

# Canadian Hospital Food Service Practices to Prevent Malnutrition

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## ABSTRACT

**Purpose:** The study aimed to determine current practice, barriers, and enablers of foodservices in Canadian hospitals relative to guiding principles for best practice to prevent malnutrition.

**Methods:** Foodservice managers completed a 55-item cross-sectional, online survey (closed- and open-ended questions).

**Results:** Survey responses (n = 286) were from diverse hospitals in all Canadian regions; 56% acute care; 13% had foodservices contracted out; and 60% had a reporting structure combined with clinical nutrition. Predominantly, foodservice systems were 43% in-house versus 41% pre-prepared, 46% cook-serve food production, 64% meals assembled centrally (on-site), and 40% non-selective menus with limited opportunities for patient choice in advance or at meals. The "regular menu" (44%) was most commonly served as 3 meals, no snacks at specific times. Energy and protein-dense menus were available, but not widespread (9%). Daily energy targets ranged from 1200 to 2400 kcal and 32% of respondents viewed protein targets as important. The number of therapeutic diets varied from 2 to 150.

**Conclusions:** Although hospital foodservice practices vary across Canada, the survey results demonstrate gaps in national evidence-based practices and an opportunity to formalize guiding principles. This work highlights the need for standards to improve practice through patient-centered, foodservice practices focused on addressing malnutrition.

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## RÉSUMÉ

**Objectif.** L'étude visait à déterminer les pratiques, obstacles et facteurs favorables actuels relativement aux services alimentaires dans les hôpitaux canadiens en comparaison avec les principes directeurs associés aux meilleures pratiques de prévention de la malnutrition.

**Méthodes.** Des responsables de services alimentaires ont participé à une enquête transversale en ligne composée de 55 questions (fermées et ouvertes).

**Résultats.** Les réponses à l'enquête (n = 286) provenaient de divers hôpitaux de toutes les régions du Canada; 56 % offraient des soins de courte durée; 13 % avaient des services alimentaires confiés en sous-traitance; et 60 % avaient une structure hiérarchique combinée à de la nutrition clinique. Les systèmes de services alimentaires étaient principalement les suivants : 43 % de plats préparés sur place vs 41 % préparés à l'avance, 46 % de production alimentaire « cuire et servir », 64 % de repas assemblés de manière centralisée (sur place) et 40 % de menus non sélectifs offrant peu de choix aux patients à l'avance ou à l'heure des repas. Le « menu standard » (44 %) était le plus souvent composé de 3 repas sans collation à des heures précises. Des menus riches en énergie et en protéines étaient offerts, mais peu répandus (9 %). Les cibles quotidiennes en matière d'apport énergétique allaient de 1 200 à 2 400 kcal, et 32 % des répondants considéraient les cibles protéiques importantes. Le nombre de diètes thérapeutiques variait entre 2 et 150.

**Conclusions.** Bien que les pratiques propres aux services alimentaires hospitaliers varient au Canada, les résultats de cette enquête révèlent des lacunes en matière de pratiques nationales reposant sur des données probantes et une occasion d'officialiser des principes directeurs. Ces travaux mettent en évidence la nécessité d'établir des normes afin d'améliorer les pratiques au moyen de services alimentaires centrés sur le patient et axés sur la lutte contre la malnutrition.

