

# Blenderized Tube Feeding: A Survey of Dietitians' Perspectives, Education, and Perceived Competence

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## ABSTRACT

Increasingly, patients and their caregivers desire blenderized tube feeding (BTF) as an alternative or adjunct to commercial enteral formula. Although dietitians are central in the care of tube fed patients, they do not necessarily have training or experience with BTF and may therefore find it challenging to manage the nutrition of patients who opt for this enteral nutrition approach. To describe dietitians' perspectives, perceived competence, and education on BTF, a cross-sectional survey was conducted by use of an original questionnaire. Dietitians with the authority to practice enteral nutrition in the province of British Columbia, Canada, were included in the study (n = 715). Of the 221 respondents (31% response rate), 28% reported being knowledgeable about BTF, and 24% reported confidence managing patients on BTF. Few agreed they had the expertise to design, administer, or teach administration of BTF (29%, 15%, and 24%, respectively). In regards to education, 27% of respondents did not have BTF education of any kind, and those with BTF education reported it to be primarily derived from informal sources such as self-directed study and learning from colleagues or patients. These results indicate that among dietitians, formal BTF education is uncommon, and there is limited perceived competence on BTF practice.

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## RÉSUMÉ

De plus en plus, les patients et leurs aidants souhaitent opter pour une alimentation par sonde de nourriture en purée (ASNP) en remplacement des préparations entérales commerciales ou en association avec celles-ci. Bien que les diététistes jouent un rôle central dans les soins aux patients alimentés par sonde, ils n'ont pas nécessairement de formation ni d'expérience relativement à l'ASNP et peuvent donc avoir de la difficulté à gérer l'alimentation des patients qui choisissent cette approche de nutrition entérale. Pour décrire les perspectives des diététistes, les compétences perçues et la formation sur l'ASNP, une enquête transversale a été menée au moyen d'un questionnaire original. Les diététistes autorisés à pratiquer la nutrition entérale dans la province de la Colombie-Britannique, au Canada, ont été inclus dans l'étude (n = 715). Des 221 répondants (taux de réponse de 31 %), 28 % ont indiqué avoir des connaissances sur l'ASNP, et 24 % ont indiqué être à l'aise de gérer les patients recevant une ASNP. Peu de répondants ont indiqué avoir l'expertise nécessaire pour concevoir, administrer ou enseigner l'administration d'une ASNP (29 %, 15 % et 24 %, respectivement). En ce qui concerne la formation, 27 % des répondants ont indiqué n'avoir aucune formation sur l'ASNP, et ceux ayant reçu une formation à cet égard ont indiqué qu'elle provenait principalement de sources non officielles comme l'auto-apprentissage et l'apprentissage par des collègues ou des patients. Ces résultats indiquent que chez les diététistes, une formation officielle sur l'ASNP est peu courante, et la compétence perçue concernant la pratique de l'ASNP est limitée.

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## INTRODUCTION

Commercial formula (CF) has been the mainstay of enteral nutrition support for decades and has a well-established position in clinical nutrition practice [1, 2]. There is, however, a growing number of enterally fed patients interested in homemade blenderized tube feeding (BTF)—making their own formula from blended food and fluids [3, 4]. This trend appears to be due to an emerging view among patients and their caregivers that BTF is more natural, better tolerated, and has a more appealing ingredient profile than CF [4]. Depending on patients' insurance and funding options, BTF may also be considerably less expensive [5].

While dietitians are pivotal in the care of enterally fed patients, they do not necessarily have experience with BTF or the training to confidently incorporate its use into practice [6–10]. Studies have identified that dietitians have concerns

pertaining to BTF; including bacterial contamination, tube occlusions, and nutritional inadequacy [10, 11]. It may be that these perceived risks, along with possible knowledge deficits, are contributing to hesitancy among dietitians to include BTF in their practice. Reluctance to deviate from the use of CF could result in a reduction of the dietitian's role as patients and caregivers turn to the internet or unregulated nutrition practitioners for BTF information and guidance [4].

This study aimed to describe dietitians' perspectives and education on BTF as well as their perceived competence in managing patients who use BTF for enteral nutrition.

