

A Pre-post Evaluation of an Ambulatory Nutrition Support Service for Malnourished Patients Post Hospital Discharge: A Pilot Study

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Abstract

Introduction: Malnutrition is common among hospitalised patients, with poor follow-up of nutrition support post-discharge. Published studies on the efficacy of ambulatory nutrition support (ANS) for malnourished patients post-discharge are scarce. The aims of this study were to evaluate the rate of dietetics follow-up of malnourished patients post-discharge, before (2008) and after (2010) implementation of a new ANS service, and to evaluate nutritional outcomes post-implementation. **Materials and Methods:** Consecutive samples of 261 (2008) and 163 (2010) adult inpatients referred to dietetics and assessed as malnourished using Subjective Global Assessment (SGA) were enrolled. All subjects received inpatient nutrition intervention and dietetic outpatient clinic follow-up appointments. For the 2010 cohort, ANS was initiated to provide telephone follow-up and home visits for patients who failed to attend the outpatient clinic. Subjective Global Assessment, body weight, quality of life (EQ-5D VAS) and handgrip strength were measured at baseline and five months post-discharge. Paired t-test was used to compare pre- and post-intervention results. **Results:** In 2008, only 15% of patients returned for follow-up with a dietitian within four months post-discharge. After implementation of ANS in 2010, the follow-up rate was 100%. Mean weight improved from 44.0 ± 8.5 kg to 46.3 ± 9.6 kg, EQ-5D VAS from 61.2 ± 19.8 to 71.6 ± 17.4 and handgrip strength from 15.1 ± 7.1 kg force to 17.5 ± 8.5 kg force; $P < 0.001$ for all. Seventy-four percent of patients improved in SGA score. **Conclusion:** Ambulatory nutrition support resulted in significant improvements in follow-up rate, nutritional status and quality of life of malnourished patients post-discharge.

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Key words: Home visit, Malnutrition, Outcomes, Telephone, 7-point Subjective Global Assessment

Introduction

Malnutrition is common among hospitalised patients, with a prevalence ranging from 20% to 50%.^{1,2} Poor nutrition results in a range of negative clinical, functional and systemic outcomes.¹⁻⁴ Malnutrition markedly increases morbidity and mortality in both acute and chronic diseases, of which trauma and heart failure are examples of each category respectively.² Specifically, malnourished hospital patients have a 1.6 to 4.4 relative risk of death up to 3 years post-discharge in comparison to well-nourished patients.^{1,5,6} Malnourished patients are more susceptible to poor wound healing, postoperative complications and lower quality of life.^{2,5} Hospital length of stay is 1.5 to 1.7 times longer and cost of treatment significantly higher in malnourished

compared to well-nourished patients.^{1,5,6}

The nutrition status of patients malnourished on admission often worsens during the hospital stay, with a cumulative decline in status associated with repeated readmissions.^{2,3} This is, at least in part, because the short length of stay of most inpatients limits the potential impact of inpatient nutrition interventions that typically include nutrition supplements, dietary fortification and patient education. These patients return to the community malnourished, and are often readmitted still malnourished, causing a vicious cycle. Therefore, it is imperative that we follow-up on these patients after they are discharged for ongoing monitoring and treatment. Outpatient dietetic follow-up post-discharge

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is commonly arranged in an attempt to extend the time frame and potential effectiveness of these interventions. However, there is very little evidence on effective methods of follow-up to treat malnutrition post-discharge, and many patients become lost to follow-up.^{7,8}

Given the adverse consequences of malnutrition and likelihood of poor rates of follow-up post-discharge, new strategies are needed to effectively manage these patients. One possible model of care is a telephone and/or home visit follow-up programme. This has the potential to provide an individualised and convenient service, thus improving patient compliance to follow-up. To date, there have been limited studies published on the efficacy of this form of intervention to improve the nutritional outcomes of malnourished patients discharged from hospital, with existing research based on geriatric populations,^{9,10} or the use of this model of care in other settings.^{11,12}

The aims of this study were to determine the rate of dietetics follow-up of post-discharge malnourished patients pre- and post-implementation of a new ambulatory nutrition

service (ANS) service, and to evaluate nutritional outcomes following implementation of the new ANS service.

