Post Surgery Resting Engery Expenditure - STA440 Final Project

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2025-12-01

1. Background

The recovery processes for surgery patients are often complex. Through understanding their metabolic needs, care can be optimized with targeted feeding. Indirect calorimetry (IC) is a standard method for measuring energy expenditure via respiration. Resting energy expenditure (REE), measured via IC, plays a key role in guiding nutritional support, which can improve post surgery patient outcomes. The goal of this study was to measure REE and REE/kg in these patients during their stays in the intensive care unit (ICU) and subsequently in the step–down unit (SDU), so that this information can be used to improve post–surgery care. A total of 11 patients (4 obese, 7 non–obese) were included in the study, with 35 indirect REE measurements taken throughout their recoveries to capture different stages of metabolic demand. These measurements were collected repeatedly, allowing for comparison between patients on ventilators versus those who were not, as well as between ICU and step–down unit patients.

Research Question:

Characterize the relationship between resting energy expenditure and obesity status, ventilator status and patient location (ICU vs SDU). Are your conclusions the same when REE is weight adjusted (REEperKG)?

2. Data

REE was measured using indirect calorimetry within 72 hours of surgery and then every five to seven days throughout hospitalization. REE and REEperKG are the outcomes variables, REEperKG is REE adjusted for weight. Obese and ventilator are indicator variables for their respective factors. BMI is the patient's body mass index. Measurement is the measurement number for that observation. ICUorSDU tells if the patient was in the intesive care unit or the stepdown unit.

3. EDA

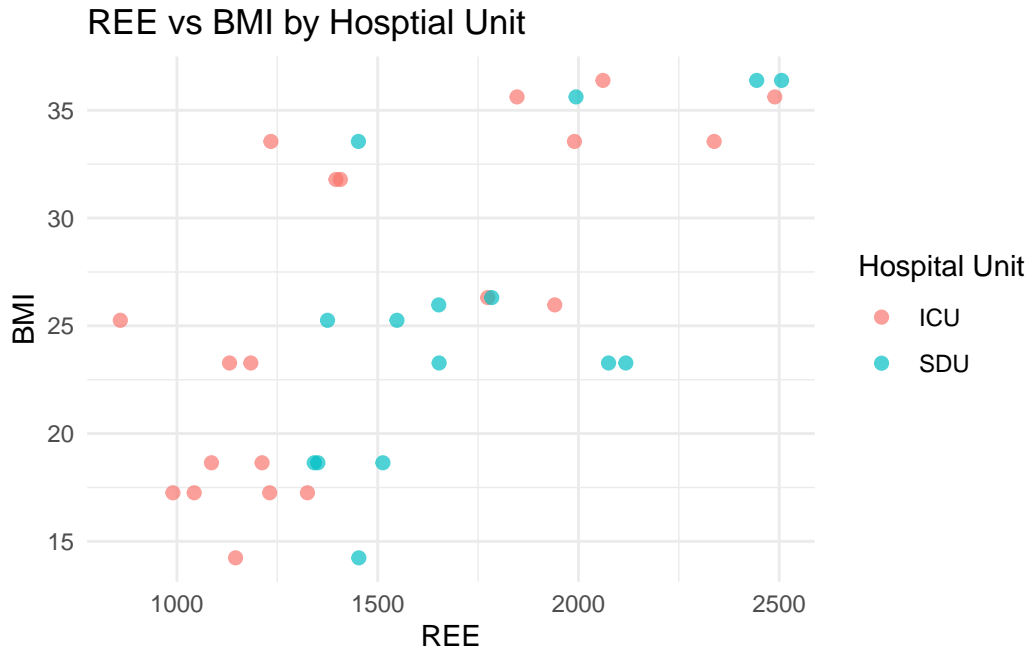In order to gain an understanding of the data exploratory data analysis was conducted.