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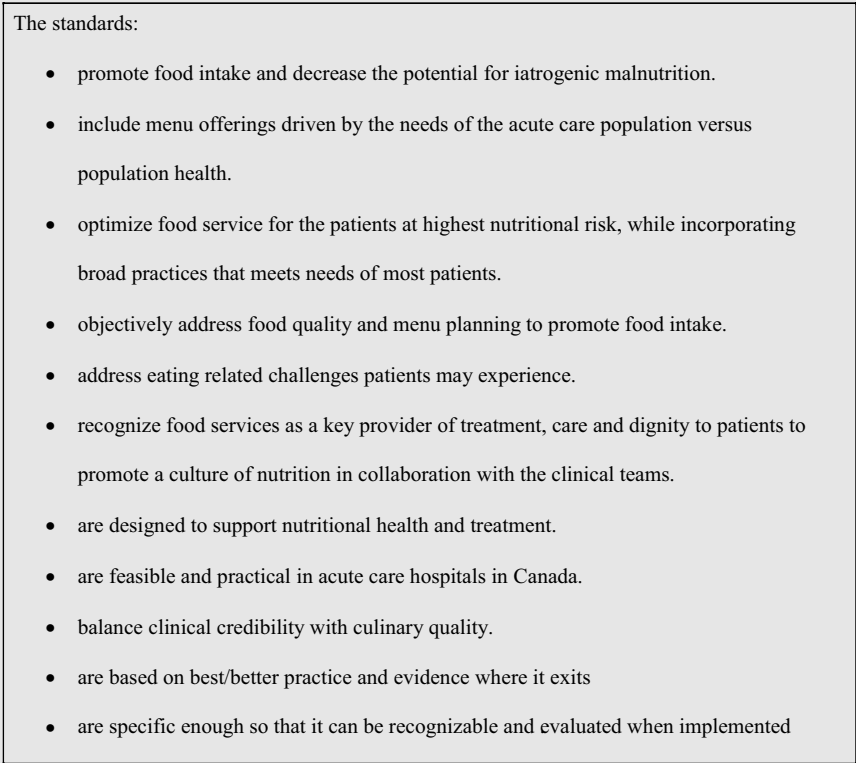
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## INTRODUCTION

Hospital food provision is a cornerstone of care. It impacts patient and health system outcomes including satisfaction, clinical outcome, and costs [1–3]. Medical nutrition therapies, such as fortifying foods, liberalizing diets, nutrition supplements, and offering food choices have improved patient intakes of energy and protein [3]. Poor food intake may be caused by patients not being able to open packages, missing meals, or not liking the food [4]. Patients who are malnourished and consume 50% or less of food on their meal trays in hospitals have longer length of stay and increased risk of mortality [5]. National foodservice standards have been

established in countries with an aim to optimize food provision to reduce risk for malnutrition [6–10]. The Council of Europe adopted a resolution in 2003 [6], which acknowledges the problem of malnutrition in hospital, declares access to food in hospital as a fundamental human right [11], and provides evidence-based recommendations related to food and nutritional care in hospital including standards for hospital foodservice provision. Currently, there are no common pan-Canadian standards for hospital foodservice related to malnutrition, and little is published about foodservice practices in Canadian hospitals. A Food in Health Care Working Group of the Canadian Malnutrition Task Force (CMTF),

**Figure 1.** Guiding principles for Canadian hospital foodservice practices to prevent malnutrition.



including foodservice directors and clinical nutrition leaders from across Canada, was formed in 2018 to address hospital foodservice practices related to malnutrition. Building upon the Integrated Nutrition Pathway for Acute Care (INPAC) [12], the working group developed guiding principles for Canadian hospital foodservice practices to prevent malnutrition (Figure 1). Applicability/validity of these guiding principles towards developing a national hospital foodservice standard was assessed by the group through a study of current practice, barriers, and enablers of foodservices in Canadian hospitals.

### METHODS

Hospital foodservice evidence and standards [13, 14] and the guiding principles informed the scope of the Canadian Hospital Foodservice Practice survey. The diverse hospital foodservice practices identified were deemed well suited to be assessed by survey. The co-chairs (JS, HF) developed a preliminary draft that was revised collaboratively and iteratively by 14 working group members from 8 Canadian provinces/territories and representing CMTF, Dietitians of Canada, the Canadian Society of Nutrition Management, and Nourish Healthcare. The survey included 55 questions on hospital demographics, foodservice organization and interdisciplinary collaboration, food production and meal service, menu

standards, diets and meals, practices to prevent malnutrition, outcome assessment, and barriers/enablers to optimise practice (Supplementary File 1<sup>1</sup>). The working group recruited participants with extensive knowledge on the survey topics (inclusion criteria: foodservice/nutrition manager in a Canadian hospital) through health authorities and professional networks in their respective regions from July to September 2018. Recruitment of participants aimed at a diverse sample from across Canada including various types of hospitals and geographical locations (Table 1). Potential participants were invited by e-mail with a link to provide informed consent to complete the self-administered survey via Survey Monkey. The survey was estimated to take 25 minutes to complete with no incentive offered. The study was approved by the Langara Research Ethics Board.

