

Evaluation of energy and protein delivery compared to targets on day four of critical care in mechanically ventilated adults



Rodney Hall – Clinical Lead Dietitian for Critical Care

Blackpool Teaching Hospitals NHS Foundation Trust

Introduction

The adequacy of enteral nutrition (EN) provided to critically ill patients has been highlighted as inadequate. International surveys have shown that actual nutrition delivered can be as little as 50-60% of that prescribed. Furthermore, studies looking at feeding patients to target, show significant improvements in patient outcomes.

Common barriers to the provision of nutrition targets are: starting nutrition support late, choice of enteral feed, the presence of and/or compliance with feeding protocols, GI intolerance and its management, fasting practices for bedside procedures and feed stoppages for off-the-unit procedures/investigations.

Closing the gap between nutrition prescription and nutrition delivery could make significant improvements to patient outcomes.

This study looked at the nutrition adequacy in a prospective cohort of adult general ICU patients. The aim of which was to identify how well the unit performs with nutritional adequacy on day four and to identify any potential areas of feeding practices that would benefit from modification.

Day four was chosen in view of recent recommendations to increase nutrition provision gradually over the first three days of ICU stay.

Methods and Materials

Data was collected prospectively upon daily review by the Dietitian. Information collected included the time to start nutrition support, volumes delivered of enteral and parenteral solutions, non-nutritional calories as well as any documented reasons for feed stoppages and/or gaps in feed delivery. Only stoppages of 1 hour or more were documented. Day one was taken as the first full 24 hour period on the unit.

TARGETS for BMI < 30Kg/m²: $\geq 80\%$ of 20Kcal and 1.3g protein per Kg of body weight

TARGETS for BMI $> 30\text{Kg/m}^2$: A 25% adjusted body weight was used with an ideal weight set from BMI 25Kg/m². Then $\geq 80\%$ of 20Kcal and 1.3g protein per Kg of adjusted body weight

TARGETS for micronutrients: 100% of RNI

Table 1. Subject characteristics.

32 patients	72% male	Average age 59yrs
91% medical	34% obese	94% EN
56% NRS 2002 ≥ 5	47% HIGH RFS	LOS 13.4 days

Results

From May to September 2021 data was collected on a total of 32 patients, 72% male, 91% medical and 34% with obesity. 56% were classified as high nutrition risk scoring ≥ 5 using the NRS 2002. 47% were classified as 'high' refeeding risk (RFS) using BAPEN criteria.

The average length of stay (LOS) was 13.4 days (4-44).

100% of patients with enteral nutrition started within 48 hours of admission or intubation.

10% (2 surgical and 1 medical) received parenteral nutrition.

The average feeding hours lost on day four was 3 hours (ranging from 0-24hours).