6. Appendix

REE vs BMI by Hosptial Unit

Figure 1: Roughly linear between BMI and REE, more ICU at lower REEs
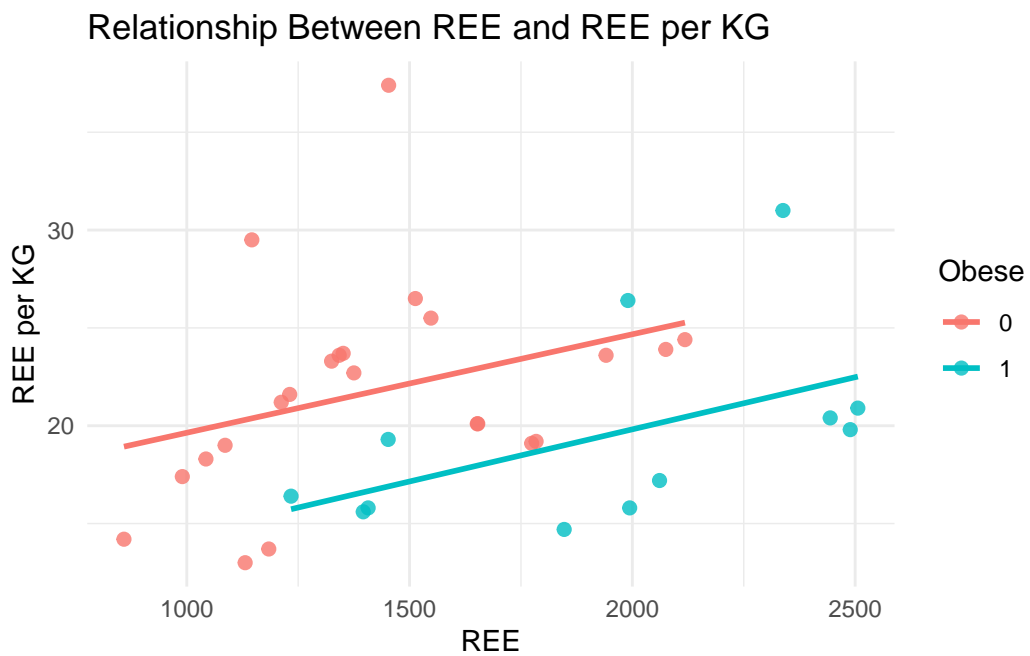
Relationship Between REE and REE per KG

Figure 2: REE per KG is lower for higher REEs and obese patients
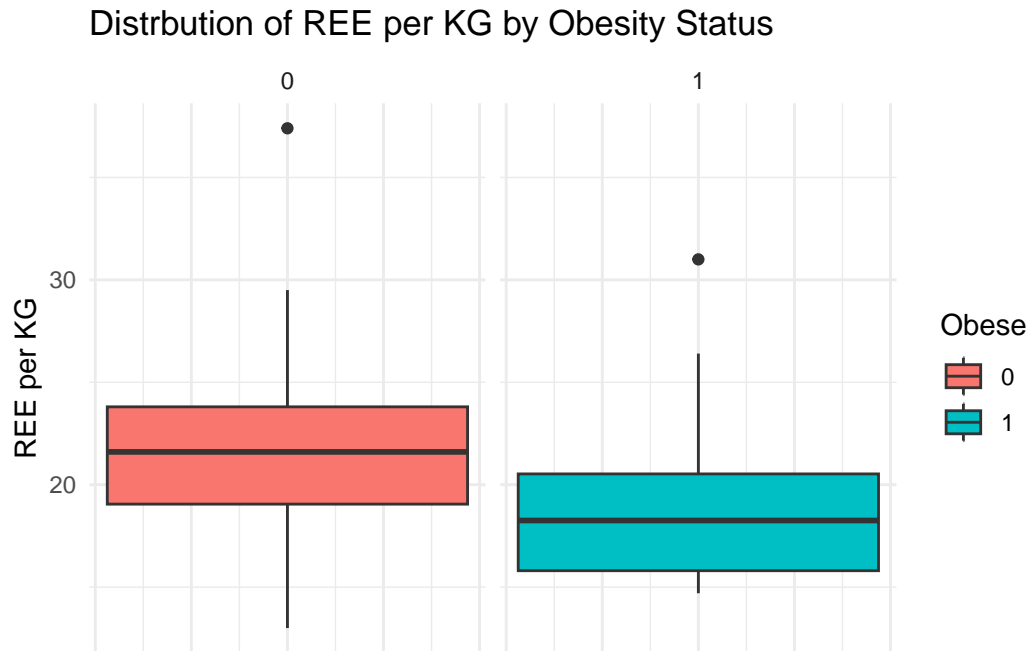
Figure 3: Non obese patients have larger range of REE per KG with higher median than obese patients
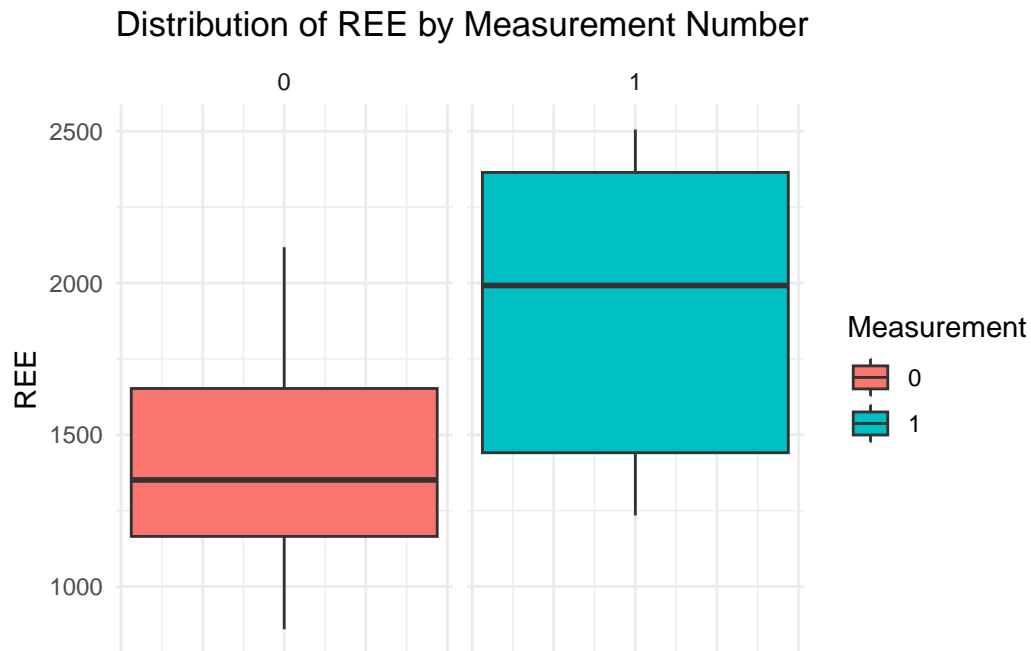

