Nutrition 65 (2019) 27–32

Contents lists available at ScienceDirect

Nutrition

journal homepage: www.nutritionjrnl.com

Applied nutritional investigation

Variations in practice patterns for adult cancer patients on home parenteral nutrition in Canada

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ARTICLE INFO

Article History:
Received 28 November 2018
Received in revised form 12 January 2019
Accepted 25 January 2019

Keywords:
Advanced cancer
Home parenteral nutrition
Palliative care
Cancer malnutrition
Survival

ABSTRACT

Objectives: Cancer has become a major indication for home parenteral nutrition (HPN). However, the use of HPN in adult cancer patients is highly variable between countries and may also differ within each country. The aim of the present study was to characterize regional variations in practice patterns for cancer patients on HPN using data from the Canadian HPN Registry.

Methods: This retrospective analysis included all cancer patients ($n = 164$) enrolled in the registry from 2005 to 2016. Patient demographic and clinical characteristics were described. Differences in baseline characteristics were evaluated by province and duration of HPN therapy. Survival was estimated with the Kaplan-Meier method and compared among different tumor types and provinces using the log-rank test.

Results: The most common tumors were gastrointestinal (54.2%) and gynecologic (31.8%). Most patients were from the provinces of Ontario (54.3%) and Alberta (41.5%). Patients who received HPN for ≥3 mo (64.6%) had a higher baseline Karnofsky Performance Status (80 versus 50) and albumin (35 versus 26 mmol/L) compared with those on HPN for <3 mo. There were no differences in survival based on tumor category. Patients in Ontario programs had a longer median survival (11.3 versus 7.1 mo) and higher proportion of secondary indications for HPN relative to patients in Alberta programs.

Conclusions: Most cancer patients on HPN have gastrointestinal or gynecologic cancers. Those surviving for ≥3 mo have better baseline characteristics. Regional variability in the prevalence, selection, and survival of cancer patients receiving HPN suggests the need for consensus on the use of HPN in this population.

Introduction

Malnutrition is a common and recognized predictor of poor prognosis in cancer patients [1]. It affects up to 4 in 10 and is virtually ubiquitous in those with advanced disease [2,3]. The mechanisms leading to malnutrition often arise early in the natural history of cancer. These may involve a combination of local and systemic effects of the underlying tumor [4,5] in addition to complications of cancer therapy (e.g., short bowel syndrome, mucositis, radiation

The Canadian HPN Registry is currently supported by the Canadian Nutrition Society, Baxter, Medical Pharmacies Group Limited, and Calea. However, this study did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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https://doi.org/10.1016/j.nut.2019.01.021
0899-9007/

enteritis, and fistulae) [5,6]. The resulting malnutrition accounts for significant morbidity, including decreased treatment response rates [2,3,6,7], increased treatment toxicity [6,7], worsened quality of life [7–9], and reduced survival [2,3]. Despite these consequences, the treatment of malnutrition in cancer patients is seldom prioritized in practice and is quite variable across centers [10].

Cancer malnutrition resulting from intestinal failure—the inability to maintain adequate nutrition or hydration by mouth or gut [11]—is no exception. Although home parenteral nutrition (HPN) has emerged as a relevant feeding modality in this setting [4,5], its use is not standard practice. Home parenteral nutrition involves the intravenous administration of daily nutritional requirements on an outpatient basis [4]. Although HPN may improve nutritional status and prevent premature death by starvation [9], long-term use has associated risks, including catheter-related bloodstream infections (CRBSIs), thrombosis, and parenteral nutrition–related liver disease [9,12]. Furthermore, there is a lack of high-quality evidence regarding the effects of HPN on survival and quality of life in cancer patients because of the ethical challenges associated with conducting a randomized controlled trial in this population [9]. Previous data have indicated that cancer patients receiving HPN have a median survival ranging from 66.5 to 180 d [13,14], which is longer than the reported life expectancy of those with untreated cachexia (35–40 d) [15]. With regard to quality of life, there is emerging evidence indicating the benefits of HPN therapy in cancer patients. Recent data from observational studies by Cotogni et al. [16], Senesse et al. [17], and Vashi et al. [18] suggest that HPN may improve quality of life and performance status as early as 1 mo posttreatment, although older studies present conflicting results. Because these effects have yet to be confirmed with stronger levels of evidence, cancer-specific guidelines from the European Society for Parenteral and Enteral Nutrition (ESPEN) remain vague [9,19,20], possibly contributing to practice disparities among centers. Currently, ESPEN recommends initiating HPN in adult cancer patients based on the following criteria: inability to meet nutritional requirements orally or enterally with risk of death from malnutrition; life expectancy ≥2 to 3 mo; Karnofsky Performance Status (KPS) ≥50; absence of severe organ dysfunction; absence of liver or lung metastases; strong patient desire with appropriate caregiver support; approval by the providing clinician; and availability of a multidisciplinary nutrition support team [9,19,20].

