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# "Oral Nutritional Supplements: Sugar Content and Potential Dental Implications"

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## Abstract

**Objectives:** The objectives of this article are to list the most commonly prescribed Oral Nutritional Supplements in the UK and Ireland and their sugar content; and to raise awareness among the dental profession regarding their uses and potential dental risks involved.

**Background:** Many older patients benefit from Oral Nutritional Supplements. Prescribers may not consider dental implications of these. Patients may not think to disclose these medications to their dentist.

**Materials and Methods:** A list of commonly prescribed Oral Nutritional Supplements in the UK and Ireland was compiled. Nutritional information was obtained from the manufacturers' website and arranged in order of decreasing sugar content. Potential dental implications are discussed and recommendations made for dental practitioners.

**Results:** Pre-formed Oral Nutritional Supplements can contain between 6.6 and 27.2 g of sugar per serving. Powdered Oral Nutritional Supplements, which are to be mixed with 200 ml whole milk, contain between 16.4 and 35.0 g sugar per serving. The "shot"-type Oral Nutritional Supplements contain less sugar, ranging from 0.0 to 4.0 g per serving.

**Conclusions:** The sugar content of frequently prescribed Oral Nutritional Supplements can be high. While they are beneficial in assisting the patient to maintain a healthy BMI, they may increase the risk of dental caries. Dental professionals should enquire specifically about Oral Nutritional Supplements during history taking, particularly in groups who are likely to be prescribed such supplements. Consideration should also be given to increasing caries-preventive measures for patients who take these supplements.

KEYWORDS

malnutrition, oral health, oral nutritional supplements

## 1 | INTRODUCTION

Oral Nutritional Supplements or food for special medical purposes can be defined as: "complete nutritional food with a formulation of nutrients adapted to a specific disease, disorder or medical condition, which may constitute the only source of nutrition for the person to whom it is addressed".[1] In short, "Oral Nutritional Supplements are sterile liquids, semi-solids or powders, which provide macro- and micronutrients… for individuals who are unable to meet their nutritional requirements through oral diet alone".[2] Oral Nutritional Supplements are separate from dietary/food supplements which provide vitamins, minerals and or/trace elements (eg Vitamin B12 complex tablets), and they must comply with the labelling and compositional requirements of Directive 1999/21 EC on Foods for Special Medical Purposes (FSMP)..[3]

Dietary advice which encourages the use of energy- and nutrient-rich foods is suggested as the initial approach, rather than the prescription of Oral Nutritional Supplements, for managing disease-related malnutrition.[4] However, Oral Nutritional Supplements are proven to be of benefit in individuals who have difficulty in maintaining their nutritional intake.[5] Furthermore, appropriate use of Oral Nutritional Supplements has been associated with reduced healthcare use, including a reduction in the number of hospital admissions and duration of hospital stays in people who are malnourished.[6]

NICE expert guidelines recommend the initiation of Oral Nutritional Supplements if patients are malnourished or "at risk" of malnutrition.[7] Malnutrition affects over 3 million people in the UK and 33 million people in Europe annually.[8] Malnutrition is particularly common among older people; it has been reported to affect 29%–61% of the elderly hospital population.[9] It is also seen in approximately 9% of the elderly population at home.[10]

Some common conditions for which Oral Nutritional Supplements may be prescribed are presented in Table 1.

As can be seen in Table 1, some courses of ONS are short term, such as peri-operatively, and therefore, intake for a short period of time is unlikely to have any long-term effect on the dentition. However, some conditions are chronic, such as dementia, and therefore the intake of Oral Nutritional Supplements over many years is more likely to have an impact on the dentition.

**TABLE 1** Some conditions where an individual may be prescribed ONS because of malnutrition

| |
|---|
| **Peri-operative surgical patients**[11] |
| Cancer patients[12] |
| People with poor appetite or loss of taste or smell[9] |
| Dementia, depression, anxiety[9,13] |
| Chronic heart failure and COPD[14] |
| HIV and other chronic infection diseases[15] |
| Gastrointestinal diseases (Crohn's disease, ulcerative colitis, short bowel syndrome)[16] |
| Chronic diseases such as kidney disease[17] |
| Cystic fibrosis[18] |

A study into nursing homes across 21 countries found that, of the 23 689 patients studied, 13.9% received Oral Nutritional Supplements.[19] This varied from country to country, with 43.2% of nursing home residents in the Turkish study receiving Oral Nutritional Supplements, while it was only 1.2% in Portugal.

