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previous audits on our unit that feed delivery is often <80% of target, and although this review was based on COVID-19 patients, the 'typical' patients in ICU often have specific nutrition requirements, which includes high protein.

The challenges faced during COVID-19 has raised awareness of the importance of protein delivery in ICU and our review highlights the need to continually monitor and augment protein delivery in critically ill patients. The findings support the need for a high protein supplement in

Our aims were to (i) meet his estimated nutrition requirements, (ii) promote weight gain, and (iii) maintain functional status. This was achieved via bolus feeding with 4 Ensure TwoCal daily alongside level 4 pureed diet taken at risk by patient choice. Either bolus or continuous tube feeding is recommended for this patient group to avoid a catabolic state and hypoglycaemia [2,5]. His fluid requirements were met via the gastrostomy. Although supplementation with vitamins, including riboflavin and thiamin, may be practiced, these

**Table 1 Anthropometric and nutritional information of a patient with mitochondrial depletion syndrome.**

Date	Weight (Kg)	BMI (Kg/m <sup>2</sup> )	Estimated energy requirements (kcal)	Estimated protein requirements (g)	Estimated energy intake (kcal)	Estimated protein intake (g)
19/03/21	51.2	17.1	1280 – 1792	41 – 78	1900 – 2000	82 – 87
25/03/19	43.3	14.6	1083 – 1516	35 – 65	2000	78
12/04/18	48.6	16.3	1165 – 1631	37 – 70	1500 – 1800	40 – 48
19/10/17	43.4	14.5	1825 – 2225	53 – 81	1920	60

specific population groups; particularly those who may be obese, require CRRT or are receiving high dose propofol in an ICU setting.

<sup>1</sup> McClave S A, Taylor B E, Martindale R G et al. Guidelines for the Provision and Assessment of Nutrition Support Therapy in the Adult Critically Ill Patient: Society of Critical Care Medicine (SCCM) and American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.) J Parenter Enteral Nutr 2016; 40(2): 159-211.

<sup>2</sup> Singer P, Blaser A R, Berger M M et al. ESPEN Guideline on clinical nutrition in the intensive care unit Clin Nutr 2019; 38: 48-79

#### NUTRITIONAL MANAGEMENT OF MITOCHONDRIAL DEPLETION SYNDROME: A CASE STUDY

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Mitochondria are organelles found in every cell of our body, except for red blood cells, and regulate energy metabolism, apoptosis, and oxidative stress. Proteins controlling these processes are encoded by nuclear or mitochondrial DNA [1]. Mutations in this DNA may result in mitochondrial disease, which are a group of incurable, multi-systemic, and progressive diseases, including mitochondrial depletion syndromes (MDS) [1]. This is a case study on the nutritional management of a patient diagnosed with encephalomyopathic MDS caused by mutations in the nuclear gene *RRM2B*, required for mitochondrial nucleotide synthesis [2].

This patient was diagnosed as a teenager upon presenting with ptosis and had weakness of his upper and lower limbs, which limited his mobility. He was referred to Nutrition and Dietetics aged 47 years in October 2017 due to being at high risk of malnutrition (Table 1). On initial presentation the patient was on a soft diet secondary to dysphagia, and at high risk of refeeding syndrome [3]. Our primary aims were to (i) manage refeeding risk and (ii) improve his nutritional status and body weight to maintain functional status. His nutritional requirements were estimated using Henry equation. There is a paucity of evidence regarding the nutritional management of this patient group, however, NICE (2006) guidelines for nutrition support for adults and ESPEN (2018) guidelines for clinical nutrition in neurology are frequently used for this patient group [3,4].

The patient's bodyweight increased by 7% over 3 months using food fortification and oral nutritional supplements (ONS) to meet his estimated nutritional requirements. After discontinuing ONS, his bodyweight had increased by a total of 11% over 6 months and he was discharged. The patient was referred back to our service a year later following an episode of severe aspiration pneumonia that resulted in admission to ICU and subsequent placement of a percutaneous endoscopic gastrostomy (PEG) feeding tube. He had been established on level 4 pureed diet and normal fluids, which later progressed to increased aspiration risk, and his BMI had once again significantly decreased. He had also commenced non-invasive nocturnal ventilation.

have shown little benefit in slowing disease progression [2]. Despite an increase in the patient's bodyweight, weakness of his respiratory muscles and reflux from gastrostomy feeding resulted in repeated occurrences of aspiration pneumonia. Unfortunately, this would see the patient succumb to his condition at 51 years, 2 years after commencing gastrostomy feeding.

