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ORIGINAL ARTICLE

Exploring reasons behind patient compliance with nutrition supplements before pelvic exenteration surgery

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Abstract

Purpose Compliance with oral nutrition support (ONS) is poorly reported in the literature. Many factors influence compliance, which could mask the true benefits of preoperative ONS. Surgical oncology patients, including pelvic exenteration patients, are often requested by healthcare workers to consume nutrition supplements before surgery. Exploration of barriers and enablers to compliance with nutrition supplements is needed to improve patient compliance and understand the real impact of preoperative ONS.

Method A qualitative study using semi-structured interviews was performed to investigate enablers and barriers to preoperative nutrition supplement compliance. Twenty participants who had been asked to consume 15 nutrition supplements, either immunonutrition or standard polymeric supplements, were interviewed. Inductive thematic analysis was used to determine major themes associated with compliance.

Results Twelve out of 20 participants were not compliant with recommended dosing. Well-nourished participants were more compliant than malnourished participants. Major themes associated with compliance were flavour, volume, texture, impact on dietary intake and motivation to consume supplements. Flavour differed between the two groups, negatively impacting compliance in the immunonutrition group. Volume, texture and impact on dietary intake also negatively impacted compliance whereas motivation positively impacted compliance.

Conclusion To overcome barriers and enforce enablers with nutrition supplement compliance, it is essential healthcare workers implement individualised interventions, taking into account nutritional status. A range of flavours, minimal volume and low viscosity supplements should be provided to address individual preference and minimise poor compliance. Better-targeted education and regular motivation are needed to improve compliance.

Keywords Preoperative period · Patient compliance · Enteral nutrition · Qualitative research · Elective surgical procedures

Introduction

Compliance with oral nutrition support (ONS) is an ongoing challenge for healthcare workers to enforce and monitor. Various factors influence patient compliance including disease states and treatment plans [1–4]. Oncology surgical patients can experience several symptoms due to their clinical condition and therapeutic treatment that impact their ability to comply with ONS regimes [5–7]. Many different ONS regimes have been utilised during the preoperative period for oncology patients to enhance patient outcomes and recovery.

The benefits of preoperative ONS for oncology surgical patients remain inconclusive [1, 3, 8–11]. The lack of research, study design and heterogeneity of current studies prevents the ability to determine the effects of preoperative ONS and draw useful conclusions [1, 3, 9]. Nutrition supplements in the preoperative period commonly focus on the consumption of carbohydrates, protein or immunonutrients that are aimed to improve different aspects of postoperative recovery [1, 3, 8–10, 12]. Compliance is generally underreported in these trials, which could influence the effectiveness of ONS [1]. Bruns et al. [1] suggested the lack of reporting on compliance should be addressed in preoperative ONS programs.

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Pelvic exenteration surgery is a major lower gastrointestinal surgery performed on patients with locally advanced or recurrent tumours of the pelvis [13]. Pelvic exenteration is the only potential cure for these types of cancer [14]. The average age of patients undergoing pelvic exenteration surgery is 59 years [15], with most studies reporting a higher number of females to males undergoing such surgery [16, 17]. Pelvic exenteration surgery has been associated with high rates of morbidity after surgery ranging from 37 to 100%, due to the extent and complexity of the surgery [15, 18]. The most prevalent postoperative complications include wound infection, intra-abdominal and pelvic collections, abscesses, urinary tract infections, intestinal obstruction, ileus, fistulas and urological complications [15, 16].

Malnutrition after pelvic exenteration surgery is also a concern for these patients. Beaton et al. [19] reported 76% of patients were well-nourished before pelvic exenteration surgery compared to 49% on discharge from hospital, indicating 27% of well-nourished patients became malnourished during their hospital stay after pelvic exenteration surgery. Preoperative nutritional status has been reported to be associated with postoperative complications in surgery for colorectal cancer [1, 20]. Many studies compare the effectiveness of preoperative ONS based on nutritional status or nutritional risk [8], therefore is important to take into account when investigating compliance.

Despite this, the barriers for patients to comply with ONS regimes before surgery and potential factors influencing compliance have not yet been explored. Greater understanding as well as recommendations on how to improve compliance is needed to enable oncology surgical patients to benefit from preoperative nutrition support.

The aim of this study, therefore, is to explore enablers and barriers for patients of overall compliance with preoperative oral nutrition supplements in patients undergoing pelvic exenteration surgery for cancer.

Materials and methods

Design

A qualitative study using semi-structured interviews was performed using inductive thematic analysis [21].