## 2 | TYPES AND PRESCRIPTION OF ONS

There is a wide range of Oral Nutritional Supplements styles, such as milk, juice and yogurt style products. They also come in different formats (liquid, powder, pudding, pre-thickened), types (eg high protein, fibre containing, low volume) and energy densities (1.0–2.4 kcal/mL). The main carbohydrate source is either maltodextrin or glucose syrup; proteins can include cows' milk, whey, soy or animal protein; and fat sources are usually from soya bean, corn, palm nut or seeds. They differ in price, with the powdered supplements that require preparation generally the cheapest.20 Due to the cost of these, a number of government bodies have attempted to decrease the amount prescribed and have implemented "prescribing pathways" in order to decrease inappropriate prescription (Appendix 1). The selection of Oral Nutritional Supplements type is typically dietitian-led, with the dietitian generally making recommendations to the prescribing physician.[21] In the UK, registered dietitians have to right to prescribe supplements.[22] Table 2 lists the nutritional information of pre-formed bottle drinks, which range in sugar content from 6.6 g to 27.2 g. Table 3 lists the nutritional information of powdered Oral Nutritional Supplements, which are generally reconstituted with 150-200 ml of whole milk and range in sugar content between 16.4 g and 35.0 g. Table 4 lists the nutritional information of shot-type Oral Nutritional Supplements, which range in sugar content between 0.0 and 4.0 g.

Interestingly, when dietitians are asked what factors they take into account when choosing what Oral Nutritional Supplement to prescribe, the sugar content is rarely singled out as a separate factor. Among the commonly cited factors that influence clinical prescribing practice are nutritional value, patient palatability, patient acceptability, tolerance and hospital contracts.[21]

## 3 | DENTAL IMPLICATIONS

Oral Nutritional Supplements are often referred to as "sip feeds",[23,24] because the patient is encouraged to sip on them throughout the day "little and often", in order to minimise appetite suppression.[25,26] From a dental perspective, eating between meals can increase the risk of caries, and both the amount and frequency of sugar consumption contribute to caries lesion formation.[27,28] Accordingly, the World Health Organisation released guidelines recommending that free sugars should provide ≤10% of energy intake and suggesting further reductions to <5% of energy to protect dental health throughout life.[29] Unfortunately, that document did not address sugar intake in individuals who suffer from malnutrition, merely stating: *"Intake of free sugars is not considered an appropriate strategy for*

**TABLE 2** Selected nutritional information ONS Sip feeds: pre-formed bottle drinks. These are listed in decreasing sugar content order

| Product | Serving Size | Calories (kCal) | Carbohydrates (g) | Protein (g) | Sugar (g) |
|---|---|---|---|---|---|
| Fortijuice® | 200ml | 300 | 67.0 | 7.8 | 27.2 |
| Ensure® Plus Juice | 220ml | 330 | 71.9 | 10.6 | 20.7 |
| Fortisip® Compact (2.4 kcal/mL): | 125ml | 300 | 37.1 | 12.0 | 19.4 |
| Fortisip® Compact Fibre | 125ml | 300 | 31.5 | 16.0 | 17.6 |
| Fortisip® Compact Protein (2.4 kcal/mL): | 125ml | 306 | 31.4 | 24.0 | 17.1 |
| Fresubin® Jucy | 200ml | 300 | 67.0 | 8.0 | 16.0 |
| AYMES® ActaGain 2.4 Complete Maxi | 200ml | 480 | 57.6 | 19.2 | 16.0 |
| Ensure® Plus (1.5 kcal/mL) | 200ml | 300 | 40.4 | 12.5 | 13.0 |
| Altraplen® Compact | 125ml | 300 | 36.0 | 12.0 | 14.5 |
| Fortisip® (1.5 kcal/mL) | 200ml | 300 | 36.4 | 16.0 | 13.4[a] (2.2 unflavoured) |
| AYMES® Complete | 200ml | 300 | 36.0 | 12.0 | 12.0-13.6 [a] |
| Ensure® Compact | 125ml | 300 | 36.0 | 12.8 | 7.8 |
| Fresubin® 2 Kcal Fibre Mini Drink | 125ml | 250 | 27.1–27.3[a] | 12.5 | 7.4 |
| Fresubin® 2 Kcal Mini Drink | 125ml | 250 | 28.1 | 12.5 | 6.6-7.3[a] |

[a]Where there is a range of values, this relates to the different flavours available.

