, Berger MM, Calder PC, Casaer M, Hiesmayr M, et al. ESPEN practical and partially revised guideline: Clinical nutrition in the intensive care unit. Clin Nutr. 2023 Sep;42(9):1671-1689.
30. Mendez-Romero D, Clark AT, Christie A, Wolf SE. Weight changes and patterns of weight measurements in hospitalized burn patients: a contemporary analysis. Burns Trauma. 2018 Oct 15;6:30.
31. Graves C, Thompson CM, LaChapelle CR, Fleming ID, Lewis GM. 523 weight loss in patients with large burns. Journal of Burn Care & Research. 2024 May 1;45(Supplement_1):127-8.
32. Norman K, Stobäus N, Gonzalez MC, Schulzke JD, Pirlich M. Hand grip strength: outcome predictor and marker of nutritional status. Clin Nutr. 2011 Apr;30(2):135-42.