Participant selection

Individuals in this study were participants who had already enrolled in a randomised controlled trial (RCT) investigating the effects of preoperative immunonutrition supplements on length of stay at a large, tertiary referral hospital in Sydney, Australia. The RCT was prospectively registered on the Australian New Zealand Clinical Trials Registry (ACTRN12615000308594) and was undergoing recruitment at the time this study was completed. Participants were included in the RCT if they had undergone pelvic exenteration for curative measures, were able to consume nutrition supplements five days prior to their surgery and were 18 years of age or older. Participants were excluded from the RCT if they were unable to consent due to language barriers or cognitive function. Informed consent was obtained from all participants. Individuals who had consented and participated in the RCT, been discharged from hospital and able to verbally consent to participating in a semi-structured interview were then eligible for this qualitative study.

RCT protocol

Eligible participants were informed the RCT aimed to investigate the effects of preoperative ONS (immunonutrition or polymeric supplements) on length of stay, postoperative complications and immune function. Consented participants were asked to consume three nutrition supplements every day for five days (15 supplements in total) prior to their pelvic exenteration surgery in addition to their standard dietary intake. Nutrition supplements were either 15 immunonutrition vanilla-flavoured supplements (Nestle Advanced Impact Recovery™) or 15 vanilla-flavoured standard polymeric supplements (Nestle Resource Protein™). Participants were provided with verbal and written instructions prior to commencing the preoperative ONS regime. Nutritional status was determined using the patient-generated subjective global assessment (PG-SGA) tool at time of recruitment. Complete compliance was defined as drinking all 15 nutrition supplements. Compliance was reported as amount of drinks consumed out of the total 15. No encouragement to improve compliance took place during the intervention.

Qualitative protocol

An independent dietitian researcher identified the most recent 20 consecutive, eligible participants (ten from each supplement group). Eligible participants were telephoned by their treating dietitian within 6 months of having pelvic exenteration surgery and asked if they would be interested in participating in a semi-structured interview investigating compliance with the oral nutrition supplements they had previously consumed for the RCT. If participants were interested, they were contacted within one week by another independent dietitian researcher and provided informed consent before undertaking the semi-structured interview. Recruitment continued until data saturation was reached. Transferability of the results was limited as the study was only conducted at one site; however, as the intervention occurred prior to surgery, transferability of the results to more general pelvic oncology populations is possible.

Measures and data collection

Ten interview questions were developed to explore enablers and barriers to consuming nutrition supplements prior to surgery (Table 1). Interview questions were peer reviewed by two researchers experienced in delivering nutrition support. Interview questions were piloted on two participants who had enrolled in the same RCT but were still admitted to hospital and were therefore not eligible for this study. In line with an inductive approach, interview questions were altered based on participant responses as themes emerged during the data collection process.

One-on-one semi-structured interviews were conducted over the telephone at a time that suited each participant. Two independent dietitian researchers not known to the participants conducted the interviews thereby resulting in researcher triangulation and reducing potential bias [22]. Telephone interviews were deemed appropriate as the anonymity may have improved accuracy and truthfulness.

Interviews were audio-recorded and took between 4 and 11 min to complete with the average being over 7 min. Neutrality was ensured with the use of open-ended questions, withholding researcher's assumptions/bias and by transcribing all interviews in participant's own words. Demographic, medical and nutrition supplement information were obtained from medical records.

Due to small sample size and nonparametric nature of the data, all results were recorded as median and range.

Table 1 Interview questions

1. What made you agree to participate in the preoperative immunonutrition study?
2. What was your reaction when we requested you to consume nutrition drinks before your surgery?
3. Do you have any comment on the amount of nutrition drinks we asked you to consume?
4. How did you find the flavour of the nutrition drink?
5. If you were unable to finish the nutrition drinks, why?
6. If you were unable to finish the nutrition drinks, were there any feelings you had leading up to the surgery that could have played a part in preventing you from drinking them?
7. If you drank the nutrition supplements did it mean you ate less than your normal diet before surgery? Why?
8. Did the nutrition drinks induce any of the following symptoms?
The below are examples to help prompt the interviewee
   a. Early satiety
   b. Nausea
   c. Vomiting
   d. Bloating
   e. Change in bowel motions
9. Are nutrition supplements before surgery something you would recommend to other people going through the same surgery? Why?
10. Do you have any advice on what to do differently next time?