## METHODS

A cross-sectional survey was conducted by use of an original questionnaire developed by the research team and hosted by an online platform (Checkbox, Version 6.0, Watertown, MA,

2017). Ethics approval was granted by the University of British Columbia Research Ethics Board. The validity and reliability of the questionnaire was not tested; however, it was piloted by a group of dietitians to ensure functionality and clarity of questions. In January 2017, an invitational email containing the link to the questionnaire was distributed by the College of Dietitians of British Columbia (CDBC), the provincial regulatory body for dietitians in British Columbia, Canada. In British Columbia, enteral nutrition practice is restricted to dietitians with special authority. To be included in the study, respondents were required to be registered with the CDBC, holding this special authority (n = 715). The survey was open for 2 weeks, and a reminder email was sent after 1 week.

The anonymous questionnaire focused on homemade BTF which was defined as “food and fluids that have been blended as needed for consumption through a feeding tube.” Views on commercially available food-based formulas were not explored. There were multiple choice questions pertaining to demographics, followed by a series of Likert scale questions exploring dietitians’ perceived competence related to BTF and support for its use. Next were multiple choice questions on perceptions of BTF as compared with CF, education on the topic of BTF, interest in learning about BTF, perceived barriers to the use of BTF, and general views on patients’ experience with BTF.

To ensure anonymity, the resulting response data were aggregated for analysis. Response frequencies and relationships between categorical variables were analyzed using SPSS (IBM, Version 21, Armonk NY, 2017). Tests included  $\chi^2$  and Fisher’s exact.

## RESULTS

Of the 715 dietitians meeting the inclusion criteria, 31% (n = 221) completed the questionnaire. Respondent characteristics are displayed in Table 1.

### Competence

The majority of respondents did not agree that they were knowledgeable regarding BTF or could confidently manage patients on BTF. Likewise, few agreed they had the expertise to design BTF, administer BTF, or teach administration of BTF (see Table 2).

### Education

Twenty-seven percent of respondents (n = 60) reported having had no BTF education of any kind. Respondents with BTF education (n = 161) were asked to indicate all applicable sources of their BTF education. Self-directed learning was the most common (68%, n = 109), followed by learning from colleagues (45%, n = 73), learning from patients (44%, n = 71), and workplace education sessions (31%, n = 50). Twelve percent (n = 19) reported learning about BTF at professional conferences. Education where learning was guided by a formal curriculum was uncommon among respondents. Of all respondents (n = 221), only 7% (n = 16) indicated university course work

**Table 1.** Demographics of responding dietitians (n = 221).

Characteristic	No. (%)
Years of experience	
<5 y	64 (29)
5–15 y	75 (34)
16–25 y	42 (19)
>25 y	40 (18)
Primary practice setting	
Acute care	98 (44)
Ambulatory care	28 (13)
Extended care	44 (20)
Community	31 (14)
Other	20 (9)
Patient population <sup>a</sup>	
Infant (0–12 m)	38 (17)
Child/youth (13 m–18 y)	47 (21)
Adult (19–65 y)	157 (71)
Older adult (>66 y)	161 (73)
Working with patients who are enterally fed at home	
Yes	126 (57)
No	95 (43)
Experience working with patients who use blenderized tube feeding	
Yes	99 (45)
No	122 (55)

<sup>a</sup>Multiple responses allowed.

was a source of BTF education, and 10% (n = 22) received BTF education in dietetic internship. When asked if they would like to learn more on the subject of BTF, 89% (n = 197) of the survey respondents responded “yes”.

Respondents with BTF education had greater perceived competence with respect to BTF, compared with dietitians without BTF education (see Table 3).

### Barriers

When asked to select all applicable factors perceived as barriers to incorporating BTF into practice, the most common selections were: limited provider resources (85%, n = 172), limited patient and caregiver resources (80%, n = 162), personal knowledge limitations (66%, n = 133), limited support from supervisors (24%, n = 49), and limited evidence to support BTF (40%, n = 80). Twenty-five percent of respondents (n = 50) incorrectly believed the CDBC did not support the use of BTF.

### Comparison

When comparing BTF with CF, most dietitians felt that BTF is equally effective in meeting the nutritional goals of patients

**Table 2.** Dietitians' perceived competence related to homemade blenderized tube feeding (BTF; n = 221).

Survey statement	Agree <sup>a</sup> No. (%)	Neutral No. (%)	Disagree <sup>b</sup> No. (%)
I am knowledgeable regarding BTF	61 (28)	55 (25)	105 (48)
I can confidently manage a patient who has chosen BTF	54 (24)	69 (31)	98 (44)
I have the expertise to design BTF to meet the nutritional goals of patients	63 (29)	43 (19)	115 (52)
I have the expertise to administer BTF to patients	34 (15)	47 (21)	140 (63)
I have the expertise to teach caregivers or patients to administer BTF	53 (24)	51 (23)	117 (53)

<sup>a</sup>Agree = collapsed categories of strongly agree and agree.