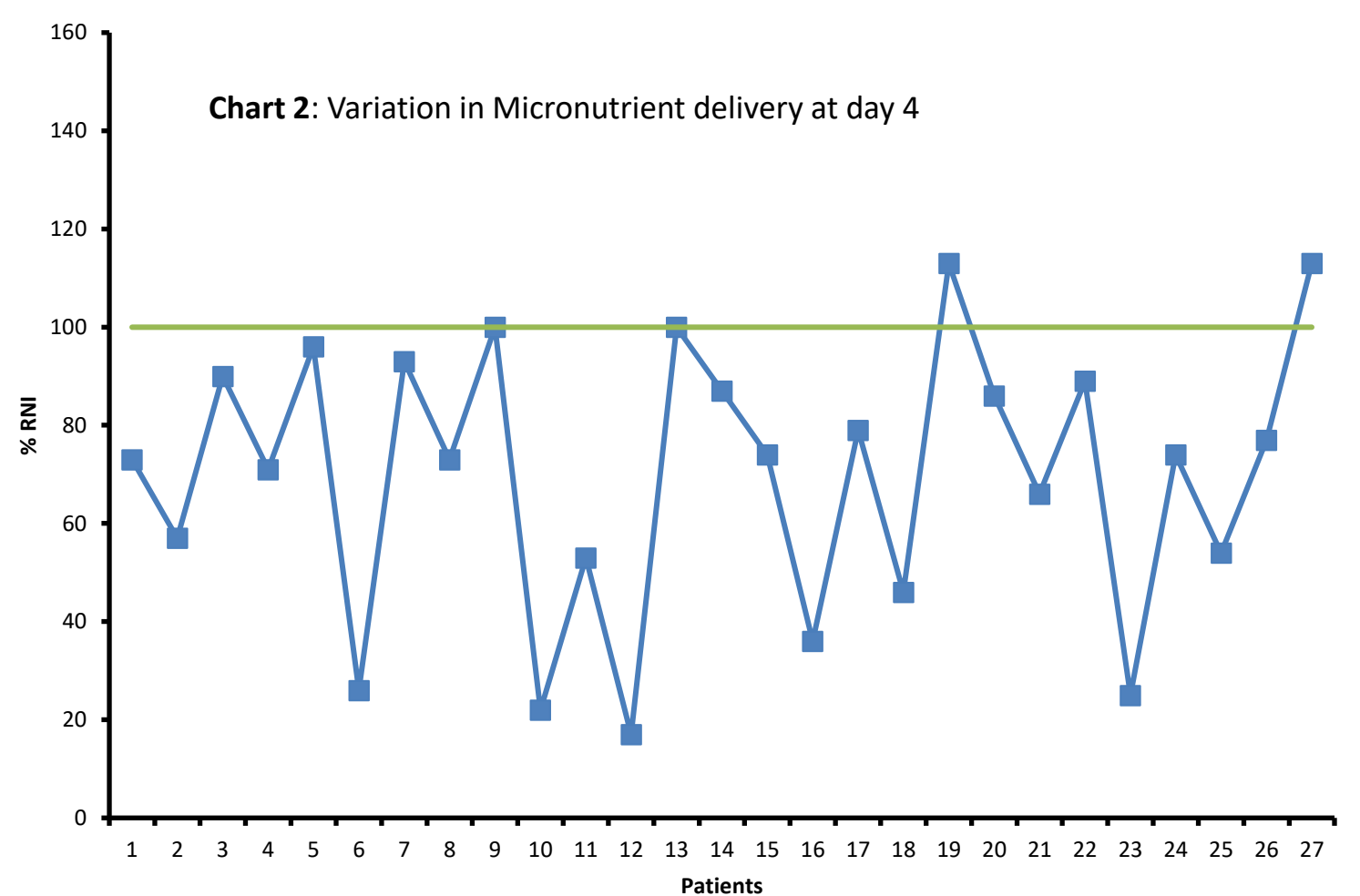
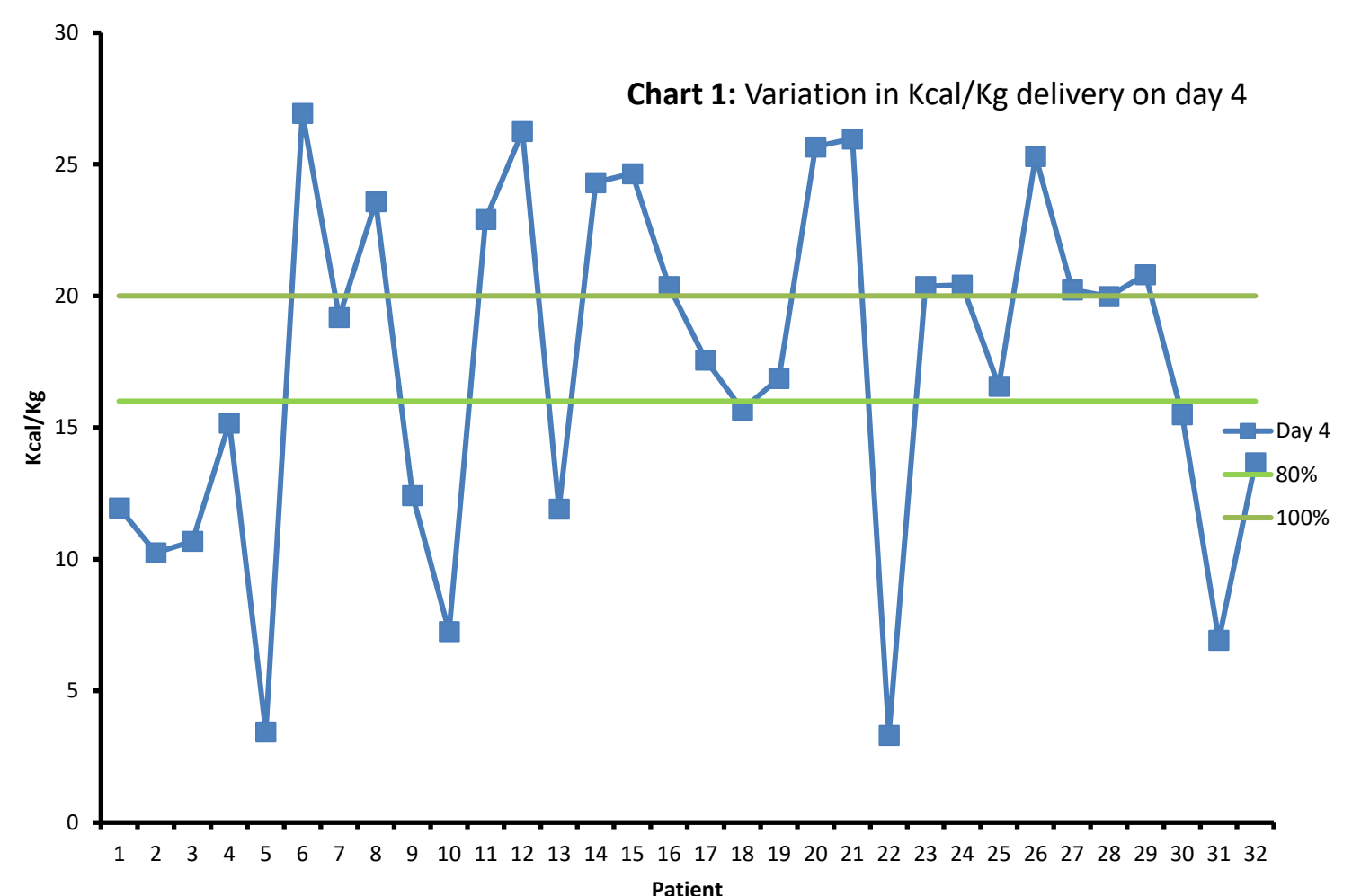
The interpretation of gastric volumes was documented as being high in 60% of the patients at least once during days one to four with enteral feed delivery rates reduced and/or prokinetics started.