Figure 4: Non obese patients have smaller median REE with lower IQR than obese patients
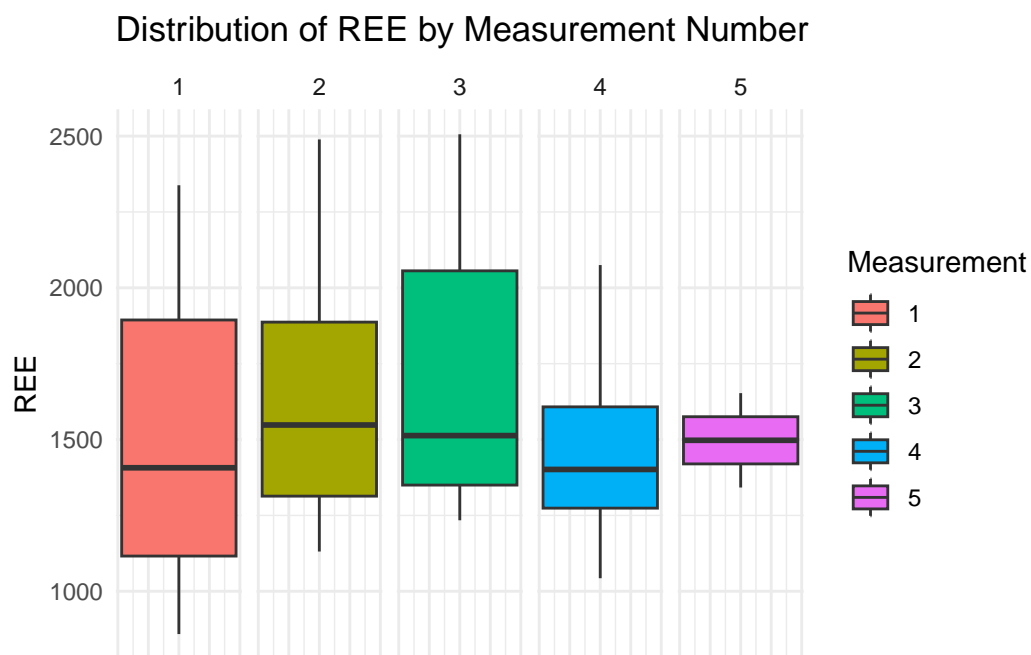
Distribution of REE by Measurement Number