Quantitative data were analysed using IBM-SPSS® Statistics (version 24.0, 2016, Armonk, New York) by frequency for categorical/ordinal variables and mean ± standard deviation (SD) or median ± interquartile range (IQR) and/or maximum and minimum for normally or non-normally distributed continuous variables, respectively. Qualitative questions were thematically coded manually by JS and a research assistant (TS) based on the question form and a review of all responses. Additionally, a qualitative research consultant

<sup>1</sup>Supplementary data are available with the article through the journal Web site at <https://dcjournal.ca/doi/suppl/10.3148/cjdpr-2021-013>.

(LEL) used NVivo® (QSR International, version 12 Plus, 2018, Burlington, Massachusetts) for in-depth analysis. NVivo auto-coding generated a list of themes (based on frequency) to provide initial insight on main themes and prioritize subsequent manual coding. LEL read responses to prioritize questions in depth to elicit key words and phrases commonly reported in the responses. Key words and phrases were queried to collate responses of similar meaning and initial coding was queried for additional information. When the review of the question responses and queries failed to yield any substantial new information, LEL outlined the qualitative analysis including topic descriptions, number of references to phrase/word, and key quotes illustrative of responses. The French data set was translated into English, collated with the English data set, and coded by themes of the English data set.

## RESULTS

A total of 598 invitation e-mails were sent, with 400 individuals responding to the invitation, and 114 were excluded related to no informed consent (n = 9), no responses (n = 88), only demographic responses (n = 8), international (n = 1), not a hospital (n = 7), and other (n = 1). Forty eight percent (n = 286) of requested surveys were included in the analysis with 90% completed in English (n = 258) and 10% in French (n = 28).

### Demographics

Responses from across Canada included 51% (n = 145) from urban locations (Table 1). Most hospitals were acute care or mixed acute and long-term/extended care. Of the respondents, 20% (n = 57) were responsible for multiple facilities, almost half (n = 126) also provided foodservices outside of the hospital, and 13% (n = 38) had foodservices managed by a contract provider.

### Foodservice system

Foodservice systems were diverse with a split between pre-prepared and in-house production, mostly cook-serve food production and assembled at a central location (on-site) versus decentralised or off-site meal assembly (Table 2). Non-selective menus were most common with limited opportunities for patient choice in advance or at point of service. Typically, hospitals offered snacks to few patients and flexible meal availability was generally not offered or only offered for few patients. The most common menu cycle length was 3 weeks for 57% (n = 79) of hospitals.

Meals were most commonly delivered to the patient by foodservice staff or by nursing staff when eating assistance was required, although practices varied. Adequate training was indicated to be higher for meal delivery than for assistance during meals at 55% (n = 125) versus 29% (n = 59), respectively. Additionally, only 3% stated that no training was provided for meal delivery, whereas 24% had no training on meal assistance. Restrictions on family/visitors bringing meals for patients from the outside were noted by 23% (n = 54) of respondents, e.g., must follow diet orders, disallowed for

dysphagia, food safety, and proper food handling/storage. Furthermore, 58% (n = 134) of respondents reported restrictions on who could provide assistance with meals and feeding patients. Practices ranged from “only nursing provide assistance with meals” to “family and paid companions often provide assistance”. Allowance of assistance from volunteers or foodservice staff varied. Some sites required training and were more restrictive for dysphagia, whereas setting up trays and opening containers was typically less restricted.

### Menu planning and outcome assessment

The top factors influencing menu planning were therapeutic diets and Canada's Food Guide 2007 (CFG), whereas the least influential factors included: Indigenous foods, limiting packaging, environmental sustainability, hospital-specific standards, and cultural diversity (Table 2). The most common foodservice outcome assessment methods were patient satisfaction and financial performance, whereas waste audits, meal observations, and monitoring food intake were least common.

### Diets

“Regular” was the term most commonly used (71%) for a non-therapeutic diet (n = 189) followed by “General” for 7% and “Standard” for 6%. When asked how this diet was defined (n = 151), 36% defined it by nutrient targets, 29% by CFG, 28% by provincial and/or regional standards, 18% by calorie targets, 9% by no standards/unrestricted, 7% by no texture modifications, 5% by Dietary Reference Intakes (DRIs), and 4% by preferences/personalized. Calorie targets ranged from 1200 kcal to 2400 kcal with 1800 kcal being most common for half of the respondents. Nutrient targets that were perceived as most important in descending order (n = 139) included: protein (32%), sodium (22%), calories (22%), fat (11%), fibre (6%), carbohydrate (6%), sugar (5%), all nutrients (4%), and water (2%). Additionally, regarding targets, some respondents viewed compliance with dietary guidelines and/or local nutrient standards (15%) as important, whereas diet liberalization (8%) and flexibility/choice (6%) were most significant for others. Targets that were viewed most flexible (i.e., able to liberalize) included: sodium (11%), fat (6%), carbohydrate (6%), and micronutrients (5%). A need to liberalize diets to optimize intake and reduce the risk of malnutrition was noted by some respondents.