Materials and Methods

This study was approved by the National Healthcare Group Domain Specific Review Board.

Setting and Participants

This study includes data from malnourished adult patients aged ≥ 21 years of age, discharged from a tertiary hospital at two different time periods, in 2008 and 2010.

Patients receiving tube feeding or total parenteral nutrition upon discharge; psychiatry or maternity patients; patients on palliative care or with a terminal illness; patients residing overseas; and patients discharged to another healthcare or step-down care facility or nursing home were excluded from both cohorts.

The workflow of the study is described in Figure 1.

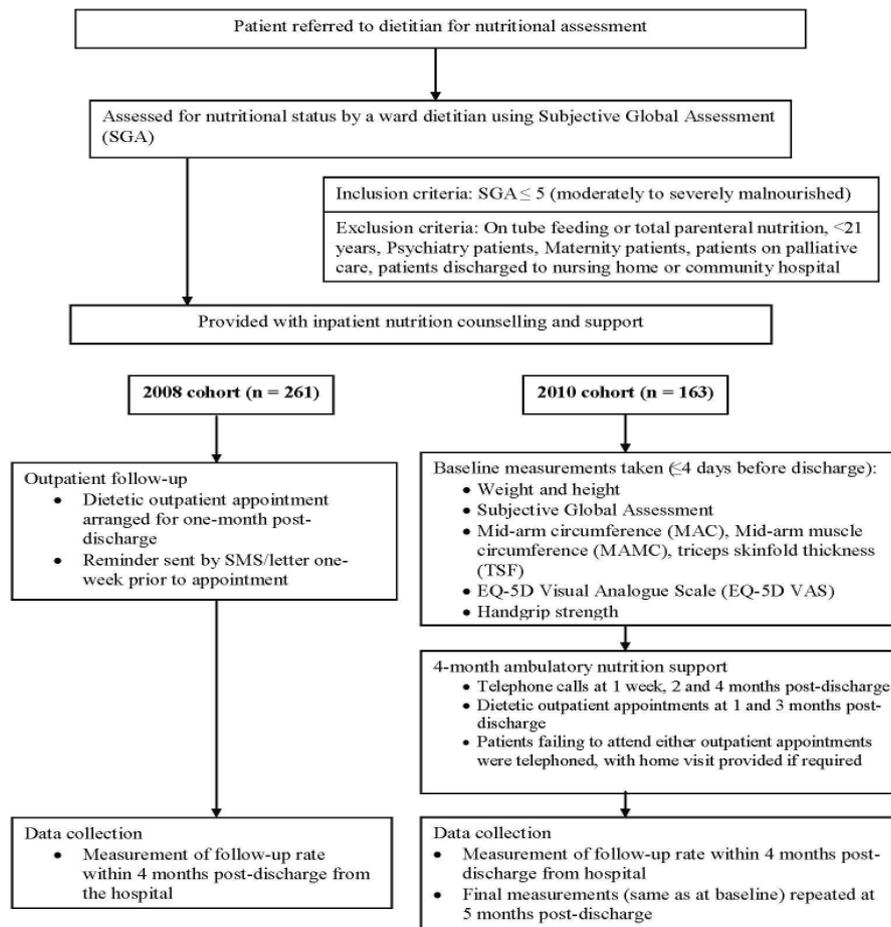


Fig. 1. Workflow for 2008 and 2010 data.

Participants in 2008

The dietetics records of 261 malnourished adult inpatients consecutively referred to dietetics from January to October 2008 were retrospectively reviewed to assess the post-discharge dietetics follow-up attendance rate. All patients were screened for risk of malnutrition on admission using 3-Minute Nutrition Screening^{13,14} by the ward nurses as per hospital protocol. Any patient identified as at risk of malnutrition was referred to the hospital dietitian, who confirmed the diagnosis of malnutrition using Subjective Global Assessment (SGA).^{15,16} Malnutrition was defined by a score of ≤ 5 in a 7-point SGA.¹⁶

Each patient was provided with individualised nutrition intervention and counselling by a dietitian on the ward, and a follow-up appointment with a dietitian at the outpatient clinic one-month after discharge. Two weeks prior to this appointment, patients or caregivers were provided a reminder via an appointment letter sent to their home address or short messaging system via telephone (according to patient preference). All readmitted patients underwent the same malnutrition screening process described above, and were seen again by a ward dietitian if referred.

