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Nutrition and oncology: best practice and the development of a traffic light system

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ABSTRACT

Malnutrition is common in oncology patients, with age, disease stage and tumour type all influencing malnutrition risk. There are several detrimental effects of malnutrition in oncology patients, including weight loss, which is associated with negative oncological outcomes, and reduced survival. The causes of malnutrition in this group may be multifactorial and include effects from the tumour itself, altered metabolism, increased nutritional requirements, and cancer treatments and their associated side effects, which can impact on an individual's ability and desire to eat. Nutritional screening to identify early nutritional risk is essential and should involve the use of a validated screening tool, with commonly used tools usually assessing nutritional risk and weight loss over a period of months, for example a 3- to 6-month period. It is also important to consider weight changes over a shorter time period to identify rapid weight changes. Multidisciplinary teamworking is essential in tackling malnutrition, with collaborative working between the dietitians and the nutrition nurses shown to be beneficial in the authors' practice to develop community pathways and improve their service and manage increasing patient numbers. Malnutrition within oncology can often be managed with additional supplementation with oral nutritional supplements or enteral nutrition, where indicated. A low-volume, energy-dense, high-protein supplement can help to meet nutritional needs and to achieve dietetic aims, with compliance improved by the use of a low-volume product.

Key words: Nutrition ■ Malnutrition ■ Oncology ■ Traffic light system

The term malnutrition can refer to either over- or under-nutrition, and for the purposes of this article will focus specifically on under-nutrition. Under-nutrition can be defined as a deficiency of energy, protein and other nutrients that causes adverse effects on the body and clinical outcome (Holdoway et al, 2017; National Institute for Health and Care Excellence (NICE), 2017).

Oncology patients have one of the highest prevalence of malnutrition (Agarwal et al 2012; Marshall et al 2019), occurring

in the majority of cancer patients (Van Cutsem and Arends, 2005). Such patients are more likely to be malnourished compared to any other patient group (Ryan et al, 2016). Worldwide prevalence of malnutrition in cancer patients is estimated to range from 20% to over 70% (Arends et al, 2017a), with cancer cachexia affecting 50–80% and sarcopenia present in 20–70% of cancer patients (Ryan et al, 2016). In the UK and Ireland, estimates show that, annually, 34% of patients may experience weight loss of over 5% body weight depending on tumour site; with an additional 18.5% experiencing weight loss over 10%, and a further 35% of patients experiencing sarcopenia (Sullivan et al, 2020). Older age and disease stage, as well as tumour type, can influence malnutrition risk, with malnutrition and nutritional risk increased in oesophageal and/or gastric and pancreatic cancers, and weight loss increased in upper gastrointestinal tumours and advanced disease (Bozzetti, 2009; Hébuterne et al, 2014).

Malnutrition remains both under-identified and undertreated, which leads to adverse effects (Stratton et al, 2018). The consequences of malnutrition include a physical and functional decline that can negatively affect performance status, poorer clinical outcomes, impaired immune function leading to increased risk of infections and increased length of hospital stay. It can also have a negative effect on complications and mortality (Van Cutsem and Arends, 2005; Neumann et al, 2005; Stratton et al, 2018). Weight loss is associated with negative oncological outcomes and reduced survival (Marshall et al, 2019; Sullivan et al, 2020; Prado et al, 2020), and can decrease the response to chemotherapy as well as increasing the frequency and severity of chemotherapy-induced toxicity (Van Cutsem and Arends, 2005). Moreover, malnutrition risk and weight loss can also be linked to a reduced quality of life (Rasheed and Woods, 2014; Sullivan et al, 2020), with fear, depression and anxiety affecting quality of life and negatively impacting on appetite and oral intake (Van Cutsem and Arends, 2005).