The role of nutrition in supporting patients with mitochondrial diseases places Dietitians as key members of the multidisciplinary team. This case study highlights the importance of regularly monitoring patients' nutritional status and bodyweight throughout their disease course. Although the heterogeneous nature of mitochondrial diseases makes this challenging to study, the need exists for disease-specific nutrition guidelines.

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2. El-Hattab A W, Scaglia F. Mitochondrial DNA depletion syndromes: review and updates of genetic basis, manifestations, and therapeutic options. *Neurotherapeutics* 2013; 10: 186-198.

3. Nutrition support for adults: oral nutrition support, enteral tube feeding and parental nutrition. NICE, 2018. (Accessed June 22, 2021, at [support-for-adults-oral-nutrition-support-enteral-tube-feeding-and-parenteral-nutrition-pdf-975383198917](https://www.nice.org.uk/guidance/cg32/resources/nutrition-support-for-adults-oral-nutrition-support-enteral-tube-feeding-and-parenteral-nutrition-pdf-975383198917) title="https://www.nice.org.uk/guidance/cg32/resources/nutrition-support-for-adults-oral-nutrition-support-enteral-tube-feeding-and-parenteral-nutrition-pdf-975383198917">https://www.nice.org.uk/guidance/cg32/resources/nutrition-support-for-adults-oral-nutrition-support-enteral-tube-feeding-and-parenteral-nutrition-pdf-975383198917.)

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#### A QUALITY IMPROVEMENT PROJECT TO OPTIMISE NUTRITION IN COVID-19 PATIENTS RECEIVING CPAP THERAPY IN A WARD BASED SETTING

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Patients receiving Continuous Positive Airway Pressure (CPAP) therapy for severe COVID-19 are at high risk of malnutrition<sup>1,2</sup>. This is related to poorer outcomes and longer durations of hospital stay<sup>3</sup>. British Dietetic Association guidance recommends nasogastric (NG) feeding for all COVID-19 patients on CPAP<sup>4</sup>. The aim of this Quality Improvement Project (QIP) was to optimise nutrition in COVID-19 patients receiving CPAP therapy in a ward-based setting at a UK District General Hospital.

The QIP included 222 patients in total across four QI cycles. Four domains: meeting nutritional requirements (outcome measure), dietitian review, accurate weight and NG feeding (process measures) were studied. Whether patients were reviewed by dietitians, weighed and NG fed was determined for all 222 patients. Meeting of estimated nutritional requirements could be determined in 108 patients. Interventions included use of a local nutrition pathway, COVID-19 diet sheet, NG feeding and involvement of dietitians at a daily multi-disciplinary meeting. Descriptive statistical analysis in the form of a Chi-Squared test was used to compare the first two COVID-19 waves. No ethical approval was required.

Results showed significant improvement in the proportion of patients reviewed by dietitians, accurately weighed and NG fed between the first two waves of COVID-19 ( $p < 0.05$ ). Comparing the 1<sup>st</sup> to the 4<sup>th</sup> QI cycle; meeting requirements improved from 50% to 68%, dietitian review from 29% to 91%, accurate weights from 44% to 87% and NG feeding from 6% to 65%.

These improvements were achieved through novel approaches, rapid implementation of new guidance and multi-disciplinary working. Next steps should include introduction of a standardised care proforma and study in future QI cycles. These interventions could be trialled in other inpatient wards to deliver wider benefit.

This QIP was successful in optimising nutrition in this cohort of patients and thereby delivering better patient care.

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### STEPWISE APPLICATION OF A PILOT PREHABILITATION PROGRAM FOR COLORECTAL CANCER PATIENTS PREVENTS NUTRITIONAL DECLINE AND IMPROVES PATIENT-REPORTED OUTCOMES

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Prehabilitation refers to a multimodal preoperative strategy aiming to enhance patients' functional capacity. Evidence for the implementation of a prehabilitation program has demonstrated favourable patient reported and healthcare cost outcomes (Gillis et al. 2018). A stepwise implementation of a pilot prehabilitation program was undertaken in a colorectal unit.