Data analysis

The interviews were transcribed verbatim. De-identified interview transcripts were uploaded into NVivo version 10.0.641.0 SP6 (32 bit) software (QSR International 1999–2014). Thematic analysis was conducted independently by two researchers (SH and SC), which included a researcher experienced in qualitative methodologies (SC). This increased the credibility of the results. Initial coding of the transcripts involved creating an extensive list of potential codes. Coding of the data was undertaken systematically and further analysis led to a refined list of codes. These codes were organised into themes. Discussion between the two researchers took place to compare codes and themes and to reach consensus on a list of major themes. Quotations were extracted from the data to emphasise the major themes by providing examples.

Results

All 20 eligible participants that were approached to be involved in the study consented. Twenty participants who had undergone pelvic exenteration surgery were interviewed. Demographic, nutritional status, treatment and compliance information are shown in Table 2. Ten participants were provided with 15 immunonutrition supplements and 10 participants were provided with 15 standard polymeric nutrition supplements.

Twelve out of 20 participants were not able to consume the total amount of the recommended dose. The overall compliance ranged from 1–15 and the median amount of nutrition supplements consumed was 12. In the immunonutrition group, compliance ranged from 2–15 and the median amount of nutrition supplements consumed was 11.5. In the standard polymeric supplement group, compliance ranged from 1–15 and the median amount of nutrition supplements consumed was 12.

The median age of participants was 62 years, ranging from 33 to 79 years. Compliance for participants aged 55 years and above, 40–54 years and less than 40 years ranged from 1–15, 6–15 and 2–14 respectively for each age group. Median compliance for participants aged 55 years and above, 40–54 years and less than 40 years was 11, 15 and 12 respectively.

There were 14 female and six male participants. The median compliance for females was 12 nutrition supplements ranging from 1–15 compared to a median compliance of 11.5 nutrition supplements ranging from 5–15 for males.

Thirteen participants were well-nourished compared to seven malnourished participants prior to surgery. Median compliance for well-nourished participants was 15 ranging from 1–15 nutrition supplements compared with a median compliance of seven ranging from 5–15 nutrition supplements for malnourished participants. Seven out of eight participants who were able to consume the entire recommended dose were well-nourished.

Table 2 Demographics, nutritional status, treatment and compliance information

Participant number	Age (years)[a]	Sex	Nutritional status	Treatment	Compliance[b]
1	54	F	Well-nourished	Immunonutrition	15
2	41	F	Well-nourished	Immunonutrition	15
3	68	F	Well-nourished	Standard polymeric	15
4	51	F	Malnourished	Standard polymeric	6
5	68	F	Well-nourished	Standard polymeric	1
6	69	F	Malnourished	Immunonutrition	5
7	52	M	Well-nourished	Immunonutrition	15
8	45	F	Malnourished	Standard polymeric	15
9	64	M	Malnourished	Immunonutrition	5
10	68	F	Well-nourished	Standard polymeric	11
11	36	F	Well-nourished	Standard polymeric	14
12	64	F	Well-nourished	Standard polymeric	12
13	51	F	Malnourished	Standard polymeric	10
14	79	M	Well-nourished	Immunonutrition	8
15	79	M	Malnourished	Immunonutrition	7
16	35	F	Well-nourished	1mmunonutrition	2
17	33	F	Malnourished	Standard polymeric	12
18	60	M	Well-nourished	Immunonutrition	15
19	70	F	Well-nourished	Standard polymeric	15
20	68	M	Well-nourished	Immunonutrition	15

[a] Age at treatment commencement

[b] Amount of nutrition supplements consumed out of the total 15

There were five major themes that were associated with compliance of preoperative nutrition supplements. The major themes included flavour, volume, texture, impact on normal dietary intake and motivation to consume nutrition supplements. The top two themes reported to influence compliance were flavour and volume of nutrition supplements. The only difference between immunonutrition and standard polymeric supplements was flavour. All other themes were consistent between both groups.

Flavour

Opinions on flavour varied between the two nutrition supplements. No one disliked the standard polymeric supplement, whereas six out of ten participants who consumed the immunonutrition supplement disliked the flavour. The majority of participants who consumed the standard polymeric supplement found the flavour neutral and did not report it impacted on compliance, unlike the immunonutrition supplement, which was reported to decrease compliance.

Immunonutrition supplement:

> I didn't like the drinks before the surgery, I didn't drink them because I didn't like the taste of them, I just don't like them. They're not for me. Other people might like them but I just couldn't drink them (Participant 16, immunonutrition, 13% compliance)

Standard polymeric supplement:

> I didn't find the taste of it repulsive, it can have a bit of a strong flavour but it didn't cause me any hassles and I was quite content (Participant 3, standard polymeric, 100% compliance)

Volume

Eight out of the 20 participants interviewed believed the volume of nutrition supplements was excessive. Seven of these participants reported the volume of nutrition supplements decreased their compliance. There was no difference between the two groups. A common recommendation among all participants was to decrease the volume of nutrition supplements prior to surgery.

