

## RESEARCH PAPER

# Patient-reported dietetic care post hospital for free-living patients: a Canadian Malnutrition Task Force Study

H. Keller,<sup>1</sup>  H. Payette,<sup>2</sup> M. Laporte,<sup>3</sup> P. Bernier,<sup>4</sup> J. Allard,<sup>5</sup> D. Duerksen,<sup>6</sup> L. Gramlich<sup>7</sup> & K. Jeejeebhoy<sup>8</sup>

<sup>1</sup>Department of Kinesiology, Schelgel-University of Waterloo Research Institute for Aging, University of Waterloo, Waterloo, Ontario, Canada

<sup>2</sup>Research Centre on Aging, CIUSSS de l'Estrie-CHUS and Faculty of Medicine and Health Sciences, University of Sherbrooke, Sherbrooke, Québec, Canada

<sup>3</sup>Réseau de santé Vitalité Health Network, Campbellton Regional Hospital, Campbellton, New Brunswick, Canada

<sup>4</sup>Jewish General Hospital, Montreal, Québec, Canada

<sup>5</sup>Department of Medicine, Toronto General Hospital, University of Toronto, Toronto, Ontario, Canada

<sup>6</sup>Department of Medicine, Faculty of Health Sciences, University of Manitoba, Winnipeg, Manitoba, Canada

<sup>7</sup>Department of Medicine & Dentistry, Royal Alexandra Hospital, University of Alberta, Edmonton, Alberta, Canada

<sup>8</sup>Department of Medicine, University of Toronto (*emeritus*), Toronto, Ontario, Canada

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dietitian, hospitalized, malnutrition, transition of care.

### Correspondence

H. Keller, Department of Kinesiology, Schelgel-University of Waterloo Research Institute for Aging, University of Waterloo, 200 University Ave W, Waterloo, ON, N2L 3G1, Canada.

Tel.: +1 519 888 4567 ext 31761

Fax: 519 746 6776

E-mail: hkeller@uwaterloo.ca

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### Abstract

**Background:** Transitions out of hospital can influence recovery. Ideally, malnourished patients should be followed by someone with nutrition expertise, specifically a dietitian, post discharge from hospital. Predictors of dietetic care post discharge are currently unknown. The present study aimed to determine the patient factors independently associated with 30-days post hospital discharge dietetic care for free-living patients who transitioned to the community.

**Methodology:** Nine hundred and twenty-two medical or surgical adult patients were recruited in 16 acute care hospitals in eight Canadian provinces on admission. Eligible patients could speak English or French, provide their written consent, were anticipated to have a hospital stay of  $\geq 2$  days and were not considered palliative. Telephone interviews were completed with 747 (81%) participants using a standardised questionnaire to determine whether dietetic care occurred post discharge; 544 patients discharged to the community were included in the multivariate analyses, excluding those who were admitted to nursing homes or rehabilitation facilities. Covariates during and post hospitalisation were collected prospectively and used in logistic regression analyses to determine independent patient-level predictors.

**Results:** Dietetic care post discharge was reported by 61/544 (11%) of participants and was associated with severe malnutrition [Subjective Global Assessment category C: odd's ratio (OR) 2.43 (1.23–4.83)], weight loss post discharge [(OR 2.86 (1.45–5.62)), comorbidity [(OR 1.09 (1.02–1.17))] and a dietitian consultation on admission [(OR 3.41 (1.95–5.97))].

**Conclusions:** Dietetic care post discharge occurs in few patients, despite the known high prevalence of malnutrition on admission and discharge. Dietetic care in hospital was the most influential predictor of post-hospital care.

## Introduction

Malnutrition and poor food intake in hospital are prevalent problems, leading to increased morbidity and health-care utilisation<sup>(1–3)</sup>. Recent work from the Canadian Malnutrition Task Force (CMTF) has identified that the majority of patients admitted to acute care do not improve their nutritional status on admission<sup>(4)</sup> and, for those who stayed more than 7 days in hospital, 48% were malnourished at discharge<sup>(5)</sup>. Only 23% of patients saw a dietitian during their hospitalisation and 75% of patients who were admitted malnourished never received the care of a dietitian during their hospital stay<sup>(6)</sup>. Even with a short length of stay, this is a missed opportunity to detect malnutrition that originates in the community<sup>(1)</sup> and to treat this malnutrition by referral to community services.