Despite this, cancer is a major indication for HPN in many programs. In the Netherlands [21], Italy [22], and Switzerland [23], oncology patients comprise 60% or more of all HPN users (Table 1). This is in contrast with the United Kingdom [21] and United States [24,25], which have previously reported proportions as low as 5% of their respective HPN populations. In Canada, cancer was a relatively uncommon indication for HPN before 2008, with a prevalence of 17% among HPN patients [26]. However, a recent analysis of the Canadian HPN Registry revealed more than a doubling in this percentage over the last 10 years, with a proportional decrease in patients with short bowel syndrome [26]. These national numbers prompted us to examine whether the recent trends are reflective of regional practice patterns in the Canadian provinces, which have their own health care system and a varying degree of HPN programming.

Table 1
Prevalence of cancer as an indication for HPN in selected countries

Country	Cancer as an indication for HPN (%)
United Kingdom [21]	5
United States [24,25]	5*–43
Denmark [27]	35
Canada [26]	37.9
Spain [28]	49.5
Netherlands [21]	60
Italy [22]	66
Switzerland [23]	67.4

HPN, home parenteral nutrition.
*Includes primary cancer diagnoses, chemotherapy-associated complications, and radiation enteritis.

To this end, the present study aimed to address the following: 1) describe the demographic and clinical characteristics of cancer patients enrolled in the Canadian HPN Registry between 2005 and 2016; 2) evaluate differences in baseline characteristics based on province and duration of HPN use; and 3) assess the impact of tumor type and province on survival.

Methods

This retrospective analysis included all cancer patients (n = 164) enrolled in the Canadian HPN Registry between 2005 and 2016. The web-based registry is a validated tool [29] that collects clinical data longitudinally, including information on demographic characteristics, diagnoses, indications, nutritional status, HPN regimen, KPS, gastrointestinal anatomy, vascular access, and laboratory results. Data are drawn from a standard questionnaire administered by nutrition support teams at 2-y intervals and are then prospectively entered into the online database. A total of six Canadian HPN programs in four provinces have contributed baseline and follow-up data on cancer patients since 2005: Toronto (Toronto General Hospital), Hamilton (Hamilton Health Sciences), Montréal (McGill University Health Centre), Edmonton (Northern Alberta HPN Program), Calgary (Southern Alberta HPN Program), and Vancouver (British Columbia HPN Program). These programs are the largest in Canada and are administered in academic centers. Other smaller HPN programs had either no HPN cancer patients enrolled or no participation in the registry. Each program had approval from its Research Ethics Board, and patients provided written informed consent.

Only data from adult patients with "cancer/tumor" specified as an indication for HPN or as a contributing diagnosis were extracted from the registry. A descriptive analysis was performed to summarize patient demographic characteristics, nutritional status, KPS, tumor type, HPN duration, HPN regimen, and vascular access, both overall and by province. In addition, patients were assessed for differences in baseline characteristics according to duration of HPN use. Last, we evaluated the impact of tumor type and province of origin on overall survival.

Statistical analysis

Categorical variables were characterized with counts and percentages. Continuous variables were assessed for distribution using graphical methods, and medians (Q1, Q3) are presented here because most variables showed skewed distributions. A comparison of baseline characteristics was made between the two provinces contributing the most data (Alberta versus Ontario) and between short- versus long-term HPN duration (defined as <3 versus ≥3 mo) using the Mann-Whitney U test, χ^2 test, or Fisher exact test based on the nature and distribution of the variables. Duration of HPN was calculated from the start date of HPN to the end date (or to the date of data extraction if HPN support was ongoing), with any time off HPN subtracted.