Figure 5: Median REE is consistent, but range varies drastically over time

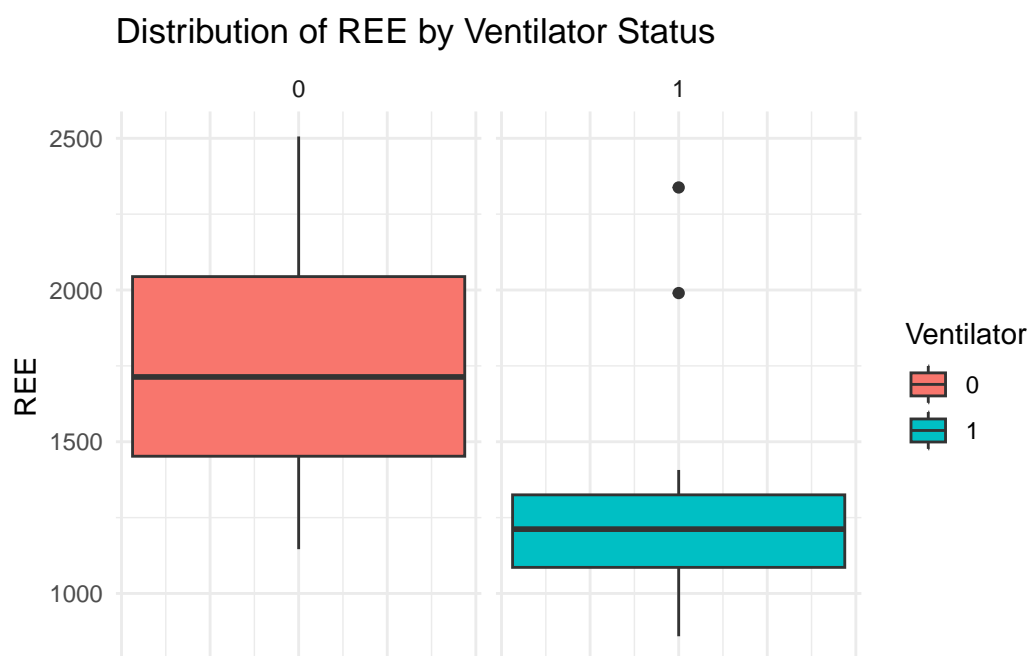## Distribution of REE by Ventilator Status

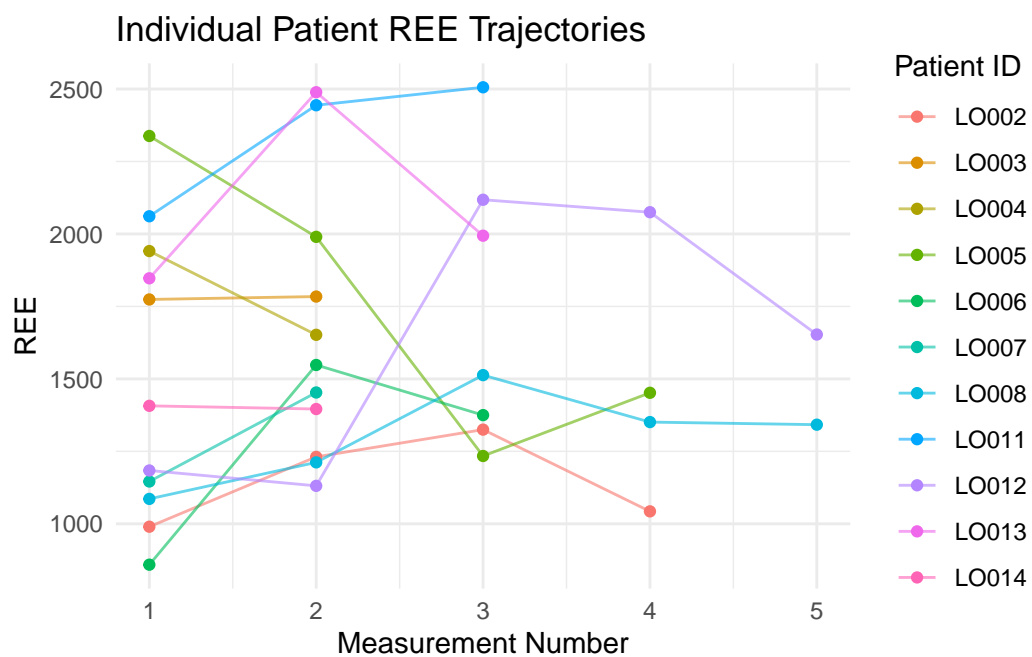Figure 6: Higher REE for patients not on ventilator, but similar ranges

Figure 7: No clear trends by patient overtime