As hospital stays become shorter, there will be an increased need for nutrition services post discharge to support improvements in nutritional status to prevent complications such as readmission<sup>(7,8)</sup>. However, no research has been conducted to date focused on understanding transition of care with respect to dietetics. The purpose of this secondary analysis of a large observational cohort study was to identify the independent patient characteristics that predict 30-days post-discharge dietetic care, using data from the Nutrition Care in Canadian Hospitals study conducted by the CMTF.

## Materials & methods

A multicentre prospective cohort study including small (<200 beds) and large (200 plus beds), academic ( $n = 11$ ) and community ( $n = 7$ ) hospitals across eight Canadian provinces recruited adult ( $\geq 18$  years) patients for the purpose of characterising malnutrition, its determinants and its outcomes; data were collected originally from 18 hospitals, although only 16 had discharge data collection ( $n = 922$ ). Sample size was driven by estimating the prevalence of malnutrition in hospital and its prediction of the key outcome of length of stay<sup>(1)</sup>. Specially trained research coordinators used standardised tools and protocols<sup>(1)</sup> to minimise bias. Patients were included in this study if they were located on a medical or surgical unit in the recruited hospitals, had an anticipated length of stay of at least 2 days, were proficient in English or French, were not considered terminally ill on admission and consented (or their family proxy) to participate. Patients admitted directly to critical care, obstetric, psychiatry, palliative or paediatric units or admitted to a medical day unit were excluded. Those with terminal cancer or other terminal conditions identified at recruitment were also excluded. Participants were recruited using a consecutive admissions protocol to avoid selection bias and provided their written informed

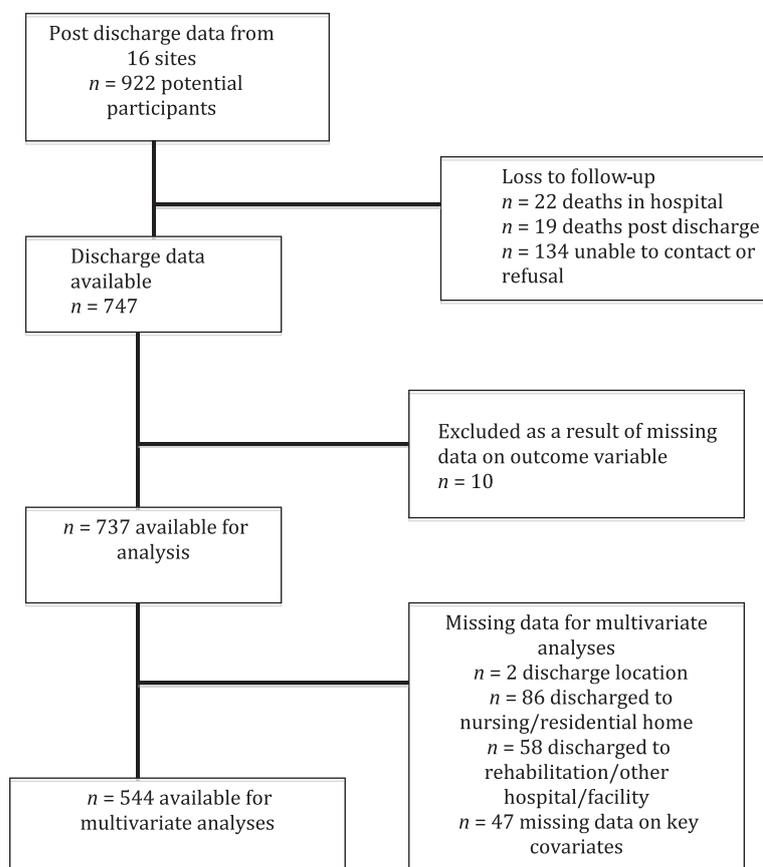
consent for the study<sup>(1)</sup>. Ethical clearance was provided for the conduct of this cohort study from the Universities of Toronto, Guelph and Waterloo research ethics boards, as well as the research ethics board review at each participating hospital. This research was conducted in accordance with the Declaration of Helsinki.