For the survival analysis, survival was defined as the time interval between the start date of HPN and the date of death from any cause or the date of last contact if the patient was lost to follow-up. The Kaplan-Meier method was used to estimate the probability of survival and the log-rank test to evaluate differences in survival based on tumor type and province.

All analyses were performed with SPSS version 23.0 (IBM Corp., Armonk, NY, USA). A two-tailed P value of 0.05 or less was considered statistically significant.

Results

Between 2005 and 2016, 164 cancer patients were entered into the Canadian HPN Registry (107 women, 57 men; median age, 58 y). This comprised 26.7% of all HPN patients captured by the registry (n = 615) during this period. The proportion of HPN patients with cancer as an indication at each of the participating centers was as follows: Toronto, 33.1%; Hamilton, 32.0%; Edmonton, 30.3%; Calgary, 20.0%; Vancouver, 7.6%; and Montréal, 4.5%.

Patient demographic and clinical data from initial baseline entries are shown in Table 2. A total of 44.5% of the cancer patients

Table 2
Baseline characteristics of cancer patients in Canadian HPN Registry ($n = 164$)

Characteristic	Value*
Age (y)†	58 (47, 64)
Sex	
Female	107 (65.2%)
Male	56 (34.1%)
Missing data	1 (0.6%)
No. of follow-ups	
Baseline	164
2 y	73
4 y	7
6 y	2
8 y	1
Total	247
Province	
Alberta	68 (41.5%)
British Columbia	6 (3.7%)
Ontario	89 (54.3%)
Québec	1 (0.6%)
Center	
Edmonton	63 (38.4%)
Toronto	56 (34.1%)
Hamilton	33 (20.1%)
Vancouver	6 (3.7%)
Calgary	5 (3.0%)
Montréal	1 (0.6%)
Tumor type	
Gastrointestinal	89 (54.3%)
Colorectal	25 (15.2%)
Gastric	23 (14.0%)
Appendiceal	13 (7.9%)
Small bowel	9 (5.5%)
Desmoid	5 (3.0%)
Peritoneal	3 (1.8%)
Other GI	11 (6.7%)
Gynecologic	52 (31.7%)
Ovarian	37 (22.6%)
Cervical/endometrial	15 (9.1%)
Other	23 (14%)
ENT	4 (2.4%)
Other non-GI	19 (11.6%)
Clinical parameters†	
BMI (kg/m^2)	20.6 (18.8, 23.8)
KPS	60 (50, 70)
Hemoglobin (g/L)	101 (94, 112)
WBC count ($\times 10^9$/L)	6.5 (4.5, 9.9)
Platelets ($\times 10^9$/L)	228.5 (173.8, 327)
ALT (U/L)	29 (18, 51.5)
AST (U/L)	28 (18, 44.8)
ALP (U/L)	142 (105, 234.5)
Bilirubin (μmol/L)	8 (5, 14)
Albumin (mmol/L)	32 (25, 37)
HPN regimen	
HPN days per week	7 (7, 7)
Bags per week	7 (7, 7)
Total daily calories (kcal/d)	1590 (1285, 1824)
Daily protein (g/d)	80 (60, 97.5)
Daily dextrose (g/d)	240 (175, 287.5)
Daily lipids (mL/d)‡	237.5 (172, 255.3)
Weight-adjusted total daily calories (kcal/d per kg)	26 (18, 31)
Weight-adjusted daily protein (g/d per kg)	1.0 (1.0, 1.0)
Weight-adjusted daily dextrose (g/d per kg)	3.0 (2.0, 4.0)
Weight-adjusted daily lipids (mL/d per kg)‡	3.0 (2.0, 4.0)
Vascular access	
PICC	91 (55.8%)
Tunneled	50 (30.7%)
Implanted	22 (13.5%)
No. of lumens	
1	43 (26.2%)
2	105 (64.0%)
3	1 (0.7%)
Missing data	15 (9.1%)
Line sepsis/1000 catheter days	0.40

ALT, alanine transaminase; ALP, alkaline phosphatase; AST, aspartate transaminase; BMI, body mass index; GI, gastrointestinal; HPN, home parenteral nutrition; KPS, Karnofsky Performance Status; PICC, peripherally inserted central catheter; WBC, white blood cell.
*Age, clinical parameters, and HPN regimen presented as median (Q1, Q3). All other values presented as No. (% of n).
†At time of data extraction.
‡At lipid concentration of 20%.

contributed a follow-up entry at the 2-y interval, after which the number of subsequent follow-ups greatly declined. The most common tumor categories were gastrointestinal (54.2%) and gynecologic (31.8%), within which the most prevalent cancer types were colorectal and ovarian, respectively. In terms of vascular access, peripherally inserted central catheters (PICCs) were the most prevalent vascular access device (55.8%), and the incidence of CRBSIs was 0.40 per 1000 catheter days.