Table 2. Target achievements

59% achieved energy target

46% achieved protein target

18% achieved micronutrient target



Conclusions

Nutrition support was commenced within 48 hours in all patients. The standard enteral feed had a low protein:energy which is reflected in the lower protein target achievement of 46%.

Using the same feeding rate in all patients does not allow for individualised nutrition support. This is highlighted in chart 1. This method of feeding can lead to under & over feeding. 43% of patients received $> 100\%$ of their target for energy. Overfeeding energy has been shown to be harmful. Only 5% of patients were fed within 80-100% of their energy target.

There was a lack of consistency in gastric volume management however it was difficult to reflect this in the data due to recording practices. Prokinetics medications were prescribed in 60% of the patients.

Lost feeding hours were recorded and the average hours lost reduced over the four days from seven hours to three. Displaced feeding tubes were responsible for most hours lost, followed by CT scans.

9% of patients on EN alone achieved the micronutrient target. Patients with low body weight or those on high doses of non-nutritional calories, $< 100\%$ micronutrient intakes occurred even when energy targets were achieved. The supplementation of micronutrients from day one needs to be looked at further.

This evaluation has highlighted several areas that could be modified to allow nutrition delivery to be more individualised and in line with current nutrition guidelines and help towards improving patient outcomes.



References

- Heyland DK. The prevalence of iatrogenic underfeeding in the nutritionally 'at risk' critically ill patient: Results of an International, Multicentre, prospective study. *Clin Nutr* 2015; 34(4):659-666
- van Zanten, A.R.H., De Waele, E. & Wischmeyer, P.E. Nutrition therapy and critical illness: practical guidance for the ICU, post-ICU, and long-term convalescence phases. *Crit Care* 23, 368 (2019)
- Fetterplace K et al. Targeted Full Energy and Protein Delivery in Critically Ill Patients: A Pilot Randomized Controlled Trial (FEED Trial). *JPEN* 2018; 00:1-11
- Erika Salciute-Simene. Impact of enteral nutrition interruptions on underfeeding in intensive care unit. *Clinical Nutrition* 2021 (40) 1310-1317