Trained researchers collected all data, and most (15/16) were clinical dietitians seconded from their clinical duties at the site. Training was conducted in person by the project coordinator visiting the site; a google group and e-mail contact with the lead researchers assisted with addressing questions during data collection and promoted consistency. A comprehensive clinical history was obtained by interview and by accessing the medical chart; details are described elsewhere<sup>(1)</sup>. Nutrition assessment based on Subjective Global Assessment (SGA) was completed on admission<sup>(9)</sup>. To address the effect of comorbidity on dependent variables, number of diagnoses, new conditions, current cancer and the Charlson Comorbidity Index (CCI)<sup>(10)</sup> were collected on admission and at discharge. Patients were followed throughout their hospitalisation; every 2 days, the chart was reviewed by the site researcher to determine whether nutrition care activities (e.g. dietetic consultation) had occurred. A site survey identified the hospital size, full time equivalent of dietitians and also whether it was an academic or community hospital; for descriptive analyses, the in-patient to dietitian ratio was calculated [mean 44 : 1 minimum (min) 19 : 1 maximum (max) 92 : 1].

Approximately 30 days post discharge, up to five telephone call attempts were made to the patient and/or their proxy and a standardised questionnaire was administered by each site, including: weight change (gain/loss  $\geq 2.27$  kg), appetite (fair or poor versus good or very good), eating with others (never or rarely; sometimes or often or always), cooking (share or someone else cooks versus patient cooked)<sup>(11)</sup>, following a special diet post discharge, readmissions to hospital, and if and where (e.g. outpatient, primary care clinic) they had seen a dietitian. The 747 (81% of 922) patients recruited for data collection and included in this analysis are noted in Fig. 1. Because it was anticipated that patients discharged to a long-term care home or rehabilitation hospital would have greater access to a dietitian, these individuals were removed from the data set for the analyses.

## Statistical analyses

Key patient-level covariates for this analysis included: demographics of age and sex; diagnoses and current cancer (active treatment in the past 6 months); having a surgical procedure in hospital; dietitian consultation when in hospital; SGA on admission if length of stay (LOS) was



**Figure 1** Participants from nutrition care in Canadian Hospitals Study and the subset used in the present analysis.

less than 7 days or alternatively SGA at discharge (A = well nourished, B = mildly/moderately malnourished, C = severely malnourished); length of stay (days); CCI at discharge; and discharge location. Comparisons between participants and nonparticipants in follow-up calls were made using a chi-squared test, a *t*-test and Fisher's exact test to demonstrate any potential bias in participation. Those with 30 days of follow-up data were: older (66 versus 60 years,  $P < 0.001$ ), more likely to live with others (65.9% versus 58.3%,  $P = 0.04$ ), more likely to be well nourished (57.8% versus 46.1%,  $P = 0.038$ ) and more likely to have a surgical procedure during hospitalisation (51.1% versus 28.4%,  $P = 0.005$ ). Those respondents who were discharged went to a residential or nursing home ( $n = 86$ ; 12%) or to a rehabilitation setting or hospital ( $n = 58$ ; 7.8%) were excluded from analyses, as they were more likely to see a dietitian in these facilities than in the community setting.

Descriptive statistics (proportions, median) presented in Table 1 are based on the free-living subset of participants excluding those who were admitted to a nursing home or rehabilitation facility after discharge ( $n = 544$ , 74% of 737; other participants not used in the analysis had missing data on covariates included in final models) (Fig. 1). Bivariate

analyses were completed to identify how those who received a dietetic care in the community potentially varied from those who did not receive this care. Student's *t*-test, a chi-squared test and analysis of variance were used to determine potential group differences.  $P < 0.05$  was considered statistically significant. Multiple logistic regression models assessing probability of dietetic care post discharge were built using generalised estimating equations; these accounted for site or hospital cluster effect. As a result of the limited number of patients reporting the outcome of dietetic care in this subsample ( $n = 61$ ), several models based on significant variables at the bivariate level were built and examined, each containing a maximum of six predictors. The final model (Model 1) (Table 2) is based on grouping those who did not know their weight with those who reported no weight change; a sensitivity analysis omitting these patients ( $n = 103$ ) was conducted to ensure that the results were not influenced by this analytical decision (Model 2) (Table 2).