<sup>b</sup>Disagree = collapsed categories of strongly disagree and disagree.

**Table 3.** Influence of blenderized tube feeding (BTF) education on dietitians' perceived competence.

Survey statement	With BTF education (n = 161), agree <sup>a</sup> ; no. (%)	Without BTF education (n = 60), agree <sup>a</sup> ; no. (%)	P value
I am knowledgeable regarding BTF	58 (36)	3 (5)	<0.0001
I can confidently manage a patient who has chosen BTF	52 (32)	2 (3)	<0.0001
I have the expertise to design BTF to meet the nutritional goals of patients	57 (35)	6 (10)	<0.0001
I have the expertise to administer BTF to patients	33 (21)	1 (2)	<0.0001
I have the expertise to teach caregivers or patients to administer BTF	49 (30)	4 (7)	<0.0001

<sup>a</sup>Agree = collapsed categories of strongly agree and agree.

(e.g., weight maintenance). BTF was perceived to be superior to CF in regards to cost effectiveness, tolerance, allergy management, and nutritional benefits (e.g., phytochemicals, fibre). BTF was viewed as carrying a higher risk of tube occlusions and bacterial contamination and seen as less convenient compared with CF. Refer to the Supplementary File<sup>1</sup> for detailed data.

### Experience

The questionnaire contained a multiple choice question that inquired, "How would you generally describe your patients' experience using homemade blenderized tube feeds?" Of the dietitians who responded (n = 105), 3% (n = 3) reported their patients' experience as "mostly negative", 32% (n = 34) indicated their patients' experience was "varied", and 65% (n = 68) reported their patients' experience as "mostly positive".

### Support

Of all respondents, 64% (n = 142) support the use of BTF, 28% (n = 61) felt neutral, and 8% (n = 18) were not supportive.

## DISCUSSION

### Perspectives

Respondents' prevalent support for the use of BTF and desire to learn more on the topic may be evidence that dietitians are becoming more accepting of BTF as an option for enteral

nutrition. In previous surveys of dietitians, nutritional inadequacy and concerns regarding nutrient composition were identified as potential issues or reasons why BTF was not used in practice [10, 11]. Dietitians' perspectives may be evolving, as an important finding of this survey was that most respondents viewed BTF to be equivalent to CF in meeting the nutritional goals of patients. This survey also identified that dietitians perceive BTF to be better tolerated; a view that aligns with findings from studies of pediatric patients on BTF and a survey of adult enteral nutrition patients [4, 12–14]. Additionally, the majority of respondents felt that BTF is more cost effective compared with CF. It is important to note that in British Columbia, the cost of CF for home tube feeding is not covered by the provincial medical services plan, and funding programs for home enteral nutrition are not accessible to all patients.

Findings were consistent with a survey of dietitians in the United Kingdom (UK) in that BTF was perceived to carry an increased risk of tube occlusions and bacterial contamination [10]. Analyses of formulas have shown that BTF is typically higher in viscosity than CF [15, 16]. This could be one reason why dietitians consider BTF to have a higher likelihood of occluding feeding tubes. However, in a study of 33 pediatric patients who received BTF by gastrostomy for 2 months, there were no reported tube occlusions [13]. Parents were instructed on proper preparation and administration techniques.

<sup>1</sup>Supplementary data are available with the article through the journal Web site at <http://dcjournal.ca/www.nrcresearchpress.com/doi/suppl/10.3148/cjdp-2019-007>.

This suggests that education of caregivers, and to the same extent patients, is an important factor in reducing the risk of tube occlusions.

In regards to bacterial contamination, dietitians may be influenced by previous research that has shown blended formulas prepared in hospitals have higher bacterial content than CF [17, 18]. It is reasonable to assume that the bacterial content of BTF prepared at home would be dependent on food safety practices, comparable with homemade food intended for oral consumption.

This study confirms previous findings that dietitians generally see positive patient experiences with the use of BTF [11]. There are, however, significant barriers to the inclusion of BTF in practice. Many respondents felt there is limited evidence to support the use of BTF. It may be that dietitians feel less secure with BTF as compared with CF as there is not a robust body of literature on the topic and there are relatively few published articles guiding practice [5, 19–24]. Resources for patients and their caregivers are just as imperative [25]. Greater availability of education materials, standardized recipes, and equipment lists would be highly useful for dietitians to ensure their patients are well-informed and well-prepared to use homemade BTF.