Cancer patients are at high risk of malnutrition due to the disease itself, as well as cancer treatments and side effects, which may impact nutritional status. Reduced food intake, altered metabolism, changes to resting energy expenditure and a decrease in physical activity levels all influence risk of malnutrition and loss of muscle mass (Arends et al, 2017b). Overall, disease and treatment effects can threaten nutritional status (Arends et al, 2017a). Treatments such as radiotherapy, chemotherapy and surgery can all impact on an individual's appetite, ability to eat and overall nutritional intake. The effects of

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treatment on nutritional intake can vary according to treatment type, treatment strength and duration, as well as tumour site (Ryan et al, 2016). Common treatment side effects that can affect nutritional intake include swallowing difficulties, early satiety, nausea (Zhang et al, 2019) taste changes and mucositis (Grant and Kravits, 2000), as well as sore/dry mouth, increased oral secretions, fatigue, malabsorption and bowel changes (Arends et al, 2017a). Treatment may also impact on nutritional intake indirectly by increased time spent travelling to hospital appointments, as well as time taken having treatment, all of which can impact on fatigue, appetite and the time available to prepare and consume food.

The European Society for Clinical Nutrition and Metabolism (ESPEN) guidelines advise that all cancer patients should be screened for the risk and presence of malnutrition regularly (Arends, 2017b). NICE (2017) provides guidance relating to screening for nutritional risk, and screening tools should assess body mass index as well as percentage weight loss. Screening should be completed by health professionals with appropriate skills and training using a validated tool (Stratton et al, 2018; Holdoway et al, 2017). Timely screening, as well as initiating a treatment plan including nutritional support and referral to a dietitian where appropriate, is essential.

A commonly recommended validated screening tool is the Malnutrition Universal Screening Tool (MUST); this is the most commonly used screening tool in the UK, as well as being used worldwide (British Association of Parenteral and Enteral Nutrition (BAPEN) (2016). The 'MUST' uses five steps to determine an individual's risk of malnutrition, which may be low, medium or high. The tool is supported by many organisations, including the British Dietetic Association and the Royal College of Nursing. The tool is quick and simple to use, and can be used in community, hospital and care settings, and provides management guidelines to follow depending on the risk score identified. Individuals identified as being at high risk require treatment that can consist of referral to a registered dietitian or implementation of local policy. The MUST report and an Explanatory Booklet on 'MUST' are available via the BAPEN website (<https://www.Bapen.org.uk>).

Although less commonly used, other validated screening tools are available, such as the Subjective Global Assessment (SGA). The SGA includes components such as weight change, changes in dietary intake, the presence of gastrointestinal symptoms, functional capacity and physical examination, as well as disease and its relation to nutritional requirements. Using these components individuals are assigned one of three SGA ratings depending on whether they are well nourished (A), moderately (or suspected of being) malnourished (B) or severely malnourished (C) as originally described by Detsky et al (1987). The SGA tool is comprehensive, and looks at other factors aside from weight, such as dietary intake; however, the overall tool may be perceived as complex and time consuming to complete.

An alternative version of the SGA, the Patient-Generated Subjective Global Assessment (PG-SGA) has been adapted for the oncology population (Ottery 1996; Shaw et al, 2015). As with the SGA, this tool rates individuals as either well nourished,

moderately malnourished or severely malnourished. Although the tool is described as having high sensitivity and specificity, it is also noted as being labour intensive (Shaw et al, 2015) and although adapted specifically for the oncology population the practicalities of using this tool, particularly in busy settings, should be considered.

Local policy will often indicate which screening tool should be used in practice, and may vary dependent on the setting or clinical specialty. A validated screening tool is always recommended.

Best practice and community management pathways

Multidisciplinary working is vital to proactively manage the nutritional care of oncology patients, whether this is via oral nutritional support or prophylactic/reactive enteral feeding.