As most patients in the 2008 cohort did not return for follow-up, the data on nutritional outcomes is too limited to assess any change in nutritional status for this cohort.

Participants in 2010

A consecutive sample of 163 adult inpatients referred to hospital dietitians due to malnutrition were recruited for this study. Patient screening, referral and diagnosis of malnutrition and treatment were as above.

Intervention

In addition, as part of a quality initiative project, a novel four-month ANS service was implemented for the 2010 cohort of patients. The planned duration of the intervention was 4 months as clinical experience suggests that this is the average period required to see changes in nutritional status.¹⁰ A flow chart of both intervention and assessment activities is shown in Figure 1.

The ANS service provided 5 post-discharge consultations (at week 1 and then monthly till the 4th month inclusive). The planned schedule included (i) two outpatient appointments with a dietitian (1 and 3 months) and (ii) 3 telephone calls from a dietetic assistant (1 week, 2 months and 4 months). The dietetic assistant was trained by the dietitian to assess a patient's diet by taking a simple diet history via phone call. The dietetic assistant was only allowed to make independent phone calls after passing competency assessment for at least 10 cases. The dietetic assistant was also trained to ask a set of questions regarding appetite, supplement usage

(if prescribed), and to identify any new dietary issues or questions. Detailed documentation on the advice given during the telephone call made by the dietetic assistant ensured continuity of care when the dietitian saw the patient at outpatient follow-up. If no issues were identified by the dietetic assistant, the next planned review was an outpatient clinic appointment (as described below). If problems were identified beyond the capability of the dietetic assistant, the patient was escalated to the study dietitian who then called the patient again to provide individualised advice. Patients who were not progressing well in terms of weight, nutritional status and oral intake were advised to return to the outpatient clinics for follow-up as they would require a more thorough review and intervention by the dietitian.

If a patient failed to attend either of the scheduled outpatient appointments at 1 and 3 months post-discharge, they would receive an additional telephone call from the dietetic assistant to review self-reported weight status and intake. Based on the telephone interview, those who were doing well would receive their next scheduled telephone call from the dietetic assistant at the 2nd or 4th month (as applicable). Patients with suboptimal intake or weight loss were visited at home by the study dietitian in lieu of the missed scheduled outpatient appointment. This visit would include measurement of weight. Weights obtained at intervention contacts, including self-reported weights, were used solely for assessing nutritional progress for the purpose of tailoring the nutrition care. They were not used for outcome assessment.

All patients attending outpatient appointments in 2008 and 2010 paid the standard dietetic outpatient review charge. Telephone reviews and home visits were provided free of charge for the 2010 cohort. Patients were not advised in advance that home visits were not charged.

Outcome Assessments for the 2010 Cohort

Scheduling: Each outcome was measured by the study dietitian at baseline (no more than 4 days before discharge) and 1 month after completion of the intervention and hence 5 months post-discharge (± 1 week). Final outcomes measures were taken at an outpatient assessment appointment with the study dietitian. Any patient who failed to attend this appointment was visited at home within one week of the defaulted appointment.

Nutritional Outcomes

Subjective Global Assessment (SGA): Nutritional status was assessed using a 7-point modification^{16,17} of the 3-point SGA scale.¹⁵ The 7-point SGA was used in this study as it has a more detailed scoring compared to 3-point SGA, wherein 6 to 7 indicates well-nourished, 3 to 5 indicates

moderately malnourished, and 1 to 2 indicates severely malnourished.¹⁶ It is able to detect nutritional changes over a shorter time frame than the 6 months typically required for the 3-point SGA.^{18,19} This scoring method can always be converted to the conventional 3-point SGA (A = well-nourished, B = moderately malnourished, C = severely malnourished), which has been widely validated for prognostic outcomes.^{1,5,6} We acknowledge that the 7-point version has been shown to be reliable primarily in dialysis patients.^{20,21} However, given that dialysis patients are amongst the most difficult in which to reliably assess nutritional status due to fluctuating fluid status, it is likely that this extension of the traditional SGA will also be valid in all hospital patients. This measure was supplemented with additional parameters described below.