### Perceived competence and education

Without direction from knowledgeable clinicians, patients and their caregivers may have difficulty producing safe and nutritionally adequate homemade formula [26, 27]. It is therefore concerning that the majority of respondents did not agree that they had confidence, knowledge, and expertise with respect to BTF. Additionally, “personal knowledge limitations” was seen as a barrier to incorporating BTF into practice by two-thirds of responding dietitians.

The perceived competence of dietitians with BTF education was significantly greater than those without, a finding that highlights the importance of BTF education. Few dietitians had received formal BTF education in their dietetics training, whereas informal self-directed study and learning from patients or peers was predominant. Similar results were reported in the survey of UK dietitians [10]. Of the 77 respondents, 81% (n = 63) had never received professional training on BTF. The introduction of BTF in the academic curriculum and inclusion of BTF as an enteral nutrition learning objective in the practicum setting may help to ensure BTF competence for new dietitians. Education should include BTF design and analysis, as well as production and administration methods. For dietitians already in practice, efforts should be made to access BTF education to develop knowledge in this area of growing patient interest.

### Limitations

There is likelihood of response bias as dietitians with interest in BTF may have been more inclined to participate in the survey. The questionnaire was not validated and responses

were subjective; therefore, the competence-related findings are not necessarily representative of actual knowledge, confidence, and expertise. As the intent of the survey was to describe general perspectives on BTF, the questionnaire did not provide contextual information such as care settings, enteral nutrition administration methods, or the clinical condition of patients. Some dietitians may have been uncomfortable providing responses without such information, particularly when considering the limited evidence identifying BTF risks and benefits. Similarly, the multiple choice survey questions exploring perspectives on BTF as compared with CF did not describe the nutritional quality of the homemade BTF; therefore, some respondents may have had difficulty making response selections. Finally, this was a survey of dietitians in a single Canadian province; therefore, the findings may not be reflective of dietitians in general.

### RELEVANCE TO PRACTICE

The movement towards natural, whole foods for oral consumption and by tube feeding is gaining momentum. In cases where patients opt for BTF, dietitians must be prepared to advise on its design, preparation, and administration for safe and optimal nutrition. The limited competence identified by this survey suggests this would be challenging for many dietitians. Recognition of this issue is essential in order for dietitians in the clinical nutrition field to improve their BTF competence to better support patients who desire this approach. Education is essential to ensure that dietitians can confidently and capably manage the nutrition of patients who choose BTF.

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**Supplementary File 1.**

Dietitians' Perspectives on Homemade Blenderized Tube Feeding as Compared to Commercial Enteral Formula. (n=221)

Statement	Perception	No. (%)
In regards to meeting nutritional goals BTF <sup>a</sup> is	equally effective	106 (48%)
	more effective	32 (15%)
	less effective	32 (15%)
	not sure/no opinion	51 (23%)
In regards to nutritional benefits BTF has	equal nutritional benefit	72 (33%)
	superior nutritional benefit	81 (37%)
	inferior nutritional benefit	20 (9%)
	not sure/no opinion	48 (22%)
In regards to tube blockages BTF has	equivalent risk	26 (12%)
	higher risk	169 (76%)
	lower risk	0
	not sure/no opinion	26 (12%)
In regards to tolerance BTF is	equally tolerated	60 (27%)
	better tolerated	70 (32%)
	less tolerated	5 (3%)
	not sure/no opinion	86 (40%)
In regards to convenience BTF is	equally convenient	13 (6%)
	more convenient	4 (2%)
	less convenient	188 (85%)
	not sure/no opinion	16 (7%)
In regards to cost BTF is	equally cost effective	23 (10%)
	more cost effective	101 (46%)
	less cost effective	29 (13%)
	not sure/no opinion	68 (31%)
In regards to bacterial contamination BTF has	equivalent risk	26 (12%)
	higher risk	186 (84%)
	lower risk	0
	not sure/no opinion	9 (4%)
In regards to managing allergies BTF is	equally effective	62 (28%)
	more effective	88 (40%)
	less effective	17 (8%)
	not sure/no opinion	54 (24%)

<sup>a</sup> blenderized tube feeding