Within the authors' Trust, our dietitians and nutrition nurses work collaboratively to manage enteral patients jointly. In the dietitian-and-nurse-run joint oncology enteral clinic, the authors have devised a traffic light system to better manage the increasing numbers of community oncology patients who are enterally fed. Before the implementation of this system, due to high patient numbers, the team observed increased waiting times, double-booked appointments causing long waits to be seen and, as a result, reduced time available to review patients. The traffic light system was introduced to better utilise clinic time, reduce waiting times, stop double bookings and improve the patient experience. The importance of patients receiving timely care with appropriate waiting times and assessing patients by order of clinical priority and by risk and colour coding has been identified in previous clinical guidance (NICE, 2019; NHS England, 2014).

Introduction of a traffic light system

A traffic light system was devised as shown in *Figure 1*, and involves categorising patients into either a red, amber or green risk category according to their clinical need, with patients continually reassessed and able to move between categories as indicated. The system was introduced in May 2018. It should also be noted that patients are able to contact the nutrition and dietetic department by telephone with any feeding tube or dietetic concerns between their clinic appointments. The authors have observed that clinic capacity has been eased, with no further double bookings of appointments, thus avoiding the need to create additional clinics. Better clinic utilisation and more appropriate review times has meant that our new or urgent patients are seen more promptly. The system has allowed the team to better use the clinic time available, which has been even more important during the COVID-19 pandemic and clinic recovery from cancelled appointments during the first wave of COVID-19.

It should be noted that the traffic light criteria has been developed from best practice and clinician experience and, to date, the system itself has not been validated or published. A full audit to evaluate and validate the system is a research opportunity for the future.