Body Weight: Body weight was measured using the calibrated digital Seca weighing machine (Seca, Seca Deutschland, Germany). Patients were weighed clothed but without shoes. Equipment matching that used in outpatients clinics was also used during home visits.

Triceps Skinfold Thickness: Triceps skinfold thickness (TSF) was measured using a Harpenden skinfold caliper (Harpenden, Baly International, England) based on the usual method applied in nutrition studies.²²

Mid-arm Muscle Circumference: Mid-arm muscle circumference (MAMC) was measured using a centimetred flexible tape at the midpoint between the acromion process and the end of the humerus.²²

Handgrip Strength: Handgrip strength was measured on the dominant hand using the Jamar dynamometer (Jamar, Sammons Preston Royland, USA) following the usual method recommended by the American Society of Hand

Therapists.²³

Quality of Life: Quality of life was assessed using the Euro-Quality of Life 5 Domain Visual Analogue Scale (EQ-5D VAS).²⁴⁻²⁶ The EQ-5D VAS records the respondent's current self-rated health on a vertical, visual analogue scale where the endpoints are labelled 'best imaginable health state' and 'worst imaginable health state'. Subjects either completed the EQ-5D VAS on their own or were asked by the study dietitian.

Statistical Analysis

All statistical analyses were performed using the Statistical Package for the Social Sciences for Windows (version 18.0, SPSS Inc., Chicago, IL, USA). Paired t-test was used to compare baseline and post-intervention results and presented as mean \pm standard deviation (SD). Proportions of patients with changes in outcome variables were presented as percentages.

Results

The demographics of the study subjects are described in Table 1. There were no significant differences between the cohorts of subjects in 2008 and 2010 for age, gender, ethnicity and baseline nutritional status.

Follow-up rate

In 2008, 15% of patients returned for outpatient follow-up within four months of discharge from index admission, and only 2% attended more than one dietetics outpatient clinic appointment. There were a total of 66 patient encounters for this cohort, consisting of 70% outpatient clinic visits and 30% ward-based reviews due to readmission. The frequency of follow-up and time until follow-up were highly variable.

In 2010, the ANS service achieved 100% (n = 163)

Table 1. Demographics of the Study Subjects (at Baseline)

		2008 (n = 261)	2010 (n = 163)	P value
Age	Mean + SD	72.5 \pm 15.8	70.8 \pm 16.1	0.279
	Range	26 to 101 years	24 to 102 years	
Gender	Males	43.7%	53.4%	0.052
Ethnicity	Chinese	74.7%	69.4%	0.122
	Malay	15.3%	19.6%	
	Indian	7.7%	5.5%	
	Others	2.3%	5.5%	
Baseline Nutritional Status*	Moderately malnourished:severely malnourished (%)	240:21 (92:8)	151:12 (93:7)	0.798

n : number; SD : standard deviation

*Severity of malnutrition as defined by Subjective Global Assessment.^{15,20}

follow-up of malnourished inpatients within 4 months of discharge from the hospital. With respect to intervention delivery, 70% of patients attended at least one outpatient visit and 29% came back for both scheduled outpatient visits. There were a total of 792 patient encounters for the purpose of follow-up in 2010. Of these, 71% were telephone calls, 23% were outpatient clinic visits, 2% were home visits and the remaining 4% were ward-based reviews of readmitted patients. The distribution of the mode of follow-up is described in Figure 2. Following telephone follow-up by the dietetic assistant, 24 out of 163 patients (15%) were escalated to the dietitian for further telephone follow-up. Of these 24 patients, 2 patients required 2 or more telephone follow-ups by the dietitian. In total, there were 27 occasions that required a dietitian input after the dietetic assistant had made the telephone follow-up.