The number of therapeutic diets (n = 158) ranged widely from 2 to 150 (median  $\pm$  IQR 23.5  $\pm$  39); 85% of respondents provided a number, whereas 10% stated that they had many or too many diets, 3% not applicable, and 2% didn't know. When asked about the most commonly used therapeutic diet (excluding texture modified) (n = 171), a diabetes-related diet was the first most common according to 63%, whereas only 3% for a high-energy, high-protein diet. The second most common therapeutic diets used (n = 169) were a cardiac-related diet, diabetes diet, and low-sodium diet according to 33%, 20% and 18%, respectively, compared to 4% for a high-energy,

**Table 1.** Demographic characteristics of the hospitals and foodservice organisation (n = 286).

	% (n)
<b>Province/territory (n = 269)</b>	
Ontario	28 (74)
British Columbia	22 (60)
Alberta	14 (38)
Quebec	9 (25)
Nova Scotia	9 (23)
Saskatchewan	6 (16)
New Brunswick	5 (12)
Manitoba	4 (10)
Newfoundland	3 (7)
Yukon	1 (2)
Nunavut	0.4 (1)
Prince Edward Island	0.4 (1)
<b>Type of hospital (n = 283)</b>	
Acute care hospital	28 (79)
Mixed acute and long-term/extended-care hospital	28 (79)
Multiple sites	20 (57)
Community hospital	9 (24)
Academic teaching hospital	9 (24)
Specialty hospital <sup>a</sup>	7 (20)
<b>Location</b>	
Urban	51 (145)
Rural/suburban/remote	37 (107)
Diverse (multiple sites)	12 (34)
<b>Foodservice organisation</b>	
Foodservices are contracted out (n = 285)	13 (38)
Oversight provided by an interdisciplinary committee <sup>b</sup> (n = 283)	41 (116)
Food provided externally outside of hospital <sup>c</sup> (n = 284)	45 (127)
<b>Foodservice department reporting structure<sup>d</sup> (n = 285)</b>	
Combined with clinical nutrition services	60 (170)
Combined with housekeeping/cleaning services	25 (70)
Combined with on-site cafeteria, catering and/or retail foodservices	45 (129)
Combine with technical service management	7 (19)
Combined with multidisciplinary service management	6 (17)
Stand-alone	2 (5)
Other	5 (15)

Note: The total cohort number of responses per topic is given where there were missing data.

<sup>a</sup>e.g., rehabilitation, psychiatric, pediatric, cancer, complex care, and mixed types.

<sup>b</sup>e.g., menu planning committee, trial of new menu items, etc.

<sup>c</sup>Food only or food and service provided for facilities/programs other than the hospital, e.g., Meals on Wheels program, out-patient programs, adult day program, community meal program, mental health facility, addictions treatment facility, long-term care facility, rehabilitation facility, assisted-living, etc.

<sup>d</sup>Respondents selected at least 1 or multiple categories that applied to their operation.

high-protein diet. The third most common therapeutic diet (n = 165) was a renal-related diet according to 24% and 7% for a high-energy, high-protein diet. The terms used and types of therapeutic diets varied considerably.

In descending order of frequency, respondents (n = 180) reported that diets were ordered by physicians 94%, dietitians

91%, nurses 60%, nurse practitioners 21%, occupational therapists 22%, speech language pathologists 12%, diet technicians 9%, and unit clerks 0.6%. Comments were made that the level of access to diet ordering varied per professional groups, e.g., initial diet order is restricted to physician or nurse practitioner, whereas nurse, dietitian, and speech language

**Table 2.** Proportion of patients served by foodservice system/practice and factors influencing menu planning (n = 286).