**TABLE 3** Selected nutritional information of powdered ONS. These are listed in decreasing sugar content order

| Product | Serving size | Calories (kCal) | Carbohydrates (g) | Protein | Sugar (g) |
|---|---|---|---|---|---|
| Foodlink Complete™ with fibre | 63 g Sachet (made with 200 mL whole milk [b]) | 397 | 42.0 | 19.0 | 35.0 |
| AYMES® Shake | 57 g Sachet (made with 200 mL whole milk [b]) | 379-383[a] | 39.8-42.3[a] | 19.0 | 27.3-34.2[a] |
| Foodlink Complete™ | 57 g Sachet (made with 200 mL whole milk [b]) | 383 | 41.0 | 19.0 | 34.0 |
| Scandishake® Mix | 85 g Sachet (made with 200 mL whole milk [b]) | 585 | 68.3 | 12.5 | 30.4 |
| Nutriplete® Shake | 57 g Sachet (made with 200 mL whole milk [b]) | 388 | 44.2-44.6[a] | 15.6-16.0 | 25.9-30.8[a] |
| Ensure® Shake | 57 g Sachet (made with 200 mL whole milk [b]) | 389 | 43.2 | 17.0 | 28.7 |
| Complan® Shake | 57 g Sachet (made with 200 mL whole milk [b]) | 380 | 44.7 | 16.0 | 27.5 |
| AYMES® Shake Compact | 57 g Sachet (made with 100 mL whole milk [b]) | 315-320 [a] | 37.2-37.6[a] | 15.0 | 22.7-29.5[a] |
| Fresubin® Powder Extra | 62 g Sachet (made with 200 mL whole milk [b]) | 397 | 47.9-48.5[a] | 17.7 | 20.9-23.5[a] |
| AYMES® ActaSolve Smoothie | 66 g Sachet (made with 150 mL water) | 296-298 | 41.2-41.5[a] | 10.7 | 16.4-17.9[a] |

[a]Where there is a range of values, this relates to the different flavours available.

[b]Please note that these shakes can also be reconstituted with water which would result in different nutritional values, however the recommended serving is with whole milk.

**TABLE 4** Selected nutritional information of ONS shots. These are listed in decreasing sugar content order

| ONS Shots | Serving size | Calories (kCal) | Carbohydrates (g) | Protein | Sugar (g) |
|---|---|---|---|---|---|
| Procal® Shots | 30 mL per shot | 100 | 4.0 | 2.0 | 4.0 |
| Altrashot | 30 mL per shot | 105 | 5.0 | 1.5 | 2.4 |
| Calogen® Extra Shots | 40 mL per shot | 160 | 1.8 | 2.0 | 1.4 |
| Fresubin® 5 kcal Shots | 30 mL per shot | 150 | 1.2 | 0.0 | 1.2 |
| Calogen® Shots | 30 mL per shot | 140 | 1.2 | 0.0 | 1.2 |

*increasing caloric intake in individuals with inadequate energy intake if other options are available".*[29] However: *"These recommendations do not apply to individuals in need of therapeutic diets, including for the management of severe and moderate acute malnutrition. Specific guidelines for the management of severe and moderate acute malnutrition are being developed separately".*[29]

Therefore, dentists are left in the situation where they may be unsure what oral hygiene/dietary advice to give individuals who have been prescribed Oral Nutritional Supplements for malnutrition. This can result in conflicting advice to the patient from the dietitian and dentist, which may have a detrimental effect on the behaviour, motivation and attitudes of the patient.[30]

As mentioned earlier, Oral Nutritional Supplements are generally not prescribed in isolation, but rather form part of the treatment of another condition. The management of any of the diseases mentioned in Table 1 will often involve the use of medications which can cause xerostomia, and this will increase the risk of dental caries.

It is also possible that the patient may not disclose to the dentist that he or she is taking oral nutritional supplementation, because they may not consider it necessary, or even consider an Oral Nutritional Supplements as medication. This is indeed a grey area; for example, the British National Formulary categorises Oral Nutritional Supplements as "borderline substances" or a "food that has characteristics of drugs".[31] A survey of patients presenting at a US dental school showed that while over 80% of patients surveyed "always informed" their dentist about the prescription drugs they took, only 63% informed them about supplements they took, and 14% thought it was "unimportant" to tell their GDP about supplements.[32] Thus, it may be prudent to investigate whether a patient is taking Oral Nutritional Supplements, especially if the dentist suspects that this may be the case, such as with a resident of a nursing home.