## Results

Table 1 provides descriptive statistics on free-living participants stratified by whether or not they received

**Table 1** Descriptive statistics and bivariate associations with dietitian care post discharge ( $n = 544$ )

Covariate	Total sample	Dietitian consultation post discharge		P value
		Yes ( $n = 61$ )	No ( $n = 483$ )	
Age, median years (q1, q3)*	64.0 (52, 75)	66 (55, 72)	63 (52, 75)	0.87
Male sex (%)	53.3	60.7	52.4	0.22
CCI discharge (q1, q3)	2 (1, 4)	<b>4 (2, 6)</b>	2 (0, 4)	<0.0001
LOS (q1, q3)	6 (4, 9)	<b>7 (5, 11)</b>	6 (4, 9)	0.02
Discharge location (%)				
Home	95.4	95.1	95.5	0.89
Someone else's home	4.6	4.9	4.6	
SGA at discharge (%)				
A (well nourished)	56.8	40.98	58.8	0.01
B (mild/moderate)	35.7	<b>44.3</b>	34.6	
C (severe malnourished)	7.5	<b>14.8</b>	6.6	
Surgical procedure (%)	43.6	44.3	43.5	0.91
Current cancer (%)	23.2	34.4	21.8	0.028
Dietitian care in hospital (%)	27.4	<b>52.5</b>	24.2	<0.0001
Weight change post discharge (%)				
Gain $\geq 2.27$ kg	16.2	9.8	<b>16.9</b>	0.004
Loss $\geq 2.27$ kg	22.9	<b>40.9</b>	20.7	
No change	52.2	40.9	<b>53.6</b>	
Do not know	8.6	8.2	8.7	
Report special diet (%)	52.8	<b>77.1</b>	49.7	<0.0001
Cooking meals (%)				
Self	41.3	23.2	<b>43.4</b>	0.0003
Share with other	30.7	26.8	31.1	
Others do	28.1	<b>50.0</b>	25.5	
Eating with others (%)				
Never/rarely	17.9	13.6	18.5	0.78
Sometimes	11.5	11.9	11.4	
Often	11.1	13.6	10.8	
Almost always	59.5	61.0	59.3	

Descriptive statistics (medians or frequencies) are provided for free-living participants (i.e. not living in or discharged to an institution such as a retirement or long-term care home, rehabilitation hospital). Bivariate comparisons were made between those who did and did not report dietetic care post discharge and statistically significant differences ( $P < 0.05$ ) between these two groups are indicated in bold.

All values are medians unless otherwise indicated; \*q1, q3 = interquartile range.

CCI, Charlson Comorbidity Index; LOS, length of stay; SGA, Subjective Global Assessment.

dietetic care post discharge from hospital. The median age was 64 years and 53.3% were male; the majority were discharged to their own home (95.4%). Only 11% (61/544), reported seeing a dietitian post discharge from the hospital (Table 1). No clear regional differences in post-discharge dietetic care were found (data not shown). However, a wide range of participants (7–27%) reported receiving care by a dietitian post discharge and in different locations by hospital site (e.g. outpatients min = 47% max = 100%; home care min = 0 max = 53%; no association by size of hospital or region). Of those participants who saw a dietitian, 73% of patients reported seeing this professional in an outpatient hospital clinic, 23% were visited at their home by a dietitian, and 4.4% saw their dietitian during a primary care clinic visit. Academic and community hospitals did not have significant differences with respect to the median proportion of patients who

saw a dietitian in the community (11.9% versus 5.2% respectively,  $P = 0.10$ ). However, differences did exist by patient characteristics (Table 1). Those who saw a dietitian were more likely to have: more comorbidity (CCI); a longer LOS; be malnourished; receive dietetic care in hospital; lose  $\geq 2.27$  kg post discharge; report being on a special diet; and had others cook for them after they were discharged home.