<b>Food production</b>	<b>None (%)</b>	<b>Few/~half (%)</b>	<b>Many/all (%)</b>
Prepared in-house (from scratch) (n = 226)	14	43	43
Outsourced (n = 218)	18	41	41
Cook-freeze (n = 190)	58	27	15
Cook-chill (n = 188)	47	34	19
Cook-serve (n = 199)	28	26	46
Commissary (n = 172)	71	16	13
<b>Meal assembly</b>			
Centralized (off-site) (n = 180)	77	11	11
Centralized (on-site) (n = 206)	24	13	64
Decentralized (n = 183)	67	17	16
<b>Menu types/meal service</b>			
Non-selective menu (n = 215)	15	45	40
Pre-selective menu (n = 205)	28	45	26
Selective menu at point of service (n = 201)	46	27	26
Selective portion size (n = 196)	24	45	31
Spoken menu (n = 198)	63	25	12
Room service style (n = 193)	68	14	18
Restaurant style (à la carte) (n = 193)	82	12	6
Buffet (n = 189)	84	15	1
<b>Snacks</b>			
Morning snack (n = 230)	15	71	15
Afternoon snack (n = 236)	2	74	25
Evening snack (n = 237)	1	65	34
<b>Food access</b>			
Meals delivered at flexible times (n = 234)	62	32	6
Food available by request on units (n = 233)	25	49	25
Food available for purchase on units (n = 227)	85	13	2
<b>Meals delivered to patient by:</b>			
Foodservice staff (n = 234)	11	18	71
Nursing staff (n = 222)	21	64	15
Multi-skilled/personal support worker <sup>a</sup> (n = 200)	69	21	11
House-keeping (n = 202)	94	5	2
Other <sup>b</sup> (n = 141)	94	4	1
<b>Assistance during meals is provided by:</b>			
Foodservice staff (n = 224)	58	34	8
Nursing staff (n = 231)	3	65	33
Multi-skilled/personal support worker <sup>a</sup> (n = 204)	49	37	14
Housekeeping (n = 210)	94	6	1
Volunteers (n = 214)	51	47	1
Family or visitors (n = 217)	4	84	12
Other <sup>c</sup> (n = 114)	91	9	0
<b>Diet type/menu offer/dietetic care</b>			
Non-therapeutic diet <sup>d</sup> (n = 171)	1	56	44
Texture modified diet (n = 170)	1	77	22
High-energy, high-protein diet (n = 170)	2	88	9
Other therapeutic diets (n = 170)	1	75	24
Fortified foods (energy and/or protein) (n = 166)	11	77	11

(continued)

Table 2. (Continued).

Food production	None (%)	Few/~half (%)	Many/all (%)
Oral nutrition supplement (commercial) (n = 172)	2	80	18
Oral nutrition supplement (home-made) (n = 165)	50	45	5
Referred to a dietitian (n = 164)	1	78	22
Assessed by a dietitian (n = 169)	1	72	27
Choice of meals in a dining facility (n = 168)	41	48	12
Factors influencing menu planning <sup>e</sup>	Not at all (%)	Very little/somewhat (%)	Much/very much (%)
Therapeutic diets (n = 220)	0	11	89
Canada's Food Guide 2007 (n = 220)	2	19	78
Provincial standards (n = 213)	6	17	77
Impact on food cost (n = 220)	0	32	68
Dietary reference intakes (n = 212)	4	23	73
Patient satisfaction and feedback (n = 220)	1	26	74
Labour required (n = 217)	2	37	61
Health authority standards (n = 213)	15	16	69
Food culinary quality (n = 213)	3	33	65
Cultural diversity (n = 215)	2	59	40
Hospital-specific standards (n = 210)	17	30	53
Environmental sustainability (n = 213)	15	68	18
Limit pre-packaged food (n = 213)	23	51	26
Traditional Indigenous foods (n = 213)	25	63	12
Performance indicator priorities <sup>f</sup>			
Patient satisfaction (n = 175)	1	27	72
Financial performance (n = 172)	2	45	53
Waste audits (n = 175)	4	64	33
Meal observations (n = 172)	4	66	30
Monitoring food intake (n = 171)	7	66	27

Note: The total cohort number of responses per topic is given where there were missing data.

<sup>a</sup>e.g., multi skilled worker, personal support worker, health care aid, and patient room aid.

<sup>b</sup>Meals delivered to patient by "Other" included, e.g., volunteers, allied health care professionals, porter.

<sup>c</sup>Assistance during meals is provided by "Other" included, e.g., volunteers, allied health care professionals, recreational therapist, paid support aid.

<sup>d</sup>Non-therapeutic diet (i.e., regular, standard, normal) not related to medical nutrition therapy.