The majority of patients in the registry were from programs based in the provinces of Ontario and Alberta (see Table 3 for more details). A further comparison of these two data sets revealed no

Table 3
Comparison of baseline characteristics by province (Alberta versus Ontario)

Characteristic	Alberta ($n = 68$)*	Ontario ($n = 89$)*	P
Demographic characteristics†			
Age (y)	58 (52.3, 63.8)	59 (52.5, 65.5)	0.735
BMI (kg/m^2)	21 (17.7, 24.3)	20.5 (18.3, 23.0)	0.541
KPS	60 (45, 75)	60 (40, 80)	0.318
HPN duration			
<3 mo	20 (29.4%)	37 (41.6%)	0.119
≥3 mo	47 (69.1%)	51 (57.3%)	
Tumor type			
Gastrointestinal	41 (60.3%)	43 (48.3%)	0.304
Gynecologic	20 (29.4%)	32 (36.0%)	
Other	7 (10.3%)	14 (15.7%)	
Laboratory results†			
Hemoglobin (g/L)	105 (98.5, 111.5)	98 (89, 107)	0.346
WBC ($\times 10^9$/L)	6.3 (3.8, 8.8)	5.8 (3.0, 8.2)	0.584
Platelets ($\times 10^9$/L)	226 (144.5, 307.5)	210 (125.5, 294.5)	0.568
ALT (U/L)	33 (18.9, 47.2)	25 (10.5, 39.5)	0.216
AST (U/L)	28 (17.5, 38.5)	23 (14.5, 31.5)	0.837
ALP (U/L)	136 (58, 214)	141 (85, 197)	0.096
Bilirubin (μmol/L)	8 (5.5, 10.5)	8 (4, 12)	0.272
Albumin (mmol/L)	32 (26, 38)	33 (25.5, 41.5)	0.956
HPN indication			
Short bowel syndrome	6 (8.8%)	29 (32.6%)	<0.001‡
Radiation enteritis	0 (0%)	8 (9.0%)	0.01‡
Mucosal defect	0 (0%)	7 (7.9%)	0.019‡
Motility disorder	2 (2.9%)	6 (6.7%)	0.467
Surgical complication	3 (4.4%)	25 (29.2%)	<0.001‡
Bowel obstruction	2 (2.9%)	20 (22.5%)	<0.001‡
Tumor/cancer only§	61 (89.7%)	36 (36.4%)	<0.001‡
Cause of death			
Cancer	24 (35.3%)	28 (31.5%)	0.232
HPN	0 (0%)	1 (1.1%)	
Infection	1 (1.5%)	1 (1.1%)	
Unknown	0 (0%)	4 (4.5%)	
Alive	24 (35.3%)	29 (32.6%)	
Missing data	19 (27.9%)	26 (29.2%)	
Vascular access			
PICC	34 (50.0%)	57 (64.8%)	0.008‡
Tunneled	29 (42.6%)	18 (20.5%)	
Implanted	5 (7.4%)	13 (14.7%)	
No. of lumens			
1	19 (29.2%)	22 (28.2%)	0.536
2	45 (69.2%)	56 (71.8%)	
3	1 (1.6%)	0 (0%)	
Line sepsis/1000 catheter days	0.37	0.46	0.397

ALT, alanine transaminase; ALP, alkaline phosphatase; AST, aspartate transaminase; BMI, body mass index; HPN, home parenteral nutrition; KPS, Karnofsky Performance Status; PICC, peripherally inserted central catheter; WBC, white blood cell.
Demographic characteristics, laboratory test results, and line sepsis compared with Mann-Whitney U test. HPN duration, tumor type, vascular access, and number of lumens compared with χ^2 test. HPN indication compared with Fisher exact test. Cause of death compared with Freeman-Halter extension of Fisher's exact test for 4×2 contingency tables.
*Values presented as number (% of n) for categorical variables and as median (Q1, Q3) for continuous variables.
†At time of data extraction.
‡$P \leq 0.05$.
§Patients may have had multiple indications. "Tumor/cancer only" refers to patients with tumor/cancer as their sole indication for HPN.