The most inclusive multivariate model predicting who saw a dietitian post discharge is presented in Table 2 (Model 1,  $n = 544$ ). Being severely malnourished in hospital (SGA-C), self-reported weight loss post discharge and a higher level of comorbidity at discharge all were independently associated with this service post discharge. Dietitian consultation *within* hospital was the strongest predictor (i.e. highest odds ratio) of dietetic care post discharge. Sensitivity analysis removing those who did not

**Table 2** Multiple logistic models for probability of dietitian care post discharge

Predictor	Model 1 (n = 544)		Model 2 (n = 497)	
	OR (95% CI)	P value	OR (95% CI)	P value
SGA at discharge				
SGA-B	1.54 (0.92, 2.57)	0.10	1.38 (0.81, 2.35)	0.23
SGA-C	2.43 (1.23, 4.83)	0.01	2.45 (1.16, 5.17)	0.02
SGA-A*				
Weight change post discharge				
Gain 2.27 kg	0.61 (0.25, 1.51)	0.28	0.64 (0.24, 1.69)	0.37
Loss of 2.27 kg	2.86 (1.45, 5.62)	<0.01	3.05 (1.49, 6.25)	<0.01
Stable weight*				
CCI at discharge, per 1 unit change	1.09 (1.02, 1.17)	0.01	1.09 (1.01, 1.17)	0.02
Dietitian visit during hospitalisation	3.41 (1.95, 5.97)	<0.001	3.45 (2.01, 5.93)	<0.001

Multiple logistic regression analyses were completed to determine those covariates significant in bivariate analyses (Table 1) that were significant predictors of dietetic care in the community at the same time as adjusting for other covariates. The most inclusive model (Model 1) is provided. Model 2 is based on a sensitivity analysis where those who did not know their body weight were excluded. For Model 1, these participants were put in the same category as the participants who reported a stable weight.

\*Referrant category.

CI, confidence interval; CCI, Charlson Comorbidity Index; OR, odds ratio; SGA, Subjective Global Assessment.

know if their weight changed did not influence associations or interpretation (Model 2).

## Discussion

To our knowledge, this is the first exploration of patient-level factors associated with a self-reported dietetic care of free-living individuals in the community within 30 days of discharge. Any interpretation needs to take into consideration that the reasons for this, the timing of the dietetic care and the frequency of contact were not determined. A prior analysis in this cohort study considered predictors of dietetic care within the first 3 and 4+ days post admission; 23% of participants had a dietetic consultation when in hospital<sup>(6)</sup>. Consultation in the first few days was based on the routines of the medical staff (e.g. referring renal patients) and on assumptions that some patients required consultation regardless of their nutritional status (i.e. patients with metabolic conditions). Consultations later after admission were associated with complications such as dysphagia and constipation<sup>(6)</sup>. Nutritional status on admission, as measured by SGA, was a poor predictor of these in-hospital dietetic consultations, indicating that nursing and medical staff were not identifying the malnutrition that was present or did not consider these patients to be relevant for consultation. By contrast, in this analysis focussing on the period post discharge, severe malnutrition identified when in hospital predicted post-discharge dietetic care. Additionally, those who reported weight loss post discharge were more likely to see a dietitian. This may have been because primary care was tracking the body weight of patients or,

alternatively, when receiving home care intake assessment post discharge, weight loss was reported by the patient. Not surprisingly, the most influential predictor was receiving the services of a dietitian during admission at the acute care hospital where they were recruited for the present study; the odds of dietetic care post discharge were three times greater for these patients compared to those who did not have the care of a dietitian in hospital. This may be a result of dietitians requesting a continuation of treatment by a dietitian in the community at discharge planning for key patients that were followed in hospital. However, only 11% of patients discharged to the community reported receiving the care of a dietitian.

Prior analyses in the present study demonstrate that most patients are discharged from hospital with no change in their nutritional status, whereas one in five patients was in a poorer nutritional state compared to when they were admitted<sup>(4)</sup>. Furthermore, half of patients admitted for more than 7 days were malnourished at discharge<sup>(5)</sup>. From an ethical and legal point of view, nutritional care should be continued if the patient is discharged home. Organisation of safe patient care should occur during transitions within the hospital and during external transitions to the community or other organisations. Recent implementation work in hospital demonstrates that screening can be put into place to promote quality care<sup>(12)</sup> and future work should examine the implementation of screening in primary practices, potentially focusing on especially high-risk populations<sup>(13)</sup> to promote safe transitions. The fact that patients reported not being under the care of a dietitian does not mean that this was not requested. Variability in access to

community dietetic care across regions is a potential barrier. Further research should explore not only the community resources available, but also the process for referral and barriers to care that occur, especially because quality transition care and interventions initiated in hospital and continued in the community can improve outcomes, including nutritional status<sup>(13–21)</sup>. However, communication and continuation of care is a known problem with any transition<sup>(22–24)</sup>.