<sup>e</sup>Respondents were asked: to what extent do the following considerations influence your menu planning in practice? (n = 220).

<sup>f</sup>Respondents were asked: to what extent are the following aspects prioritized in foodservice performance/outcome assessment? (n = 175).

pathologist can modify the order; physician must sign-off diet orders; and speech language pathologist/occupational therapists can only order dysphagia diets. The level of understanding about diets by those who order (n = 178) was rated as very good/good 50%, average 37%, and poor/very poor 13%. Comments made on communication about diets to staff responsible for ordering (n = 141) identified challenges and need for training of select staff on types and ordering of diets. Although level of understanding of diets was rated mostly positively, disparity in understanding between staff groups was reported.

### Nutrition care and foodservice practices to prevent malnutrition

Supplementary File 2<sup>1</sup> provides an overview of nutrition care, meals, diets, and foodservice practices to prevent malnutrition

including several illustrative quotes. Thirty-nine percent of respondents reported that patients are screened for nutrition risk and 27% were not aware of screening. Fifty-five percent of respondents had "culinary standards (e.g., menu planning, food quality or food plating standards)", although related practices were highly variable. Presence of foodservice initiatives for patients at risk of malnutrition were reported by 51% of respondents, with 66% of respondents reporting having diet office software packages available, 56% having a high-energy, high-protein diet for patients at risk of malnutrition, 49% noting practices for fortified foods/beverages, and 34% having medication pass (Med Pass) nutrition supplement programs. Fifty-four percent of respondents used patient satisfaction/experience tools to obtain feedback, although frequency and methods varied widely. Additionally, qualitative analysis of perceived barriers, enablers, and optimal



foods services found similar themes among questions, e.g., adequate budgets and staffing, flexible patient-centered foodservice, quality food produced in-house, liberalized diets, improved food access and support at meals, prioritization of food in hospital, and skilled, engaged workers to support effective nutrition care collaborations. However, diversity of answers appeared to also be a reflection of diversity in existing foodservice systems and practices among sites (Supplementary File 2<sup>1</sup>).

## DISCUSSION

This study is the most comprehensive to our knowledge of Canadian hospital foodservice. Another study on food and nutritional care in hospitals in 12 European countries in 1999 [15, 16] identified similar barriers, e.g., negative views of hospital food; lack of awareness of the problem of malnutrition; inadequate education, collaboration, and defined responsibilities among staff groups; lack of patient-centered menus and meal service allowing for choice and flexibility; and lack of prioritization of foods services as an important part of therapeutic care. Consistent with our findings, this study [15] also found suboptimal practices of only offering 3 meals, no snacks at specific times and the “general menu” was most common, whereas energy- and protein-dense menus were available, but not widespread. In response to these observations, the Council of Europe adopted a resolution in 2003 [6], which acknowledges the problem of malnutrition in hospital, declares access to food in hospital as a fundamental human right [11], and provides approximately 100 evidence-based recommendations for food and nutrition care in hospital.

The resolution recommends nutrition-risk screening as an essential first step of nutrition care in all hospitalized patients [6], which is consistent with the Canadian Integrated Nutrition Pathway for Acute Care [12]. Contrary to this, only about a third of the survey respondents in the current study confirmed that patients were being screened for risk of malnutrition at admission, although about a quarter were not aware whether screening was done and of those that answered yes, a third didn't know which tool was used. This apparent lack of awareness of nutrition care practice by foodservice managers is perhaps not surprising since risk status was typically not considered in diet ordering and about 40% of sites did not have a reporting structure combined with clinical nutrition services.

Another recommendation of the Council of Europe resolution is to develop national standards for hospital food provision to prevent malnutrition [6] and many countries have such standards [7–10]. Canada lacks national standards for hospital foodservice and a comprehensive review of food procurement and nutrition standards in public facilities recommended that: “given that meals are medically necessary hospital services under the Canadian Health Act, re-classify nutrition and foods services from operations (cost focus) to patient care (health focus)” [17]. This recommendation is consistent with survey responses regarding the negative culture and attitudes towards hospital food as a support service instead of an essential part of care.