Table 4
Comparison of clinical characteristics of patients on HPN <3 mo versus ≥3 mo

Characteristic	<3 mo* (*n* = 57)	≥3 mo* (*n* = 104)	*P*†
Age (y)	57 (46, 64)	58.5 (51, 63.3)	0.885
Body weight (kg)	57.5 (50, 64.2)	54.5 (49, 70.4)	0.517
BMI (kg/m^2)	20.8 (19.2, 25.6)	20.4 (18.3, 23.6)	0.718
KPS	50 (0, 70)	80 (60, 90)	< 0.001‡
Bilirubin (μmol/L)	9 (7, 16)	7.5 (4, 11)	0.26
Albumin (mmol/L)	26 (22.5, 33)	35 (29, 39)	< 0.001‡

BMI, body mass index; HPN, home parenteral nutrition; KPS, Karnofsky Performance Status.
*Median (Q1, Q3).
†Variables compared with Mann-Whitney *U* test.
‡$P \leq 0.05$.

significant differences in demographic characteristics, HPN duration, tumor type, laboratory results, HPN regimen, line sepsis, or cause of death. However, relative to Alberta, the Ontario programs had a significantly higher proportion of cancer patients with short bowel syndrome (8.8% versus 32.6%; $P < 0.001$), radiation enteritis (0% versus 9.0%; $P = 0.01$), mucosal defects (0% versus 7.9%; $P = 0.019$), or surgical complications (4.4% versus 29.2%; $P < 0.001$) as additional indications for HPN. By contrast, the Alberta data set had a larger percentage of patients with cancer as the exclusive indication for HPN (38.9% versus 22.9%; $P < 0.001$).

In terms of duration of HPN use (Table 4), almost two-thirds of patients (64.6%) received treatment for ≥3 mo. These patients were found to have a higher baseline KPS score (80 versus 50; $P < 0.001$) and albumin level (35 versus 26 mmol/L; $P < 0.001$) compared with those on HPN for <3 mo. There were no significant differences between short- and long-term HPN therapy based on age, body mass index, or bilirubin at the time of data extraction ($P > 0.05$).

The median survival of patients with gastrointestinal, gynecologic, and other cancers was 7.2, 8.8, and 9.5 mo, respectively (Table 5). However, there were no statistically significant differences in survival among these groups as determined by the log-rank test ($P = 0.887$; Fig. 1). Conversely, patients in the Ontario data set had a statistically significant longer survival compared with those in Alberta (median survival 11.3 versus 7.1 mo; $P = 0.037$; Fig. 2).

Discussion

With cancer now an increasingly common indication for HPN, there is a greater impetus to evaluate standards of practice in this setting. The present study has further characterized variations in practice patterns for adult cancer patients receiving HPN using data from the Canadian HPN Registry.

Our analysis revealed interesting trends among the Canadian provinces. Although there has been a rise in cancer as an indication for HPN since 2005 [26], this has predominantly occurred in the provinces of Alberta and Ontario. The low proportion of HPN patients with cancer in other provinces may suggest potential access issues, such as in Québec where there is a lack of funding for

Table 5
Median survival by tumor type and province

Group	Median survival (mo)
Tumor type	
GI	7.2
Gynecologic	8.8
Other	9.5
Province	
Alberta	7.1
Ontario	11.3

GI, gastrointestinal.

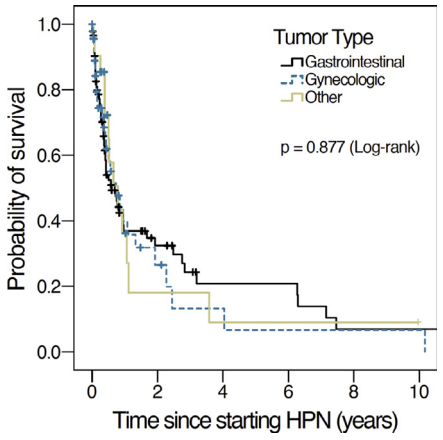

Fig. 1. Kaplan-Meier estimator of survival by tumor type. HPN, home parenteral nutrition.

