Meeting nutritional requirements in critically-ill patients with COVID-19: Does the patient's position really matter?

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Introduction

Prone positioning and veno-venous extracorporeal membrane oxgenation(VV-ECMO) can improve oxygenation in patients with COVID-19 induced Acute Respiratory Distress Syndrome [1].

Enteral feeding in the prone position has challenges, including possible aspiration risk of gastric contents and potential for disruption to enteral feeding [2].

National guidelines [2] were implemented locally; including a reduction in the maximum acceptable gastric residual volume (GRV) and the avoidance of bolus feeding while patients were in prone position.

Objectives

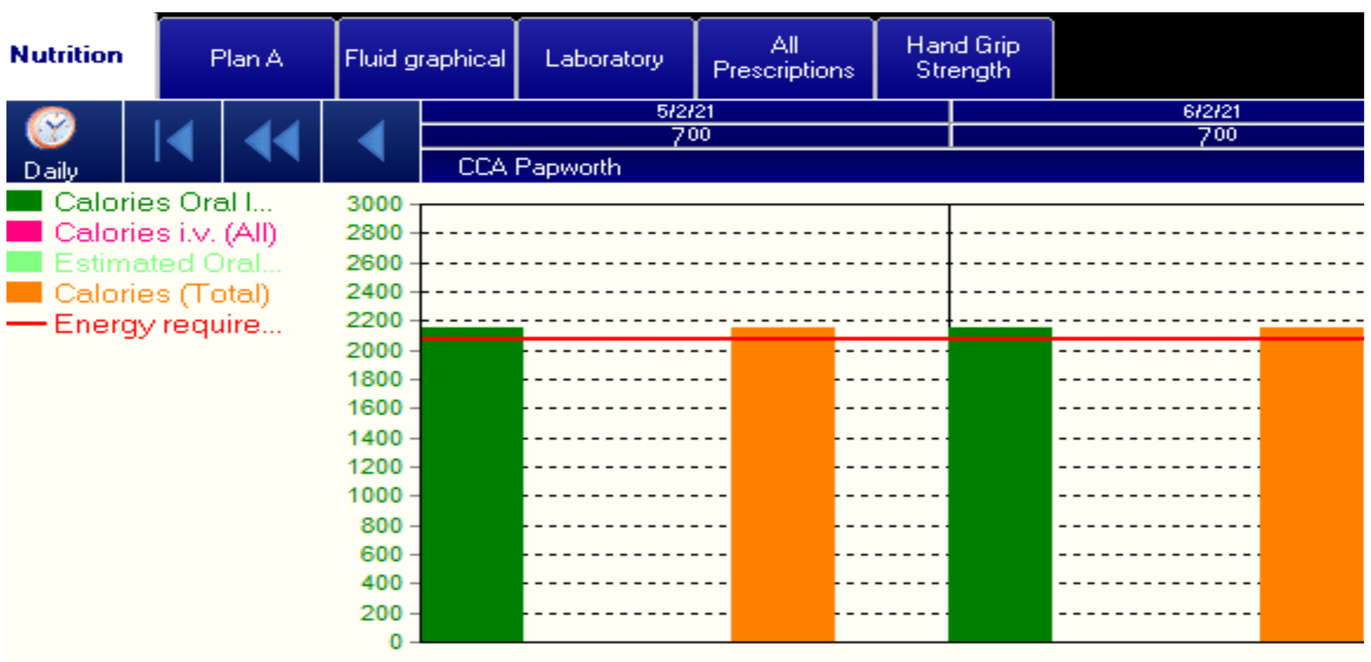
- To explore the nutritional adequacy of patients in the prone position with COVID-19 on our critical care unit during the second surge (November 2020-April 2021).
- To compare nutritional adequacy of days when patients were in prone versus supine position.
- To identify any factors that impacted on nutritional adequacy.
- To provide recommendations for improvement.

Method

Patients with COVID-19 who required intubation, were placed in prone position at any time during their admission and had been assessed by the dietitian, were included.

- Total daily energy and protein intakes, from enteral (EN) and parenteral nutrition (PN), propofol and intravenous glucose were obtained from our computerised information system (Metavision) for each full day.
- If nutritional aims were not met then reasons for this were investigated.
- Nutritional adequacy was defined as ≥ 80% of energy and protein received per day [3].