With the perceived successful implementation of the Joint

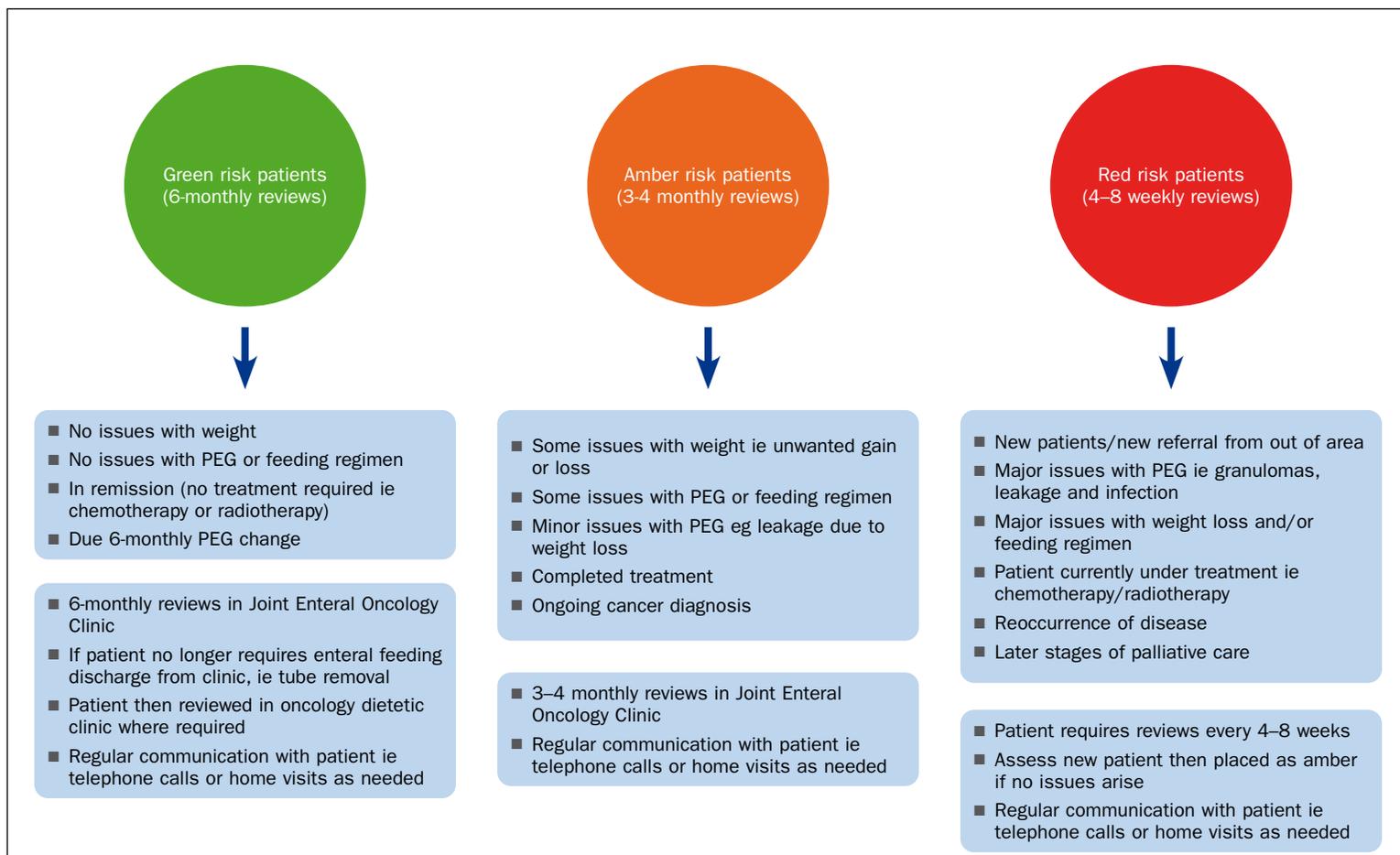


Figure 1. Joint Oncology Enteral Traffic Light System for assessing joint oncology patients requiring enteral feeding
 Key: PEG=percutaneous endoscopic gastrostomy

Oncology Enteral Traffic Light System, it was decided to implement this across the wider oncology dietetic caseload. The traffic light system was adapted for use in oncology outpatient clinics (for those patients requiring oral nutritional support during the early stages of palliative care, while receiving active treatment or with a curative intent). An adapted version was also used in oncology telephone clinics (predominantly for patients in the later stages of palliative care where weight monitoring may not be appropriate). Again this has been developed from best practice and experience and has not been validated as yet.

For the oncology outpatient clinic and where weight monitoring is appropriate, the traffic light system was adapted to categorise non-enteral feeding patients according to their degree of weight loss—whether they had lost a significant or severe amount of weight, as shown in *Figure 2*.

Interpreting percentage weight loss over time is discussed by White et al (2012) in the context of both acute illness/injury as well as in the context of chronic illness. Using criteria for looking at disease-related malnutrition and in the context of chronic illness can be of use in the oncology population. Although common validated screening tools tend to look at percentage weight loss over a 3–6-month period with a weight loss greater than 10% being clinically significant and of higher

nutritional risk (Elia, 2003), it is useful to also consider alongside these validated tools, the degree of percentage weight loss when lost over a shorter time period. This allows the identification of a rapid weight loss over a short time period (ie less than 3 months) which is often evident in oncology patients, and is particularly important where it is anticipated that weight loss or a reduction in nutritional intake is likely to be ongoing. Weight loss may be classified as significant or severe, representing moderate or severe malnutrition respectively; when lost over a shorter time period, for example 1 week or 1 month (when unrelated to changes in hydration). This can be regarded as an early indicator of increased nutritional risk, with weight loss values initially set out by Blackburn et al (1977) and reiterated by White et al (2012), as summarised in *Table 1*. Early identification and treatment of significant and severe losses in weight is essential, as well as early referral to a dietitian for expert nutritional advice.

