



The Use of Technology to Pilot a New Nutritional Support Strategy for COPD Outpatients

An alternative approach to face-to-face clinics

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Chronic obstructive pulmonary disease (COPD) is a progressive and irreversible lung disorder characterised by persistent airflow obstruction resulting from inflammation and remodelling of the airways caused mainly by smoking. The prevalence of COPD is influenced by age, with diagnosed prevalence of <1% for those between 45-54 years and >5% for individuals aged 65 years and older in the UK.¹ Worldwide, the prevalence of COPD and its impact on mortality are increasing at an alarming rate. The Global Burden of Disease (GBD) reported two million deaths in 1990, equivalent to 4.4% of all deaths, making COPD the sixth leading cause of global mortality.² Ten years later, the GBD study shows 2.7 million deaths, 4.8% of all deaths in 2000 and the fifth leading cause of death worldwide.³ More recently, COPD mortality has been projected to rise to 4.5 million deaths in 2020, based upon the GBD data, rising to be the third leading cause of death globally.

Across Europe, COPD affects 23 million people,⁵ whilst in the UK the 2010 Health Survey for England estimated around three million cases of COPD; although, around two million remain undiagnosed.⁶ It is one of the most expensive conditions for the National Health Service, with an annual cost of over 800 million.¹ COPD is the second largest cause of emergency admissions, with 130,000 per year,⁷ and between 25,000 to 30,000 deaths over the last 25 years.⁸ It has a considerable negative impact on patients' physical and psychological wellbeing and a substantial burden on healthcare providers and society as a whole.¹ The economic burden of COPD increases markedly when indirect costs – such as those associated with lost productivity and career time – are considered; in the UK the cost is €3.3 billion.⁹ Although the hallmark feature of COPD is airflow limitation resulting from chronic bronchitis or emphysema, COPD is often accompanied by multiple co-morbidities that are associated with increased mortality risk. Malnutrition is one of these co-morbidities, with low body mass index (BMI) being considered an independent prognostic factor for mortality in COPD patients.⁵

Nutrition in COPD patients

Malnutrition is common in COPD patients resulting in up to 20% higher hospitalisation costs.¹⁰ In fact, up to 60% of inpatients and 45% of outpatients have been found to be at risk of malnutrition.¹¹ Weight loss is observed in 25-40% of all COPD patients, with 25-35% showing a reduced muscle mass.¹² Decreased body weight is associated with increased morbidity and mortality.⁵ A Japanese study of circa 264,000 patients showed that those with a BMI <18.5 kg/m² (underweight) compared to a BMI of 25.0-29.9 kg/m² (overweight) had a significantly higher mortality rate of 14.3%, with the lowest levels of 4.3% observed in the other group.¹³ The importance of BMI as a predictor of mortality is recognised and is part of a variables composite index to assess prognosis of COPD patients – the BMI, airway obstruction, dyspnea and exercise capacity (BODE) index. The BODE index combines the main factors associated with mortality and it uses a BMI cut off point of 21 kg/m² since lower levels are related to high risk of death.¹⁴ Low BMI is not the only sequelae of malnutrition observed in COPD patients. Low vitamin levels, especially vitamin D deficiency, have been reported in more than 60% of COPD patients and are potentially a risk factor for osteoporosis.¹⁵ Furthermore, a cross-sectional study conducted in 414 subjects demonstrated that low levels of vitamin D might be associated with worsening airflow obstruction in COPD patients.¹⁴ In addition to vitamin deficiency, there is evidence for increased muscle protein breakdown in COPD patients characterised by low muscle mass and low BMI. COPD patients with low muscle mass have low plasma levels of branched-chain amino-acids (BCAAs), particularly leucine, that are known to stimulate muscle protein synthesis.¹⁶ Consequently, the cumulative effect of inflammatory status, catabolism and the older age, makes it imperative for a higher protein intake, especially BCAAs and its metabolites.

Nutrition support for COPD patients

Malnourished COPD inpatients are likely to have longer hospital stay,¹⁷ a higher probability of being readmitted,¹⁸ with an increase in healthcare costs.¹⁹ Nutrition supplementation in COPD patients has shown improved health economic costs and clinical benefits. A 24-month economic evaluation of a trial comparing nutritional

rehabilitation (oral nutrition supplements x3/day) with usual care in COPD patients with low muscle mass demonstrated a significant reduction in hospital costs.²⁰ The mean total COPD and non-COPD related costs per patient after two years were €12,830 for the intervention group and €14,025 for the usual care group, resulting in net savings of €1,195 (95% CI – 7905-5759). A Cochrane Review of 17 randomised controlled trials (RCT) demonstrated that nutritional supplementation led to an increase in body weight, raised muscle mass and improved exercise tolerance in COPD patients.²¹ Similarly, the NOURISH study, a double-blind RCT of 652 hospitalised malnourished aged 65 or older patients demonstrated the benefits of nutrition support in patients with lung (large numbers of COPD patients) and heart disease.²² Researchers compared the effect of a specialised nutritional supplement containing 20 g protein, an active metabolite of leucine – β-hydroxy-β-methylbutyrate (HMB) – and vitamin D to a placebo supplement on rates of readmissions or death 90-days post-discharge. The results showed that mortality risk was 50% lower in the intervention group at 90 days post discharge. Essentially, the NOURISH study estimated that one life could be saved for every 21 patients who received the specialised nutritional supplement, demonstrating it as a highly effective therapy. In addition, improvements were observed in body weight, nutritional status and vitamin D levels throughout the study. This study demonstrated that specialised oral nutritional supplements with tailored ingredients/nutrients are important for improved outcomes.