At the 5-month assessment, which was mainly for the purpose of final measurements to track the outcomes of this study, 36% of participants required a home visit and 64%

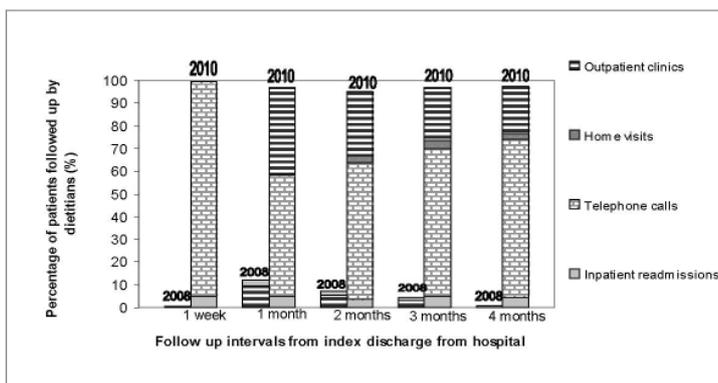
returned to see the dietitian at outpatient clinics.

Nutritional Outcomes and Quality of Life

For the 2010 cohort of patients, the nutritional status at baseline and five-months post-discharge is shown in Table 2. Overall, there were significant improvements in mean weight, triceps skinfold thickness, handgrip strength and quality of life.

Discussion

This study provides promising pilot data that a novel ANS service was able to achieve 100% dietetic follow-up of malnourished patients post-discharge. This was substantially better than data from 2008 in which 85% of patients failed to attend their dietetic follow-up appointment. The ANS potentially overcomes a range of barriers to attendance including prolonged waiting time at the clinic, reduced emotional and physical capacity of the patient to attend



*In the first four months post-discharge, there were 66 patient encounters in the 2008 cohort (pre ANS implementation) and 792 patient encounters in the 2010 cohort (post ANS implementation).

Fig. 2. Mode of follow-up of malnourished patients by dietitians post-discharge pre- and post-ambulatory nutrition support (ANS) implementation in 2008 and 2010 respectively.*

Table 2. Nutritional Parameters of Malnourished Patients Provided with Ambulatory Nutrition Support at Baseline and 5-month Post-discharge

Primary outcomes	n	Mean values at baseline	Mean values at 5 months post-discharge	Mean change ± SD	P	Proportion of patients with improvement in outcome (%)	Proportion of patients with deterioration in outcome (%)	Proportion of patients with no change in outcome (%)
Weight	162‡	44.0 ± 8.5 kg	46.3 ± 9.6 kg	2.2 ± 4.7 kg	<0.001*	69.9	27.0	3.1
SGA	163	NA	NA	NA	NA	73.8	7.9	18.3
MAC	153‡	22.5 ± 2.9 cm	22.9 ± 3.5 cm	0.4 ± 2.3 cm	0.048*	57.5	42.5	0.0
TSF	153‡	8.4 ± 3.5 mm	9.9 ± 5.1 mm	1.5 ± 2.9 mm	<0.001*	67.3	31.4	1.3
MAMC	153‡	19.9 ± 2.5 cm	19.77 ± 2.63 cm	-0.1 ± 1.8	0.511	48.4	50.3	1.3
Handgrip	105‡	15.1 ± 7.1 kgforce	17.5 ± 8.5 kgforce	2.4 ± 4.2 kgforce	<0.001*	71.4	26.7	1.9
EQ-5D VAS	81‡	61.2 ± 19.8	71.6 ± 17.4	10.3 ± 22.2	<0.001*	66.7	23.5	9.9

* Statistical significance

‡ Missing data due to refusal or inability of patients to be measured.

MAC: Mid-arm circumference; MAMC: Mid-arm muscle circumference; n: number; NA: Not applicable for categorical data; SD: Standard deviation; SGA: Subjective Global Assessment;²⁰ TSF: triceps skinfold thickness; EQ-5D VAS: Euro Quality of Life 5 Domain Visual Analogue Scale²⁴

clinic, costs, transport problems and not wanting to cause inconvenience to family members.²⁷

Worldwide, the issue of patients being lost to follow-up is common, with studies showing that 54% to 58% of patients fail to attend scheduled outpatient appointments.^{27,28} In a study by Van Bokhorst-de van der Schuren et al, only 54% of malnourished patients were seen by a dietitian during admission. Of these, only 23% were followed-up by a dietitian after discharge.⁷

