Official title

Patients´ Experiences of Calorimetry Measurements

ID

FOU2026-00337 Uppsala University hospital

2026-04356-01 Swedish Ethical Review Authority

Document Date

2026-08-10

Patients´ Experiences of Calorimetry Measurements

Background

Severe burn injury affects the entire body, not only the skin. Profound alterations occur in metabolism, endocrine function, and immune responses, resulting in a hypermetabolic state (1-2). This condition is characterized by an increased energy expenditure that may persist for months or even years following injury. Adequate nutritional support is essential to promote wound healing, reduce the risk of infection, and preserve lean body mass (3-5). Both underfeeding and overfeeding may adversely affect recovery and clinical outcomes (6-8).

To enable safe and individualized nutritional management, measurement of resting energy expenditure (REE) using indirect calorimetry is recommended)9-10). During the assessment, the awake patient wears a transparent plastic canopy placed over the head. Oxygen consumption and carbon dioxide production are measured over a period of 10 to 30 minutes to estimate energy requirements. Accurate measurements require the patient to remain still, relaxed, and awake, while refraining from speaking, as physical activity, psychological stress, and other disturbances may influence the results (11).

Although indirect calorimetry is routinely used in burn care, relatively little is known about how patients experience the measurement procedure itself. Factors such as the hospital environment, pain, anxiety, restricted mobility, and the measurement may influence the patient's experience; however, these aspects have received limited scientific attention. Understanding the patient perspective is important, as discomfort or stress may negatively affect both the patient experience and the quality of the measurement.

Aim

The aim of this study is therefore to explore how individuals receiving care for burn injuries experience the assessment of resting energy expenditure by indirect calorimetry.

Method

Inclusion criteria: Patients post-burn admitted to the Burn Centre at Uppsala University hospital, 18 years or older, Swedish/English speaking, with experience of at least one calorimetry measurement.

Data will be collected through semi-structured interviews. Eligible participants will be approached during their burn care admission and provided with both oral and written study information. Written informed consent will be obtained prior to participation.

Consent forms and interview data will be stored securely and will be accessible only to the research team.

Interviews will be conducted within two weeks of the indirect calorimetry assessment, either in person at the burn unit or remotely via telephone or video call following hospital discharge. All interviews will be audio-recorded and transcribed verbatim. The interview guide focuses on participants' experiences before, during, and after the indirect calorimetry measurement.

Data will be analysed using inductive qualitative content analysis (12). Interview transcripts will be read repeatedly to achieve immersion in the data and identify meaning units, which will be condensed, coded, and grouped into subcategories, categories, and overarching themes. Two researchers will independently code the interviews and discuss interpretations until consensus is reached. The analysis will involve an iterative process of moving between the original text, codes, categories, and emerging themes to develop a comprehensive understanding of participants' experiences. Findings will be reported with illustrative quotations to enhance transparency and trustworthiness (13-14).

Clinical implications

Through qualitative content analysis of interview data, the study seeks to provide an in-depth understanding of patients' experiences, perceptions, and needs associated with indirect calorimetry. Increased knowledge in this area may contribute to improvements in clinical procedures, patient communication, and preparation before and during the assessment. Ultimately, the goal is to make the measurement process as safe, comfortable, and patient-centered as possible, thereby enhancing both the patient experience and the quality of the measurements used to guide individualised nutritional therapy.

References

1. Wise AK, Hromatka KA, Miller KR. Energy Expenditure and Protein Requirements Following Burn Injury. Vol. 34, Nutrition in Clinical Practice. 2019. p. 673–80. PMID: 31418486.
2. Jeschke MG. Postburn hypermetabolism: Past, present, and future. Journal of Burn Care and Research. 2016;37(2):86–96. PMID: 26132047.
3. Singer P. Preserving the quality of life: nutrition in the ICU. Crit Care. 2019 Jun 14;23(Suppl 1):139. PMID: 31200741.
4. Berger MM, Reintam-Blaser A, Calder PC, Casaer M, Hiesmayr MJ, Mayer K, et al. Monitoring nutrition in the ICU. Vol. 38, Clinical Nutrition. 2019. p. 584–93. PMID: 30077342.

5. Singer P, Blaser AR, Berger MM, Alhazzani W, Calder PC, Casaer MP, et al. ESPEN guideline on clinical nutrition in the intensive care unit. Clinical Nutrition. 2019 Feb 1;38(1):48–79. PMID: 30348463.
6. Chourdakis M, Bouras E, Shields BA, Stoppe C, Rousseau AF, Heyland DK. Nutritional therapy among burn injured patients in the critical care setting: An international multicenter observational study on “best achievable” practices. Clinical Nutrition. 2020;12(39):3813–20. PMID: 32336526.
7. Lengelé L, Bruyère O, Fadeur M, Verbrugge AM, Martin F, Hans N, et al. Should we worry about nutrition of adults with minor burns? An audit of their intakes. Ann Burns Fire Disasters. 2021 Jun 30;34(2):163–9. PMID: 34584505
8. Caldis-Coutris N, Gawaziuk JP, Magnusson S, Logsetty S. Malnutrition in Burns: A Prospective, Single-Center Study. Journal of Burn Care and Research. 2022 May 1;43(3):592–5. PMID: 34653246.
9. Rousseau AF, Losser MR, Ichai C, Berger MM. ESPEN endorsed recommendations: nutritional therapy in major burns. Clin Nutr. 2013 Aug;32(4):497–502. PMID: 23582468.
10. Compher C, Bingham AL, McCall M, Patel J, Rice TW, Braunschweig C, et al. Guidelines for the provision of nutrition support therapy in the adult critically ill patient: The American Society for Parenteral and Enteral Nutrition. JPEN J Parenter Enteral Nutr. 2022 Jan;46(1):12–41. PMID: 34784064.
11. Oshima T, Berger MM, De Waele E, Guttormsen AB, Heidegger CP, Hiesmayr M, et al. Indirect calorimetry in nutritional therapy. A position paper by the ICALIC study group. Clin Nutr. 2017 Jun;36(3):651–62. PMID: 27373497.
12. Elo S, Kyngäs H. The qualitative content analysis process. J Adv Nurs. 2008 Apr;62(1):107-15. PMID: 18352969
13. Lundman B, Hällgren Graneheim U. Kvalitativ innehållsanalys. I: Høglund Nielsen B, Granskär M, redaktörer. Tillämpad kvalitativ forskning inom hälso- och sjukvård, 3:e upplagan. Lund: Studentlitteratur, Lund; 2017. s.219–234.
14. Graneheim UH, Lundman B. Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. Nurse Educ Today. 2004 Feb;24(2):105-12. PMID: 14769454.