

Therapeutic Diet Assessment and Modifications Improve Nutritional Status, Dietary Intake and Patient Satisfaction among In-Patients at AL-khor Hospital - State of Qatar

Asma Al-Muhannadi, Michelle Calapano, Marwa Rustom, Wala Mohammad, Sharifa Manaai, Somaia Hamed, Asma AL Obahi, Dr. Ghazi Daradkeh

Corresponding Author: Dr. Ghazi Daradkeh Ph. D * Department of clinical nutrition & Dietetics - AL-Khor Hospital (AKH), Hamad Medical Corporation, Qatar Tel: +97466256246; E-mail: gdaradkeh@hamad.qa drghazidaradkeh@gmail.com

Abstract

Background has been recognized that hospital food service could be improved, with malnutrition a particular concern. The problem of patients obtaining adequate nutrition in hospital is complex with many constraints at ward level. The hypothesis of this study is that patients' food intake and improved nutritional status is correlated with patient satisfaction with his/her diet. **Aims:** 1. assess patient food intake and risk of malnutrition 2. assess patient satisfaction of the therapeutic diet menu.

Methods: This is quality improvement cross-sectional study was conducted into two phases, over 12 months phase one from Jan – June (pre-diet modifications) and phase two from July- Dec. 2023(post diet modifications), at AL-Khor hospital – Hamad Medical Corporation (HMC) – the State of Qatar. Seven satisfaction dimensions with menus were included mainly taste, texture, temperature, appearance, quantity, service timelines, and food choices. Food intake was assessed based on plate leftovers. The risk of malnutrition was assessed based on Nutrition Risk Index (NRI) and Geriatric Nutrition Risk Index (GNRI). The satisfaction level was categorized into four categories: excellent, very good, good, and need improvement. Excellent and very good patient response considered as satisfied, while good and need improvement response considered as not satisfied. Food intake was classified as adequate ($\geq 80\%$) and inadequate intake ($< 80\%$) of patient's requirements. Malnutrition risk was classified as: severe, moderate, mild and no risk, while Geriatric Nutrition Risk Index (GNRI) was classified as: severe, moderate, mild and no risk. Dietary modifications were carried out after phase one of this study based on assessment of patient satisfaction, food intake and malnutrition risk assessment. Diet modifications include four components: egg, protein source (meat, fish, chicken), cooked vegetables and soups. Data was gathered, managed, tabulated, and statistically analyzed to deduce results using SPSS (Statistical Package for Social Sciences, version 24, Chicago, IL, USA. **Results:** The results of overall satisfaction indicated that significantly improved during phase two (88.2%) compared with phase one (78.1%), ($P = 0.03$). The overall Nutritional intake was significantly improved in phase two (74.3%) compared with phase one (69.0%), ($p = 0.02$). There was no significant difference between participant age, weight difference, nutritional risk index (NRI), albumin, and osmolality pre- and post-diet modifications ($P > 0.05$). After the dietary modifications, Body Mass Index (BMI) and Geriatric Nutritional Risk Index (GNRI), were improved significantly ($P = 0.03$ and 0.04) respectively. **Conclusion:** There are opportunities to improve the meal and foodservice experience for this patient group to meet their nutritional requirements and expectations. To enhance nutrition care for inpatients on therapeutic diets, demographics, investigation of the best foodservice system, and sufficient dietetic resources are required.

Keywords: satisfaction, food intake, diet, requirements, modifications.

DOI: 10.7176/FSQM/123-08

Publication date: November 30th 2024

Background

By serving food that is enticing in terms of look, flavor, scent, texture, and perceived healthfulness, hospital foodservice departments hope to promote favorable patient experiences. High quality food is foundational to both patients' enjoyment of food and the nutritional adequacy of the menu ⁽¹⁾. In recent years, hospitals and long-term care facilities have become increasingly focused on satisfaction ratings in all facets of the organization, which can be attributed to legislation mandating that patient satisfaction be measured and addressed and satisfaction indicators posted on public websites ^(2,3). This direction has had some impact on foodservice. On a related note, studies have demonstrated that food quality and food service can influence patients' overall satisfaction with their hospital stays ^(4,5). Hospital food and menus have garnered attention from patients, media, and the public because of a perception that the food provided is neither appetizing nor nutritious. Intensifying this negative image is the awareness that many hospitals outsource much of their food and pre-prepared food has a reputation of being high in sugar, fat, salt and artificial flavors and colors. Alternatively, the perception that hospital food is of poor quality may originate from patients who feel unwell and are put off by any flavor, appearance, or aroma, as well as patients