Patients can present with a significant or severe loss of weight, who may have a reduced oral intake that is further impacted by ongoing symptoms that may limit oral intake, such as taste changes, nausea or dysphagia. In such patients, it is essential to begin nutritional support promptly to prevent the adverse effects of malnutrition and, where appropriate, promote treatment response. This is particularly essential considering that

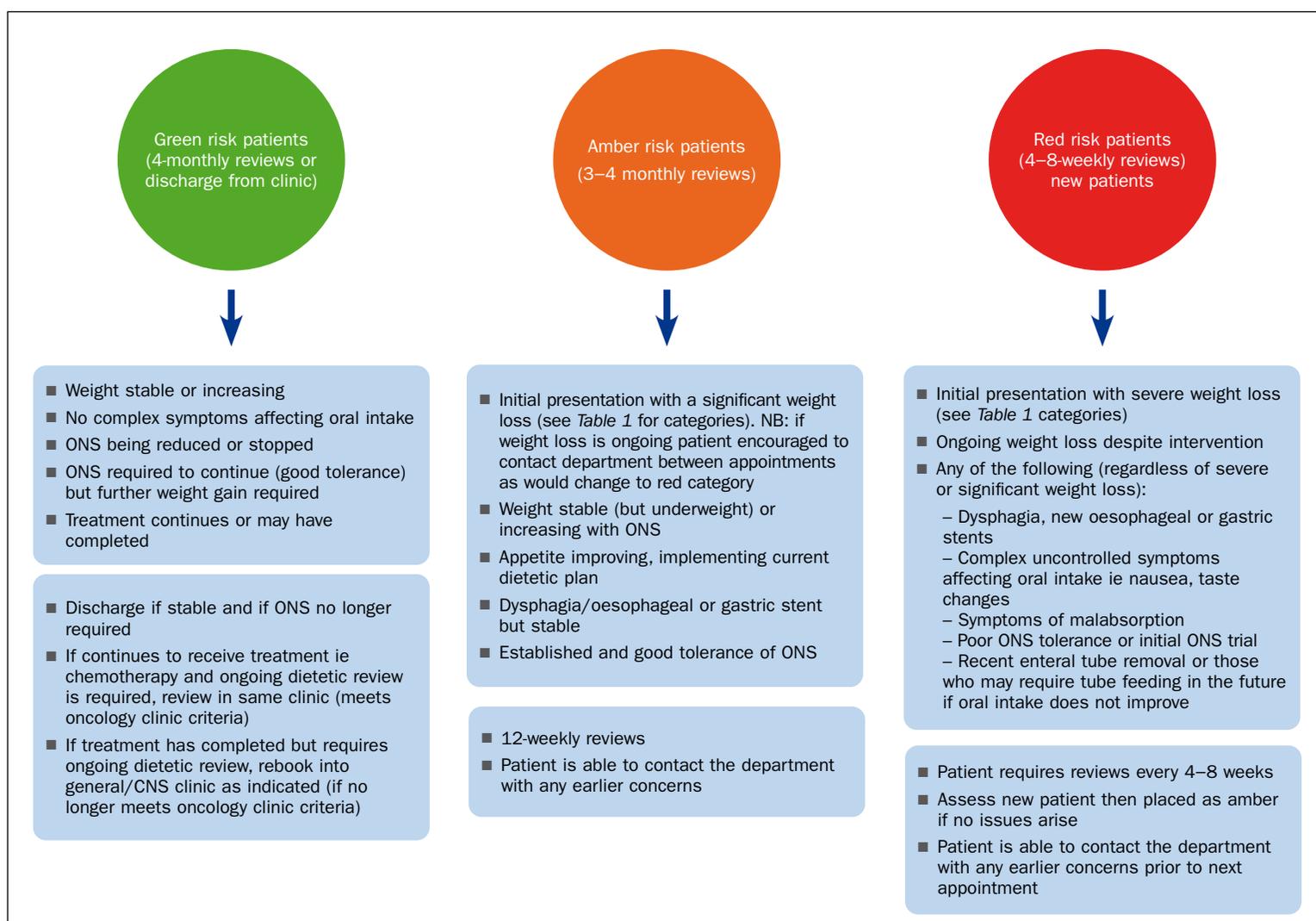


Figure 2. Traffic light system assessing oncology clinic patients receiving oral nutritional support

Key: CNS=clinical nutritional support; ONS=oral nutritional supplement; PEG=percutaneous endoscopic gastrostomy

malnutrition is strongly associated with performance status, and can be a leading factor when performance status deteriorates (Hébuterne et al, 2014). Malnutrition can be managed by dietary strategies, as well as with oral nutritional supplements and, where indicated, the use of enteral nutrition (Stratton et al, 2018).