Nutrition management of COPD patients

Evidence demonstrates the importance of adequate nutrition for COPD patients. Nevertheless, there is a lack of specialist COPD nutrition clinics in the UK and a long wait for dietetic appointments in the community. Currently, in the UK there is a shortage of specialised dietitians. The recently launched NHS England paper *'Allied Health Professionals (AHP) into Action'*,²³ offers examples of innovative AHP practice and defines how these professionals can drive improvement in patients' health and wellbeing. Considering the government recommendations to expand on AHP capabilities and the

shortage of specialised dietitians, the Royal Brompton & Harefield NHS Foundation Trust looked at ways to improve the delivery of nutrition support for COPD patients. Currently, workforce shortage and lack of space for face-to-face clinics are barriers preventing dietetic COPD outpatient (OP) clinics; patients are advised to see dietitians in the community.

Therefore, an expert COPD group was assembled, including dietitians, physicians and nurses, to look at a cost-effective and practical approach to improve nutrition in our COPD patients. The outcome was a recommendation to deliver nutrition advice through telehealth clinics. The National Information Board states that: *"One of the greatest opportunities of the 21st century is the potential to safely harness the power of the technology revolution, which has transformed our society, to meet the challenges of improving health and providing better, safer, sustainable care for all... a health and care system where technology can help tackle inequalities and improve access to services for the vulnerable."* Telehealth for the nutrition clinic is defined as a remote, two-way consultation via telephone, email or video-consultation as Skype that substitute face-to-face visits. Telehealth has the potential to address several problems in modern healthcare by increasing the quality, accessibility, utilisation, efficiency and effectiveness of healthcare, with the added advantage of cost reduction.²⁴ Telehealth has shown positive patient outcomes and improved satisfaction at reduced costs.²⁵

A framework for the telehealth COPD clinic implementation was developed to provide guidance on effective operationalisation. First, pre-telehealth clinic advice is provided by a healthcare assistant/dietetic assistant in COPD OP clinics. To guide identification of COPD patients at risk of malnutrition, a simple nutrition screening tool based on BMI and dietary intake was devised by the group (see **Figure 1**). In accordance with the BODE index, a BMI <21 kg/m² was the cut off point for at risk of malnutrition.¹⁴ Patients are also provided with written nutrition support information and/or oral nutrition supplement samples and a prescription request is sent to the GP. Second, patients identified at the clinic were offered telehealth dietetic clinics follow up. Progress and ONS intake are monitored as per *Pathway for Using ONS in COPD*.²⁶ This alternative clinic method

compared to face-to-face clinic has been effective in providing nutrition support to this vulnerable group of patients.

Despite only three months implementation, the service already shows 100% patient consultations, compared to face-to-face clinics that can have high levels of non-attendance. The service is commissioned by clinical commissioning groups providing extra income to the directorate. Additionally, patients report that nutrition in a

home-setting minimises travel times, and for the elderly averts the risks associated with travel especially for this patient group who is at high risk of falls during winter. The medical team, carers and patients have shown appreciation for the service.

Conclusion

Patients with COPD are at high risk of malnutrition and studies show that specialised oral nutritional supplements

with tailored ingredients/nutrients are important for improved outcomes. New technologies that support alternatives to face-to-face consulting are seen by policymakers as potentially improving the financial efficiency as well as the clinical effectiveness of services.²⁷ This virtual clinic offers possibilities for dietitians and patients to have a better interaction, making the consultation more efficient, effective and patient-centred.

Figure 1: Nutrition Support Strategy

NUTRITION SUPPORT STRATEGY FOR COPD OUTPATIENTS

NUTRITIONAL STATUS				
		Normal (BMI \geq 22 kg/m ²)	At risk of malnutrition (BMI \leq 21 kg/m ²)	Malnutrition (BMI \leq 20 kg/m ²) (*BMI \leq 18 - clinic in 1 week)
Dietary Intake	Normal	Monitoring	Patient to monitor intake & weight	Nutrition Dietsheet 1 wk sample - ONS BD Prescription for 6 wks Telehealth clinic in 6wks
	Reduced intake (1/2 meals)	Nutrition Dietsheet	Patient to monitor intake & weight Nutrition Dietsheet Telehealth clinic in 6 wks	Nutrition Dietsheet 1 wk sample - ONS BD Prescription for 5 wks Telehealth clinic in 5 wks
	Low intake ($<$ 1/2 meal)	Nutrition Dietsheet Telehealth clinic in 6 wks	Nutrition Dietsheet 1 wk sample - ONS BD Prescription for 6 wks Telehealth clinic in 6 wks	Nutrition Dietsheet 1 wk sample - ONS BD Prescription for 5 wks Telehealth clinic in 4 wks
<p>Prescription:</p> <ul style="list-style-type: none"> • Ensure Plus Advance: 220 ml, 330 kcals, 20 g protein (first line) • Ensure Plus juice: 220 ml, 330 kcals, 10.6 g protein for patients who prefer not to have dairy-style products • Please provide supplement sample pack (stock in clinic - 1 week) for patient to try at home • Please request supplement prescription as above and book for telehealth clinic accordingly <p>Wks = weeks BD = bis die mendium (twice daily)</p>				

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