This large multicentre cohort study has provided an opportunity to investigate, for the first time, which patient factors are associated with dietetic care post discharge from hospital, yet there are also limitations to this work. Specifically, detail on whether referrals were made in hospital for post-discharge dietetic care is not known, nor is the potential reason for this referral. However, more than 70% of care provided by a dietitian in the community was reported to occur at a hospital outpatient clinic, possibly implying that this contact was a result of the acute care dietitian involvement. Understanding the community capacity for nutrition and food-related care was not known. A key limitation is the self-report of dietetic care in the community and weight change and intentionally of weight loss are not known. Limitations with respect to inadequate data to fully interpret the findings are a result of the nature of the cohort study, which was not explicitly designed to address such questions. In addition to these challenges with respect to measurement, the sample was also biased. Individuals who did not meet eligibility criteria in hospital (e.g. those with dementia) were not recruited, and thus full representation of all medical and surgical patients in Canada is unlikely. Finally, those who completed a telephone follow-up were more likely to be older, live with others and be well nourished. However, the prospective data collection was a key strength. Post-hospital studies are often retrospective<sup>(3,24)</sup> or based on administrative data sets, limiting the exploration of diverse covariates that could impact outcomes.

### The need for future research

The low prevalence of reported dietetic care in this initial study, despite the high prevalence of malnutrition noted at discharge, suggests that further work aiming to understand how dietetic care occurs during transitions to community is warranted. In addition to patient-level characteristics, a variety of community and care process variables need to be assessed. The results of such investigations will help to identify better potential practices that can be the focus of interventions. Future work should thoroughly investigate the extent of dietetic services available to the patient at the incident hospital, both in- and outpatient services, as well as the types of services referred

(e.g. hospital outpatient clinics, home care or their primary care service). Further research should determine the proportion of patients who are followed in the community to assess whether patients are compliant with the treatments started and whether any adjustment is required. Professional dietetic services are becoming more common in primary care; thus, an investigation of the process of transition in a variety of models and outcomes for those malnourished patients who receive this care, as well as those who do not, is needed. The cost effectiveness of screening and treatment in and out of hospital also needs to be established<sup>(25)</sup>. Furthermore, other forms of nutrition and food-related support for malnourished patients should be explored, including the benefits of these community-based services on food intake and nutritional status. Understanding the patient experience during transitions<sup>(23)</sup> is just beginning and the motivation or prioritisation of patients with respect to continuing with dietetic treatment in the community is unknown.

### Conclusions

Dietetic care post discharge to the community is relatively uncommon. Predictors of dietetic care post discharge include being under the care of a dietitian in hospital, weight loss post discharge, severe malnutrition and comorbidity. This analysis suggests that malnutrition is being undertreated in the community because almost one quarter reported weight loss post discharge<sup>(26)</sup>. Future work needs to more comprehensively and prospectively assess the transition care experience to understand how care for malnourished patients post discharge can be improved and whether this care results in improved outcomes.

### Transparency declaration

The lead author affirms that this manuscript is an honest, accurate and transparent account of the study being reported. The reporting of this work is compliant with STROBE guidelines in the Supporting information (Appendix S1). The lead author affirms that no important aspects of the study have been omitted and that any discrepancies from the study as planned (Registered January 27, 2015 with ClinicalTrials.gov NCT02351661) have been explained.

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HK, HP, ML and PB designed and provided the conceptual basis for the study analysis. HK led the analysis and wrote the initial draft of the manuscript. All authors were involved in the writing and critical revision of the manuscript submitted for publication.

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### Supporting information

Additional Supporting Information may be found online in the supporting information tab for this article:

**Appendix S1.** STROBE Statement: checklist of items that should be included in reports of cohort studies.