> I was having it three times a day, every time I had a meal I had to have one. I couldn't do it. I would say 'lessen the amount'. The amount of times it was coming, in the

end I couldn't even look at it. (Participant 13, standard polymeric, 67% compliance)

Texture

It was reported that texture of the nutrition supplements was too thick or heavy by six participants in total. This was consistent between both groups. Participants described the texture as being difficult to consume, especially if they were suffering from other symptoms, such as nausea or poor appetite. Texture was reported to impact compliance.

> Flavours were ok, but I just found when you're not well (I'd been on medication and chemotherapy), I wasn't well at all, and having trouble eating, I found they (supplements) were heavy, very thick and because of nausea it would take a couple of hours to get one little thing (supplement) down, and once I got it down I was full and really didn't feel like anything else (Participant 6, immunonutrition, 27% compliance)

Impact on dietary intake

Twelve out of 20 participants reported they ate less than usual because of the nutrition supplements.

> When I had the drinks (supplements), I had less food. (Participant 14, immunonutrition, 53% compliance)

Motivation to consume nutrition supplements

Motivations to consume the nutrition supplements before surgery impacted on compliance. The two most common motivators included:

1. To improve one's own condition before surgery
2. Assist with research and therefore help other patients in future

> I participated in the study to make sure I was in the best condition I could be before surgery. It's basic common sense. I was very strong when I went in (to surgery) so whatever I could do to make it all better, I did. (Participant 19, standard polymeric, 100%)

> I thought it might be a benefit to the greater community and to advance research (Participant 18, immunonutrition, 100% compliance)

Discussion

The aim of this study was to explore enablers and barriers around patient compliance with preoperative nutrition supplements in patients undergoing pelvic exenteration surgery for cancer. Many enablers and barriers were identified, including flavour, volume, texture, dietary intake, motivation and nutritional status. Although there were limitations to this study, recommendations have been made to healthcare workers to assist them improve patient compliance with preoperative ONS.

Age and gender have been reported to impact compliance with therapeutic treatments [4, 23, 24]. Age ranges, based on compliance, have been previously described as 55 years of age and above, 40–54 years of age and under 40 years of age [24]. The literature around older adults and compliance is inconsistent [23, 24]. Some studies suggest older adults are non-compliant due to age-related decreased oral intake, physical restrictions or cognitive impairment resulting in the inability to follow simple instructions [4, 23, 24]. There are more consistent outcomes in the literature around young adults and poorer compliance, which is commonly explained due to an increased number of competing priorities in their life [24]. Although age and gender of participants in this study are comparable to the pelvic exenteration patient population, further studies are required to determine if age or gender influences preoperative nutrition supplement compliance.

Flavour was the only theme that differed between nutrition supplements. Majority of participants in the immunonutrition group disliked the flavour whereas majority of participants in the standard polymeric supplement group were partial to the flavour. An active ingredient in immunonutrition are omega-3 fatty acids, which are derived from fish oil. Fish oil supplements are often avoided by consumers because of their 'fishy taste' which is due to the oxidisation of polyunsaturated fatty acids. This could explain the difference between the preference of flavour between the two supplements [25]. As flavour is one of the main priorities of oral intake, this must be considered by healthcare workers [26]. Hubbard et al. [23] reported using a variety of oral nutrition supplement flavours (not types) significantly increased mean compliance. Immunonutrition supplements are available in very limited flavours and further collaboration with industry is required to meet consumer needs and improve compliance. In addition to that, particular needs of certain cohorts need to be addressed. Oncology surgical patients' palatability can be altered during treatment. Taste changes in oncology surgical patients

are not uncommon and healthcare workers need to provide appropriate support to minimise patient symptoms [6, 7]. Evidence suggests milk-based supplements tend to be more tolerated than other nutrition supplements in oncology patients and therefore should be healthcare workers' first choice of treatment [2].

Volume, texture and impact on oral diet were all themes identified by patients that impacted compliance. The volume of the ONS regime provided was excessive for some participants, which decreased compliance. Greater energy density and lower volume supplements have been significantly associated with higher compliance compared to lower energy density and higher volume supplements [23]. Texture was reported to decrease compliance generally because of the thickness of the supplements. Supplements with higher viscosity can increase prolonged satiety compared to supplements with lower viscosity, which could have impacted participants' ability to consume greater amounts [27]. Although participants reported ONS impacted dietary intake, this is inconsistent with other findings [23]. This may be due to the other factors including viscosity, clinical symptoms, nutritional status and volume of the supplements. Healthcare workers along with industry need to continue to develop new formulas that are more energy dense, less in volume and less viscous to improve compliance and meet patient needs. This emphasises the importance of determining effective amounts, if any, of ONS prior to surgery in order to provide realistic ONS goals particularly for surgical oncology patients. It also highlights the need for all future studies to report accurate compliance data and analyse results based on compliance and to come to a consensus on a recommended dose that can then be validated using nutritional status tools such as the PG-SGA or handgrip strength.