Strategies often consist of providing dietary advice on high-energy, high-protein food fortification, tailored to the individual. This might be advice on eating during chemotherapy, promoting symptom relief, managing existing comorbidities affecting dietary intake or for texture modification advice where required. Nutritional priorities and goal setting is always agreed with the individual. An adequate protein intake is essential, with intakes of 1-1.5 g/kg/day recommended for the adult oncology population (Arends et al, 2017b) and a minimum of 1.2 g/kg/day for patients receiving radiotherapy (Isenring et al, 2008). It should be noted that protein requirements vary with extremes of body mass index and requirements should therefore be estimated on an individual basis.

Owing to the multifactorial problems that impact on the

Table 1. Categorisation of percentage weight loss		
Time period	Significant % weight loss/moderate malnutrition	Severe weight loss/Severe malnutrition
1 Week	1-2%	>2%
1 Month	5%	>5%
3 Months	7.5%	> 7.5%
6 Months	10%	>10%
12 months	20%	>20%

Source: adapted from Blackburn et al, 1977 and White et al, 2012

nutritional status of this patient group, and where individuals are deemed to be at high nutritional risk, oral nutritional supplements (ONSs) should be used (Stratton et al, 2018). ONSs play a key role in the management of malnutrition (Hubbard et al, 2012), and are required to supplement dietary

Box 1. Case study: a patient with oesophageal carcinoma with nasojejunal tube

Case study 1

Helen Smith*, aged 62 years, had been diagnosed with T4bN2M0 oesophageal carcinoma at the oesophageal gastric junction. She had an NJ tube in place for feeding due to complete dysphagia.

Initial dietetic consultation

Usual weight: 59kg, weight on initial dietetic contact: 54kg—loss of 5kg—8.4% over 2 months (severe loss), BMI: 21kg/m².

Following her initial consultation with the dietitian, Ms Smith had completed 10 fractions of palliative radiotherapy. One month post-treatment, she was taking small amounts of ice cream, yoghurt diluted with full-fat milk and thin fluids orally, combined with overnight NJ feeding. ONS were sampled and tolerated and therefore the volume of overnight NJ feed was reduced and ONS prescribed. A liquid high-protein, high-calorie diet was advised, including full-fat milky drinks, cream ‘shots’, thin creamy soups, ice cream and smooth puddings.

Product prescribed

Fortisip Compact Protein 3 x 125ml bottles per day (a milkshake-style drink with a low-volume, high-energy high-protein content).

Treatment aim

To increase patient’s oral intake and increase weight to her usual weight of 59kg.

Progress

Brachytherapy delivered and NJ tube removed to deliver treatment. Ms Smith was tolerating Fortisip Compact Protein as prescribed. Due to patient preference, her feeding tube was not replaced and a trial of oral ONS and liquid diet alone began.

Post-treatment she progressed to a thin pureed diet but was unable to progress beyond this due to a high risk of food bolus obstruction. As her NJ tube had been removed, an additional product prescribed—Scandishake 1 sachet per day in addition to Fortisip Compact Protein 3 x daily (patient preference). The patient was encouraged

to have a pureed diet and nutritious liquids orally. She was estimated to be meeting her nutritional requirements with her oral diet and supplements).

One month later she received oesophageal dilation, with a maximum of dilation 12mm in diameter. After discussion with the MDT, it was agreed that she should continue with a pureed diet only due to risk of food bolus obstruction.

Five months after her initial dietetic referral, Ms Smith’s weight was 57 kg (an increase of 3 kg)—the dietetic aim was partially met. She was awaiting further treatment plans. Ms Smith was meeting nutritional requirements orally, so further NJ feeding was not required. This was achieved owing to a low-volume supplement being used and one with high-protein content. Supplements were served chilled and sometimes diluted with full-fat milk to improve overall tolerance.