HPN. For other provinces, data may be sparse because of limited participation in the registry (e.g., Manitoba) or nonexistent HPN programs (e.g., Saskatchewan).

Another major finding among provinces was the longer survival of cancer patients in the Ontario programs relative to those in Alberta. This result was unexpected given that both groups appeared quite similar in terms of demographic and clinical attributes. Moreover, no clear differences in HPN management were identified because both HPN regimen and HPN-related complication rates were similar across groups. The difference in survival may therefore be related to the way that patients were selected for HPN, given the higher proportion of secondary indications for HPN in Ontario (i.e., in addition to cancer), including short bowel syndrome, radiation enteritis, mucosal defects, and surgical complications. We hypothesize that the selection criteria in Toronto and Hamilton—the two Ontario programs—favored patients who may have been successfully treated for their cancer and as a result had a better prognosis than their counterparts in Alberta. The median survival of 7.1 mo identified in Alberta is comparable to the 6.8 mo reported by Obling et al. [30], who analyzed a group of incurable cancer patients in a Danish center over a similar period (2005–2015) as the present study. Older studies, however, have described shorter survival rates, including Bozzetti et al. [31] and Hoda et al. [32], with median survivals ranging from 3.0 to 6.0 mo, respectively. Conversely, the significantly longer survival of 11.3

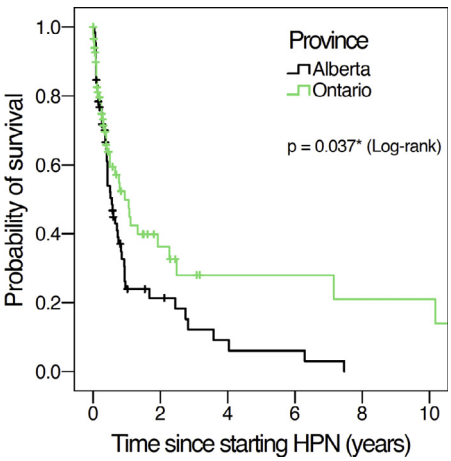

Fig. 2. Kaplan-Meier estimator of survival by province. HPN, home parenteral nutrition. *$P \leq 0.05$.

mo seen in Ontario highlights a more heterogeneous cohort with patients who have chronic intestinal failure as a result of cancer-related therapy instead of terminal cancer. For example, one study following 23 HPN patients with radiation enteritis reported a 10-y survival of 48% [33], highlighting a very different prognosis compared with that presented in the previously mentioned studies. Nonetheless, many other factors that were not assessed by the Canadian HPN Registry may have also played a role in the different survival rates, including regional differences in cancer treatment approach and home care support.

Compared with some European centers [21–23,28], the prevalence of cancer patients receiving HPN in our cohort appears low. However, as reported in a previous analysis by our group [26], this prevalence has in fact steadily increased since 2005. Between the periods of 2005 to 2008 and 2011 to 2014, the number of cancer patients receiving HPN in Canada grew from 28 to 64, corresponding to a percentage increase from 16.7% to 37.9% of all HPN patients enrolled in our registry during each period. Based on our experience, this increase is likely attributable to the expansion of our national HPN program. As discussed earlier, however, findings from the present study suggest that the selection of candidates for HPN is not standardized in Canada, with one province enrolling cancer patients who may have received more aggressive treatment and another province reserving HPN for patients with more advanced disease.

This study is the first to report on vascular access and catheter-related complications in Canadian cancer patients receiving HPN. Our cohort had a higher prevalence of PICCs (55.8%) as the vascular access device of choice compared with prior studies conducted exclusively on cancer patients, including Cotogni et al. [34] and Vashi et al. [35], who documented a prevalence of 22% and 46.8% in Italian and American cohorts, respectively. In some of our centers, PICCs have been increasingly used for convenience in patients who are concurrently receiving chemotherapy through the same catheter [26]. In terms of CRBSIs, we found an incidence rate of 0.40 per 1000 catheter days across all catheter types, which falls within the range of 0.35 per 1000 catheter days reported by Cotogni et al. [34] and 0.54 per 1000 HPN days by Vashi et al. [35].

