The Impact of Feed Interruptions on Nutrient Adequacy in the Children's Intensive Care Unit (CICU)

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Introduction

Nutrition support during illness can prevent malnutrition-related complications. Despite the known fact that the optimal nutrition during critical illness may bring about a positive impact on clinical outcomes, malnutrition in CICU patients is still relatively common ¹. In situations whereby the gastrointestinal system is functional but oral intake is compromised, enteral nutrition (EN) is often the preferred mode of nutrition. However, optimizing EN in an acute setting poses as a challenge due to feed interruption being common and avoidable in some ².

Aim

The objective of this study is to identify the reasons for feed interruptions and evaluate the impact of feed interruptions on nutrient adequacy in the CICU setting.

Method

Energy and protein intake were recorded in 15 patients admitted to CICU for 10 consecutive days, unless discharged. Patients on mechanical ventilator support with an anticipated stay of 48 hours were studied. Neonates and cardiac patients were excluded in the study. Energy and protein requirements were calculated using the Schofield equation, adjusted for stress factor. The actual energy and protein intakes were compared with the calculated requirements, expressed as a percentage, to determine the nutritional adequacy. Episodes of feed interruptions were recorded. The reasons for feed interruption were categorised into the following groups: (a) fasting for intubation/ extubation; (b) high gastric residual; (c) too sick; (d) fasting for diagnostic tests or procedures; (e) abdominal distension; (f) unknown reasons. The differences in impact of feed interruptions on nutrient adequacy was compared using student's T-test. All statistical analysis was conducted using SPSS (Version 14.0) software.

Results

- Clinical characteristics of patients is shown in Table 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>Patients (n = 15)</th>
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<tbody>
<tr>
<td>Age (months)</td>
<td>24 (2 – 180)</td>
</tr>
<tr>
<td>Female</td>
<td>8 (53.3%)</td>
</tr>
<tr>
<td>Male</td>
<td>7 (46.7%)</td>
</tr>
<tr>
<td>Length of stay in CICU (days)</td>
<td>13.7 (4 - 43)</td>
</tr>
<tr>
<td>Length of stay in hospital (days)</td>
<td>23 (5-52)</td>
</tr>
<tr>
<td>Ventilator days</td>
<td>6.5 (4 -27)</td>
</tr>
<tr>
<td>Mortality (%)</td>
<td>40</td>
</tr>
</tbody>
</table>

- Values given as median (range), unless otherwise noted
- Six out of fifteen (40%) patients commenced EN on Day 1
- Energy intake was achieved by Day 10 while protein intake was near adequate by Day 3 (Figure 1)
- Median feed interruption time was 9 hours (range 0 – 51 hours)
- High gastric residual was the key reason for feed interruption followed by fasting for intubation/ extubation
- Patients with no feed interruption had a significantly higher energy and protein intake by Day 10 compared to those who had feed interruptions

Discussion

In this study, patients’ energy intake was inadequate for up to 10 days. Although underfeeding is common in the CICU setting, the delay in the provision of adequate calories was longer in this study compared to other studies whereby adequate feeding was achieved by the fifth to seventh day ³,⁴. The use of predictive equations may overestimate the energy requirements of CICU patients, hence explaining why these patients appeared to be receiving sub-optimal nutrition ⁵. Frequent or prolonged feed interruptions may also be a reason for the delay of optimization of feeds. On the contrary, protein intake far exceeded the estimated protein requirement. This could be because the feeds used in the current study are of high protein content. High gastric residual was the most common cause of feed interruption in this study as well as in the study conducted by Mehta and colleagues ². Whether high gastric residual reflects a delay in gastric emptying and an increased risk of aspiration is controversial ², hence stopping feeds based on this reason may not be well warranted. A major limitation of this study was the small number of patients and also the high mortality rate. This could indicate that the patients in this study were more critically ill compared to other studies.

Conclusion

Feed interruptions can compromise nutrient delivery. High gastric residual was the commonest cause of feed interruption. It is used frequently as an indicator of feed intolerance. More studies should be conducted to determine the precision of measured gastric residual volume in predicting gastric emptying. Guidelines on the threshold for gastric residuals, withholding of feeds, use of prokinetic agents and alternative feeding methods are required to minimize such interruptions which may in turn compromise the nutritional intake of patients.

References

² Mehta NM et. al. Challenges to Optimal Enteral Nutrition in a Multidisciplinary Pediatric Intensive Care Unit. JPEN J Parenter Enteral Nutr. 2010; 34: 38 – 45