Using the traffic light criteria, Ms Smith was initially categorised into the red category and reviewed monthly with contact details provided should any earlier concerns have arisen.

*The patient’s name has been changed. Key: MDT=multidisciplinary team; NJ=nasojejunal ONS=oral nutritional supplement

strategies and, in doing so, better meet nutritional requirements and achieve dietetic goals. Registered dietitians who specialise in this area are best placed to provide this advice, to prescribe and monitor ONS effectiveness and advise regarding ongoing ONS requirements. Early referral to these services is essential.

The Malnutrition Pathway (Holdoway et al, 2017) highlights reports and research that show that oral nutritional supplements can increase energy and protein intake as well as having functional benefits including to quality of life. They can be an effective way to improve nutritional intake (energy, protein and micronutrients) when used in addition to dietary strategies (Stratton et al, 2018).

When choosing an oral nutritional supplement to prescribe, it is essential to consider patient preference, existing comorbidities such as diabetes, renal disease, and swallowing difficulties requiring thickened fluids, as well as nutritional deficits and any tolerance concerns.

Various types of supplements and brands are available such as juice- or milk-style drinks, powders requiring mixing with fresh milk (many in sweet or savoury varieties), high-calorie shots or dessert style supplements. Local guidance may help to determine which to use. A range of product flavours are available including neutral (milk-based) which add versatility and can be easily incorporated into foods, in addition to supplements that may be better tolerated for those experiencing taste changes. Examples of Nutricia products that are designed for taste changes include Fortisip Compact Protein* Hot Tropical Ginger, and from the authors’ experience, Fortisip Yoghurts in Raspberry, Peach & Orange and Vanilla & Lemon flavours have been helpful.

Where patients struggle to take adequate supplement volumes or experience early satiety, a lower volume, more concentrated product is beneficial with additional fluids offered across the day to meet hydration needs. From clinical experience, patients can

often struggle to take large supplement volumes and compliance is often much improved with a lower volume product. This is also beneficial to avoid over-filling on supplements and to promote appetite for dietary intake.

Nutritional supplements provide essential protein and micronutrients. Often oncology patients can struggle to meet their high energy and protein requirements via oral diet alone and a high-energy high-protein lower volume supplement is therefore often the product of choice to bridge this gap. Energy-dense, smaller volume supplements have been shown to improve compliance, which is essential for both clinical and cost effectiveness (Hubbard et al, 2012). Regular review regarding ONS tolerance is essential, along with further strategies offered to improve tolerance where needed; for example, diluting products, serving them chilled or by providing recipes to incorporate supplements into food or other drink recipes. Appropriate patient review according to the established traffic light criteria is essential, with more frequent reviews indicated while supplement preference and tolerance is established (red traffic light category).

Two patient case studies are presented in *Box 1* and *Box 2*.

Conclusion

Early nutritional intervention for nutritionally at-risk oncology patients is essential, with specialist oncology dietitians best placed to provide this advice. When assessing patients, although validated screening tools are available that look at percentage unplanned weight loss, usually over a 3–6-month period, it is also important to consider the degree of weight loss over shorter time periods. This is essential to detect a more rapid severe weight loss.

Multidisciplinary team working is essential, and from clinical experience at the authors’ Trust, close working between the

Box 2. Case study 2: a patient with high-grade neuroendocrine carcinoma

Case Study 2

Joe Williams*, aged 67, was diagnosed with a high-grade neuroendocrine carcinoma, and had commenced chemotherapy. He had a tight impassable oesophageal stricture and was initially referred to the dietitian for consideration of NG tube feeding.

Initial dietetic consultation

Mr Williams' initial weight on referral was 79.3 kg, he was 1.76 m tall and had a BMI of 25.6 kg/m². He had lost 9.6 kg (10.7%) over 3 months (severe loss). He had a prescription for Fortisip Compact Protein 2 x 125 ml bottles per day issued by the specialist nurse, and at initial dietetic consultation his weight was noted to have stabilised since starting these. Liquids were taken orally.