Motivation to consume preoperative nutrition supplements played a clear role in determining compliance. The discovery of patient motivations behind this intervention suggests that the provision of nutrition supplements is not a passive task, rather an active task, meaning patients process and consider information provided to them [28]. Patient involvement and education are therefore crucial to increase motivation and subsequently improve compliance. Compliance of preoperative ONS in colorectal cancer patients is poorly reported and no measures have been utilised to improve compliance during interventions [1]. Encouragement, reminders and reiteration of instructions were not provided during this intervention but should be conducted in future research to assess its effectiveness. Compliance tends to be higher if instructions include 'consume between meals'; 'in small doses' and 'at similar times each day' [23]. These instructions should be provided to patients regularly throughout interventions. Social support can also improve remembering to take therapeutic treatment and motivation around positive attitudes [24]. Healthcare workers should identify supportive relatives and friends and collaborate with them to provide patient support.

It is well documented that nutritional status is associated with patient outcomes after surgery [1, 20, 29, 30]. To our knowledge, no studies have investigated the impact of nutritional status on compliance with ONS. Thirteen out of 20 (65%) participants were well-nourished prior to surgery, which is similar to other studies [19]. Despite small numbers, median compliance for well-nourished participants was 15 and therefore considered complete compliance compared to the median compliance for malnourished patients which was seven, less than half complete compliance. Seven out of eight participants who were able to consume the entire recommended dose were well-nourished. Although further studies with larger numbers are required to determine a significant association between compliance and nutritional status, it should be noted that decreased nutrition supplement compliance in malnourished patients could be due to deconditioning and clinical symptoms related to malnutrition in oncology cohorts [5, 20]. As benefits of preoperative ONS have been reported in well-nourished patients, perhaps more interventions and monitoring of malnourished patients are required to maximise the benefits received [3].

Evidence clearly supports ONS in malnourished patients prior to surgery, yet acknowledges the difficulties in implementing them [1]. Barriers for malnourished patients to consume oral nutrition supplements must be addressed to improve outcomes for at-risk surgical oncology patients. ESPEN guidelines recommend nutrition counselling and use of ONS as the first line of nutritional therapy, therefore strategies overcoming difficulties consuming oral nutrition supplements should be utilised [31]. Strategies including changing flavours, selecting energy dense and low volume supplements should be provided to malnourished patients on an ongoing basis during their treatment. Individual care plans should be developed and re-visited with malnourished patients to ensure they are invested and motivated in their nutrition care plan. Resources should be targeted at these patient groups to enhance their preoperative condition.

There were limitations to this study. The cohort was small and only included patients who had undergone pelvic exenteration surgery; therefore, transferability of the study to other patient groups is reduced; however, the outcomes of this study can be used to improve local practice. As this was a self-reported study relying on participant memory, recall bias could have occurred; therefore, inaccurate descriptions or feelings associated with preoperative nutrition supplements may have been reported. Only two nutrition supplements were assessed in this study, hence cannot be generalised to the use of other nutrition supplements. In future studies, the use of real time diaries should be utilised to capture the dietary intake of all participants. Despite this, this study highlights the importance of barriers and enablers to consuming preoperative nutrition supplement

and the effects on compliance. It is imperative future research reports on compliance data and accurate analysis is undertaken.

In conclusion, healthcare workers can implement several strategies to improve patient compliance with preoperative ONS in oncology surgical patients. Identification of malnourished patients, as well as recognising patient cohort characteristics, is essential. Individualised ONS interventions must be provided to these patients to potentially improve postoperative outcomes. A range of oral nutrition supplement flavours should be provided to every patient to assist with compliance. Energy dense, low volume supplements should be provided wherever possible and healthcare workers need to continue to work with industry to ensure products meet patient needs. All patients should be motivated to comply throughout their ONS regime and provided with clear and regular instructions. Patient support networks should be utilised to encourage compliance. Further investigations are required to consolidate the findings.

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Compliance with ethical standards

Ethics approval to conduct this research was obtained from the Sydney Local Health District Human Ethics Review Committee.

Conflict of interest The authors declare that they have no conflict of interest.

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