Example of patient nutrition page on Metavision



Calories		
Calories Oral In (i)	2,158	2,158
Calories i.v. (All)	0	0
Calories (Total)	2,158	2,158
Energy requirements (Aim)	**2,075**	**2,075**
Percentage of daily energy r...	104.0	104.0
Protein		
Protein in (daily)	126	126
Protein requirement (daily aim)	**124.0**	**124.0**
Percentage of daily protein r...	101.5	101.6
Calories from medications		
Propofol 1%	0	0
Propofol 2%	0	0
Actrapid Human Insulin	46.66	44.66
5% Glucose	0	0
Glucose 50%	0	0

↑ in Prone days = ↑ Nutritional deficiency especially for protein

Results

The total number of patients with COVID-19 in second surge =102 (Table 1). The total number of patients with COVID-19 meeting inclusion criteria and included in this study=34 (Table 2).

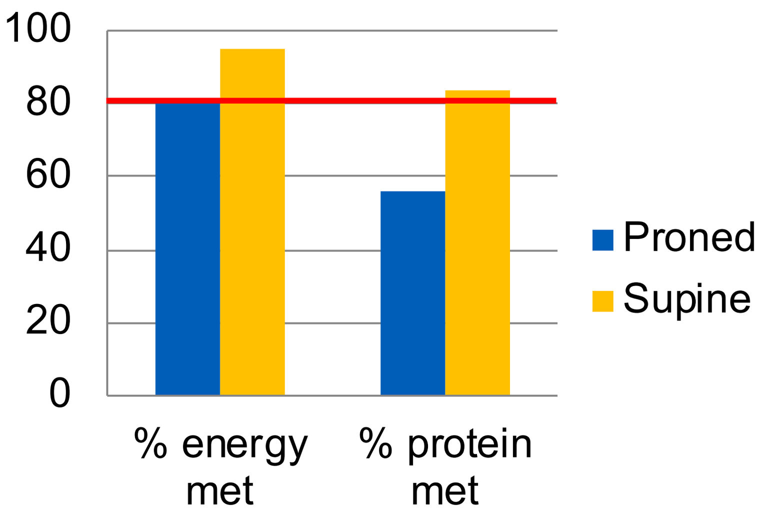
Table 1: Patient Characteristics
Gender: Male n=67 Female n=35 Mean age: 52 years (33-73 years) Mean BMI: 31.2kg/m2 (21-50) Mean Length of Stay: 30.8 days (min: 16 hours-110 days)

Table 2: Characteristics of Prone position patients included in study (n=34)
Gender: Male n=27 Female n=7 Mean age: 52 years (34-73) Mean BMI: 28kg/m2 (21- 47) Mean Length of Stay: 35 days (6-142) Patients on ECMO: n=14 Non-ECMO Patients: n=20

A total of 1142 ICU days were included; 106 (9.3%) prone position days and 1036 (90.7%) supine position days. Patients received EN on 1098 days (96.1%) and PN on 44 days (3.9%). Only 4 of the 44 PN days occurred whilst a patient was in the prone position (0.4%).

On prone position days, patients received an average 80% of their prescribed energy and 56% of their prescribed protein requirements, compared with 95% prescribed energy and 84% prescribed protein on supine position days (Figure 1).

Figure 1: Nutritional adequacy (80%) in Prone versus Supine position



The average received for all patients across length of stay for both prone and supine position days was 94% energy and 82% of protein.

The 4 most frequent barriers to meeting nutritional adequacy when in prone position were:

- Reduction of NG feed rate when GRV's were higher than maximum acceptable volume.
- Use of a standard 4g protein/100ml 'Out of Hours' enteral feed.
- Fasting for procedures.
- Failure to give protein supplement boluses when patient returned to supine position.

Conclusions

Patient position affected nutritional intake, with energy and protein intake being lower on prone position days compared with supine position days.

As only 9.3% of total ICU days were prone position days, average energy and protein received across all days still achieved nutritional adequacy.

An increase in a patient's prone position days during ICU admission is likely to result in greater nutritional deficit, particularly for protein.

Recommendations

To improve nutritional adequacy on prone position days consider:

- Use of post-pylorick feeding to increase feed tolerance.
- Use of a higher protein 'out of hours' enteral feed.
- Raise awareness of standard fasting times to ensure minimum disruption to feeding.
- Administration of protein supplement boluses in prone position when GRV's are within the accepted range.

References

[1] Garcia B, Cousin N, Bourel C, Jourdain M, Poissy J, Duburcq T. Prone positioning under VV-ECMO in SARS-CoV-2-induced acute respiratory distress syndrome. Critical Care. 2020 Dec;24(1):1- 4.

[2] CCSG Best practice guidance: Enteral Feeding in Prone Position, 2020.https://www.bda.uk.com/resource/best-practice-guidance-enteral-feeding-in-prone-position.html Date accessed: 17/08/2021.

[3] Heyland DK, Cahill N, Day AG. Optimal amount of calories for critically ill patients: depends on how you slice the cake! Critical care medicine. 2011 Dec 1;39(12):2619-26.