Mr Williams was keen to persevere with oral intake given his stable weight, rather than consider and NG tube, and the oncologist agreed with this plan. Dietary advice included: liquidised diet and ways to increase energy and protein intake including food fortification methods. An increase in full fat milky drinks and milky puddings were

encouraged and dietary advice discussed for eating during chemotherapy.

Product prescribed

The Fortisip Compact Protein prescription was increased to 3 daily as he was tolerating this product well. A high energy/protein content was essential to bridge the gap between oral intake and estimated requirements. Low volume promoted compliance.

Treatment aims

To maintain weight, optimise oral intake and meet estimated nutritional requirements

Progress

A review was arranged for 2 weeks later owing to his high-risk category and concerns regarding whether an NG tube would be needed. His weight had decreased further to 76.2 kg (further loss of 3.1 kg (4%), BMI: 24.6 kg/m²). He was tolerating small amounts of liquid diet but had not tried blending many foods and was taking ONSs at mealtimes in replace of dietary intake. He was advised to

try food first and to take Fortisip Compact Protein between meals and at supper instead, to increase his appetite for an oral diet. The dietitian asked Mr Williams which foods he enjoyed and discussed how these could be incorporated into his diet to promote food enjoyment and stimulate his appetite.

Two weeks later, chemotherapy had continued with no side effects noted. Since the previous consultation he had prepared a wide range of textured-modified meals that he was enjoying and had been following all high-protein high-energy advice. Fortisip Compact Protein was taken x 3 daily between meals. Taking ONS separately to mealtimes had stimulated his appetite. His weight had increased to 79.3 kg and NG feeding was therefore not required.

Mr Williams was in the red light category. A telephone review was arranged every 2 weeks (more frequently than indicated in the traffic light system) due to concerns that his dietetic aims could not be met orally and supplementary enteral feeding would be required. The system is used as a guide only and it should be noted that clinical judgement is always given priority.

*The patient's name has been changed. Key: NG=nasogastric ONS=oral nutritional supplement

nutrition nurse and Macmillan dietitian has been invaluable for managing the community oncology enteral patients and for developing the service, including the introduction of the traffic light system, which has been adapted for use in other clinics. This has been an innovative approach to managing the increasing patient caseload and has been particularly valuable during the COVID-19 pandemic when capacity was further tested. The authors are in the process of evaluating the traffic light system by means of an audit and plan to engage patients in informing us of their experience and thoughts on service improvement.

Where patients progress from enteral to ONS/dietary support, or for those who require ONS/dietary support initially, the importance of early dietetic intervention and choice of an appropriate ONS is essential, in order to best meet nutritional needs and treatment goals. **BJN**

** Fortisip Compact Protein is a Food for Special Medical Purposes for the dietary management of disease-related malnutrition and must be used under medical supervision.*

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KEY POINTS

- Malnutrition is common in oncology patients, and regular nutritional screening should be completed using a validated tool
- In the oncology population, weight loss can occur rapidly and over a short period of time. This can be assessed by looking at percentage weight loss using the criteria provided in this article to identify its significance
- Oncology dietitians are experts in the nutritional care for these patients and early referral to this service is essential to ensure early dietetic input and to optimise outcomes
- Collaborative nutrition nurse/dietitian working has proved invaluable in devising the traffic light criteria—this has helped staff to manage an increasing caseload, particularly during the COVID-19 pandemic
- ONS are often required for oncology patients who are identified as at nutritional risk
- A low volume, high energy/protein supplement is often the product of choice

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CPD reflective questions

- What are the potential causes of malnutrition in oncology patients?
- How would you use percentage weight loss to identify nutritional risk?
- What are the consequences of malnutrition?
- Think about what the traffic light system developed involves and how you could use the system in your own practice