Prehabilitation was offered to a cohort of all newly diagnosed colorectal cancer patients planned for curative treatment. Patient demographics, oncological characteristics, anthropometric data, frailty scores and patient-reported global health assessment were recorded at baseline and during follow up after intervention and treatment (surgery). Crude clinical outcomes included hospital length of stay (LOS), morbidity, mortality, readmission rates.

39 patients were treated 'straight to surgery'. Time available for dietetic prehabilitation was a median 14 days (2–62) and for physiotherapy prehabilitation 10 days (1–31). One third of patients had experienced significant weight loss pre-operatively. Dietetic prehabilitation impeded further decline: there was no difference in median Body Mass Index (BMI) between baseline and 6 weeks post-op. Physiotherapy prehabilitation seemed to confer an observed improvement trend in the Rockwood frailty score (RFS): Baseline median RFS = 1.5 (range 1–4). Follow-up median RFS = 2, (range 1–5, ns). Similar trend was observed in self-reported general health scores: Median ED5q5L score at follow up was 90% (range 70–99%), improved from median baseline pre-op score 75% (range 50–83%, ns). Favourable clinical outcomes were recorded with no mortality or readmission. The total hospital LOS did not differ from historical data.

Prehabilitation can impede the nutritional and functional decline of colorectal cancer surgery. Holistic clinical approach to prehab and physiology-targeted tailoring to individual patient needs can build on the above preliminary experience.

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### ASSESSING THE SEVERITY OF PRE-OPERATIVE MALNUTRITION IN CANCER PATIENTS DUE TO UNDERGO POTENTIALLY CURATIVE SURGERY. A REVIEW OF A VIRTUAL DIETETIC PREHABILITATION SERVICE.

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Malnutrition is associated with increased pre- and post operative complications'. Dietetic prehabilitation aims to improve surgical outcomes by assessing patients' nutritional status and instituting early educational and dietetic interventions'. In this review, we aimed to assess the severity of nutritional risk in both colorectal and hepatobiliary cancer patients referred for potentially curative surgery and understand the need for dietetic prehabilitation as part of cancer services.

All patients were nutritionally assessed using the Patient Generated Subjective Global Assessment short form and patients were triaged as universal (score <4, low nutritional risk), targeted (score 5–9, medium nutritional risk) or specialist (score >9, high nutritional risk).

20 patients with hepatobiliary cancer and 53 patients with colorectal cancer were referred for surgical intervention between 12<sup>th</sup> February 2020 and 5<sup>th</sup> November 2020. In the hepatobiliary cohort, 15/20 patients (75%) required targeted or specialist dietetic prehabilitation. Median weight was 75kg (47kg–114.8kg) and median BMI was 22.9kg/m<sup>2</sup> (15.7–34.3kg/m<sup>2</sup>). 5/20 (25%) patients had a BMI less than 20.0kg/m<sup>2</sup>. 12/20 patients (60%) had experienced >5% unintentional weight loss over the past 6 months. 13/18 patients were started on pancreatic enzyme replacement therapy pre-surgically. 1 patient was admitted for pre-surgical nutritional optimisation. In the colorectal cohort, 21/53 (40%) required targeted or specialist dietetic prehabilitation. Median weight was 74.2kg (44kg–121.35kg) and median BMI was 24.9kg/m<sup>2</sup> (18.3–41.7kg/m<sup>2</sup>). 3/53 (6%) patients had a BMI less than 20.0kg/m<sup>2</sup>. 14/53 (26%) patients experienced >5% unintentional weight loss over the past 6 months. 18/53 patients required low fibre dietary modification due to risk of colorectal obstruction. No patients from either cohort lost further weight prior to surgery.

A large proportion of patients with colorectal and hepatobiliary malignancy referred for surgical resection are at high nutritional risk. A prehabilitation program can identify patients at nutritional risk and initiate early interventions to optimise pre-operative nutritional status, and provide education on dietary aspects important for post operative recovery. Findings from this review highlight the importance of robust dietetic screening and the importance of early referral to a Prehabilitation or Oncology Dietitian to meet the unmet nutritional needs of pre-surgical hepatobiliary and colorectal cancer patients.

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