The ANS service allowed for one of three modes of follow-up for the first 4 months post-discharge, namely telephone calls, outpatient visits and home visits. From the results, it can be seen that telephone calls made up almost three quarters of contacts and were mostly made by a trained dietetic assistant. Compared to traditional dietetic outpatient consults which can be poorly attended, telephone calls by a dietetic assistant are relatively low cost and appear to generate positive nutritional outcomes for patients as shown in this study. Telephone calls are less time-intensive than outpatient reviews, and thus offer the benefit of reduced manpower requirements and reduced costs for the healthcare provider. Patients who did not do well nutritionally and missed their appointments were visited by the dietitian at their homes. With this method, we were able to keep home visits (which is resource-intensive) to patients who really needed it. To the best of our knowledge, there have been no other studies that reserve home visits for this group of patients. However, there is support in the literature for combined telephone calls and home visits in patients with chronic disease, where this method of intervention has emerged as an increasingly popular means to deliver health promotion and behaviour change intervention.^{11,29} One study considered the effectiveness of telephone-delivered advice plus home visits for heart failure patients, incorporating home support group meetings, home visits and telephone follow-up.¹¹ These interventions resulted in reduced readmission rates, mortality and morbidity in comparison to traditional outpatient services.¹¹ In another study on home visit dietetic follow-up for elderly in the community, nutrient intake increased significantly as a result of more aggressive nutritional follow-up.¹²

There were significant improvements in mean weight and handgrip strength following implementation of the ANS service, and three in four patients had improved SGA score. There is evidence that that intensive dietetic monitoring and follow-up results in higher nutrient intake, and this is a plausible reason for the improvements in outcomes seen in this study.¹² These results are noteworthy, as improvement in nutritional status has been shown to reduce readmissions, rate of complications and mortality, which may result in long-term cost savings for the individual, healthcare institution and government.³⁰⁻³³

The current study found two thirds of patients receiving

ANS had improved quality of life (QoL). Improvements in QoL following nutritional intervention in malnourished patients have been reported elsewhere.^{31,34} In a study of 111 colorectal cancer patients, QoL improved significantly in the nutrition counselling group at the end of radiotherapy and continued to be maintained after three months. In contrast, the group who did not receive nutrition counselling had deterioration in QoL, which further worsened after 3 months.³¹

There are a number of strengths in this study. Firstly, it shows that the nutritional outcomes of post-discharge malnourished patients can be improved by multi-modal ambulatory nutrition support, at relatively low cost and healthcare burden. Secondly, it is the first study of its kind to include adult malnourished patients across the age and disease spectrums. It is also the first study specific to the Singaporean population. Inter-rater differences were not present in this study as one dietitian measured all nutritional outcomes, and this dietitian was trained in the use of all measurement tools. The study protocol requires that the baseline measurements (body weight, SGA, mid-arm anthropometry, handgrip strength and QoL) carried out were no more than 4 days before patient discharge regardless of whether they had been done earlier during the admission. This ensures the currency of the baseline data as it has been widely reported that patients' weight and nutrition status tend to deteriorate during hospitalisation.²⁻⁴

A major limitation of this study is the pre-post design and the lack of a control group. It is possible that contact with a health professional might have been responsible for the observed improvements. The different time period of each cohort might have resulted in comparisons that were not equally matched. Although there were no statistically significant differences between the demographics of each cohort, there might have been other characteristics that differed, such as socioeconomic status, family situation or motivation level. The cost to the patient associated with outpatient review, in comparison to free-of-charge telephone calls and home visits, might have negatively impacted outpatient attendance rates.

This pilot research provides initial evidence that an ANS service consisting of clinic appointments, telephone calls and home visits provides an effective model of follow-up for malnourished hospital patients post-discharge, and is able to improve nutritional outcomes in this patient group. Future research should focus on a randomised control trial assessing the effectiveness of an ANS service versus conventional methods for managing malnourished patients post-discharge. This study aligns with the Singaporean national health priority to facilitate continuity of care post-hospitalisation. This novel approach proved to be successful, feasible and beneficial in improving follow-up rate and nutritional outcomes. Incorporating this service

into routine care for malnourished patients post-discharge should be considered.

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