Regarding cancer diagnosis, our study found that the most prevalent cancer types were ovarian and colorectal. This distribution is comparable to cancer populations in other HPN centers [21,30,36,37]. We speculate that survival did not differ significantly among tumor categories because many patients had advanced disease with poor prognosis by the time they became eligible for HPN. As a result, survival was similar regardless of the type of tumor. This is in line with Bozzetti et al. [31], who did not find that tumor type had any prognostic effect on short- versus long-term survival. Santarpia et al. [22] also reported no differences in survival based on the site of primary tumor. With that said, we grouped tumors into larger categories (i.e., gastrointestinal, gynecologic, and other) to achieve adequate statistical power. It is possible that differences in survival among specific types of cancer were not detected as a result of these broad categories.

Lastly, we found that almost two-thirds (64.6%) of patients survived for ≥3 mo on HPN therapy. This suggests that the ESPEN guideline of selecting patients with a life expectancy of at least 2 to 3 mo [9,19] was respected in the majority of cases. The cutoff of 3 mo used to define short- versus long-term duration in our study was based on the upper limit of this recommendation [9,19]. Furthermore, a higher KPS score and albumin level were identified in the long-term HPN group, which is consistent with prior studies indicating prognostic value in these clinical parameters [31,38].

Some limitations of our study should be noted. First, there were missing data for cause of death in the comparison between provinces. We believe this may have been due to a loss of follow-up of patients at the end of life for whom a cause of death was never ascertained. However, the proportion of missing data for cause of death was similar across both provinces. Another limitation was the lack of cancer-specific data in the Canadian HPN Registry. Little if any information was available regarding prior cancer treatment, malignancy staging, or timing of disease onset. For HPN indications in particular, there were no further data on whether HPN was being used in a palliative or chronic disease setting, which would have implications for the survival analysis. To address this, we have incorporated new fields into the upcoming revision of the registry's patient questionnaire to capture more cancer-specific data for future analyses.

Conclusions

This retrospective study evaluated variations in practice patterns for cancer patients receiving HPN. Gastrointestinal and gynecologic cancers are the most common in this population. Patients with greater baseline functional and nutritional status received HPN for longer periods, which is suggestive of better prognosis. There is considerable regional variability in the prevalence, selection, and survival of cancer patients receiving HPN, indicating differences in practice patterns not only among but within countries. Our study demonstrates the need for consensus on the use of HPN in adult patients with a cancer diagnosis.

Acknowledgments

The authors thank the following individuals from the participating centers of the Canadian HPN Registry: *British Columbia HPN Program (Vancouver)*—Andree Richardson, R.D.; Greg Rosenfeld, M.D.; Hin Ko, M.D.; Nicole Beauregard, R.D.; Jennifer Lazuna, R.N. *Hamilton Health Sciences HPN Program (Hamilton)*—Carol Lynn Godin, R.N.; Anne Childs, R.N.; Michelle Dawson, R.N.; Suzanne Hansen, R.D. *McGill University Health Centre (Montréal)*— Yidan Lu, M.D., C.M.; Sylvie LeBourdais, B.Sc., M.Sc. (Nursing); Jocelyne Lemieux, R.N., B.Sc. *Northern Alberta HPN Program (Edmonton)*—Lisa Heighington, R.N.; Holly Ames, R.D.; Marie Hancock, R.N.; Jennifer Jin, M.D.; Dorothy Herbers; Adela Delgado, R.D. *Southern Alberta HPN Program (Calgary)*—Cathy Berry, R.N.; Kelly Cochran, R.D.; Melanie Stapleton, M.D.; Pam Crotty, C.C.R.P.; Sari Czink, R.D. *St. Michael's Hospital (Toronto)*—Brian Jurewitsch, Pharmacist; Camille Sagun, R.N.; Tracey Pignatiello, R.N. *Toronto General Hospital (Toronto)*—Anastasia Teterina, Ph.D., for her assistance with data extraction; Monica L. Ponta, M.D.; Olivia Saqui, R.N.; Patricia Kim, Pharmacist; Brooke Stewart, R.D.; Ann MacGillvray, R.D.; Nicha Somlaw, M.D.; Jessica Noelting, M.D.; Amir Ali Adel; Sarah Casselman.

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