## 4 | SUGAR CONTENT OF ONS

Tables 2-4 list the most commonly prescribed ONS in Ireland and the UK. First-line ONS prescribed on the NHS include AYMES® products and Ensure®. Second-Line ONS products prescribed on the NHS include Ensure® Plus and Fortisip®. The majority of these are on the HSE's first-line standard ONS products ("List A" of supplements), which do not require reimbursement approval or "List B", non-first-line standard ONS products which do require prior reimbursement approval for dispensing on the Community Drug Schemes (Appendix 2). Many of these supplements are available in Australia (Ensure®, Fortisip®), Asia (Ensure® Plus, Fresubin® 2 kcal, Fortijuice®) and the USA (Ensure®).

It can be seen from Tables 2-4 that there is a discrepancy between the sugar content of the different types of ONS. The "shot"-type ONS (Table 4) are generally taken in one sitting as the volume is so small, whereas the larger sip feeds or reconstituted shakes can be consumed in multiple doses throughout the day. It can be seen here that although the calorific content of the different types of ONS is similar, the amount of sugar can vary considerably.

## 5 | DISCUSSION

In patients with malnutrition which cannot be managed through conventional diet alone, Oral Nutritional Supplements can be of huge benefit. However, from a dental perspective, there is a lack of studies on the effect that Oral Nutritional Supplements may have on oral health, in particular on caries increment in those on long-term Oral Nutritional Supplements. This paper shows that the sugar content of ONS can be substantial, with some of the more commonly prescribed supplements containing over 20 g of sugar per serving. It may be hypothesised from this that people who take certain supplements are at higher risk of caries. This risk is further compounded because people taking Oral Nutritional Supplements have concurrent disease which may be detrimental to their dental health, especially xerostomia/hyposalivation arising from certain medications or polypharmacy, with a recent study showing the "greater the number and dosage of medications being taken, the greater the xerogenic side-effects". There are no studies directly investigating caries rate in individuals who take Oral Nutritional Supplements, but the authors would recommend this as an area of future research.

Individuals who present at a dental practice may not disclose that they are taking ONS, and furthermore, this information may not be captured in a standard medical history form or diet sheet. Therefore, the dentist may be unaware of the true amount of sugar being consumed by the patient. This may result in an adequate caries risk assessment or dietary assessment.

It is likely that the patient's dietician or physician may not take into account the effect that a high sugar ONS may have on the dentition, and it is unlikely that they will have liaised with the patient's dentist beforehand.

## 6 | RECOMMENDATIONS FOR CLINICAL DENTAL PRACTICE

Ask patients whether they are taking Oral Nutritional Supplements, include it in the medical history form and diet sheet. It is important to note what type and how much they typically ingest daily: as seen above the sugar content can vary widely between the different types.

If a patient has been found to have a high rate of caries and is taking Oral Nutritional Supplements with a high sugar content, discuss with the patient's GMP or nutritionist regarding changing to an Oral Nutritional Supplements with a similar calorific content, but lower sugar content.

In patients who are taking Oral Nutritional Supplements long term, consider prescribing a high-fluoride toothpaste with 5000 ppm fluoride, recommending use of a fluoride mouthrinse at separate time of the day, and/or fluoride varnish application in practice, as appropriate.

## 7 | CONCLUSIONS

The sugar content of frequently prescribed Oral Nutritional Supplements can be high. While they are beneficial in assisting the patient to maintain a healthy BMI, they may increase the risk of dental caries. Dental professionals should enquire specifically about Oral Nutritional Supplements during history taking, particularly in groups who are likely to be prescribed such supplements. Consideration should also be given to increasing caries-preventive measures for patients who take these supplements.

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## CONFLICT OF INTEREST

The authors confirm that they have no conflict of interest, financial or otherwise, in the subject matter or materials discussed in this manuscript.

## AUTHOR CONTRIBUTIONS

NC and MH were involved in the conception and design of the article. N.C wrote the manuscript and formulated the final version. N.C and CH were involved in data collection and interpretation. MH, F.O'L, FB, AR and BP were involved in critical revision of the article, both from the dental and medical aspects. All authors read and approved the final manuscript.

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## SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

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