Any regional Canadian recommendations for hospital food are typically consistent with dietary recommendations for population health (e.g., limiting salt, fat, and sugar content of menus) [17]. This lack of focus on patients at risk of malnutrition is demonstrated in survey responses, e.g., CFG is a second most important factor influencing menu planning. Therapeutic diets were the top factor impacting menu planning, which is disconcerting considering that diabetes and cardiac diets were the most common therapeutic diets whilst high-energy, high-protein diets were less common in light of evidence supporting liberalized diets to promote adequate intake [18–21] and the association of restrictive therapeutic diets with increased risk for malnutrition [22].

In contrast to these Canadian findings, UK hospital food standards [7] have a different approach, which differentiates between “eating for health” in individuals at risk of malnutrition (i.e., high-energy, nutritionally dense food/drink) versus “healthy eating” to promote health in those not at risk (i.e., Eatwell Guide [23]) and promote a “patient-focused food and drink strategy”. This UK strategy has been supported by various initiatives, such as the Better Hospital Food Project [24] and Protected Mealtimes [25], aimed at improving patient food intake. Additionally, consistent with our observations that insufficient budgets were the most common perceived barrier to optimal foods services, UK standards were deemed less effective when voluntary and/or not backed by adequate funding [26].

Prioritization of foodservice in health care as medicine has been identified as a lesson for Canada to learn from Denmark [27]. This has resulted in positive changes in foodservice practices as demonstrated by a Danish study [28] comparing practice from 1995 to 2003. This study found a decrease in centralized production (from 99% to 80%), increase in satellite kitchens (from 1% to 20%), decentralized plating or buffets (from 31% to 65%), more educated cooks/catering assistance (from 29% to 51%), and fewer unskilled workers (from 45% to 25%) allowing for point of service, personalized portion sizes, and higher-quality food produced in-house. These changes in practice are consistent with the survey themes on optimal foods services of the current study, i.e., patient-centered, flexible, and allow for choice of quality food produced in-house by skilled staff. Another Danish study found that providing education and delegating responsibility to health care assistants for patient-centered nutrition care, such as ordering personalized food for nutrition risk patients, resulted in a decrease in food waste from 55% to 18% [29].

## Study limitations

Survey responses were self-reported by foodservice/nutrition managers and might be limited by respondents' lack of knowledge of certain aspects of their practice, e.g., clinical nutrition care on units. Responses from other stakeholders, such as clinical dietitians, nurses, physicians, managers, patients etc., might have elicited more diverse and comprehensive perspectives. The survey was somewhat long and complex in parts,

which might have impacted respondent fatigue as is evident from decreasing response rate over the course of the survey. Complexity of survey responses was especially challenging for the 20% of respondents answering in relation to multiple sites, whereas responses from Alberta were more homogenous since background information for the survey was shared with colleagues throughout the province. Also, results might not be generalizable to all areas of Canada, especially underrepresented provinces/territories in northern/eastern Canada. Further research is needed to assess different types of hospitals and foodservice systems and association with patient satisfaction, health, and financial outcomes. Despite these limitations, the survey responses were representative of all regions across Canada and provide a comprehensive overview of current hospital foodservice practices relevant to address malnutrition in hospital.

## RELEVANCE TO PRACTICE

Although practices varied among sites, themes regarding optimal foodservices were mostly consistent and support the relevance and validity of the guiding principles, which could be used as a charter for hospital food policy and inspire the development of hospital foodservice standards to prevent malnutrition by a standard setting organization (Figure 1). The survey results are a call to action to address multiple gaps in and opportunities to optimize hospital foodservices aligned with evidence to prevent malnutrition, including:

- widespread use of high-energy, high-protein diets for patients screened at risk for malnutrition or as a regular menu offering comprised of appetizing, easy to eat, energy/protein/nutrient-dense small portions, such as fortified foods/beverages [30–32]
- a liberalized diet approach, i.e., least restrictive to allow for easy to eat, preferred foods/beverages [18–21]
- systems for choice/flexibility to access preferred foods/beverages and custom portion sizes to promote adequate intake [2, 33–35]
- offering energy/protein/nutrient-dense snacks/beverages between meals for patients at risk of malnutrition [31]
- addressing barriers to food intake through menu planning, uninterrupted mealtimes, and meal assistance as needed [4, 36–39]
- regularly assessing patient intake, experience, and input to inform menus and practice [40]
- fostering a hospital culture that recognizes food on par with medicine supported by a strong collaboration between clinical nutrition and foodservices and political/management prioritization to adopt evidence-based hospital foodservice standards/policy backed by sufficient resources and competent staff to implement best practice [41]

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