who are unfamiliar with the North American diet. Hospital food service is often the sole provider of food for some patients; therefore, if patients are unaccustomed to menu items their satisfaction may decrease, and consequently their intake.

Factors, and the components of menu planning in which they fall, can differ depending on the legislation, financial objectives, environment, and complexity of the foodservice department. For long-term care facilities, Mayerson and Thompson (2013) suggest four components in menu planning, including food production, nutrition care, quality food and meal service but do not consider resident preference and budget ⁽⁶⁾. Payne-Palacio and Theis (2008) offer broad categories for menu planning: i) nutritional requirements and food habits of the population, ii) goals of the organization, iii) funding, iv) limitations of equipment and facilities, v) number and skill of employees, and vi) type of service ⁽⁷⁾. Whereas Khan (1990), who gives heavier weight to operational components, and describes three consumer components (food characteristics, food habits, and nutritional requirements) and six management components (organizational goals, market conditions, budget, facilities and equipment, personnel skills, and production types) ⁽⁸⁾.

Advancement of any foodservice operation is contingent upon the individual and interdependent success of all six menu components. The aim of hospital food services is to provide nutritionally adequate different types of diets include regular, therapeutic, and modified texture menus that meet or exceed patient expectations, while balancing budget and operational capacity, supporting hospital functions, reflect community culture, and adhere to legislative requirements. It is proposed that each of the six components be considered during menu planning then assessed individually and as a group during menu evaluation. The interdependency of the six components necessitates balance. For example, a reduction in funding for food may lead to purchasing lower quality menu items with poor nutritional content, resulting in patient dissatisfaction and poor intake and subsequent increase in food waste. Resident satisfaction with food and foodservice accommodating residents' preferences enhances their quality of life and increases satisfaction, while facilitating intake, which in turn reduces their risk of malnutrition and dehydration. Accountability for honoring resident preferences is entwined in the Long-Term Care Act mandating that residents' councils be part of the menu planning and review process ⁽¹⁰⁾. Assessing the variety of foods offered on the menu is important given variety and consequently choice are predictors of patient satisfaction ^(11,12).

Limited resources such as staff time and funding as well as regulations specifying variety and portion size have been found to be barriers to responding to the patient voice ⁽¹³⁾. The legislated 21-day menu cycle in long term care attempts to address the challenge of variety of foods ⁽¹⁰⁾. Operations Regulations under the Long-Term Care Act obligate long term care facilities to employ cooks and develop menus that support some degree of in-house production. Foods prepared in the facility can be selected and modified to better meet the cultural preferences and nutritional requirements of resident populations than those that are outsourced ⁽¹⁰⁾. Indirectly, through the legislation, the Ministry of Health and Long-Term Care recognizes that foods prepared in-house are likely of higher quality and more suited to the preferences of the resident population than those outsourced ⁽⁹⁾. The Long-Term Care Act sets out the number of hours and the duties of food service workers, the purpose of which is twofold. It protects food service staffing levels in times of funding reductions, and it ensures fundamental food service tasks are known and completed ⁽¹⁰⁾. Menu planning principles and standards are well documented in textbooks, government guides and articles ^(7,9). However, within these sources are few references describing the purpose of assessing the nutritional composition of menus and when it is, it is discussed in generalities, such as "Does the menu meet nutritional guidelines and organizational objectives?" ⁽⁷⁾. Menu planning guides also neglect to address how menus should be modified to address the needs of specific patient populations. Patients with renal disease are often prescribed diets that are limited in potassium, phosphorus, and sodium; the elderly often require high intakes of protein related to sarcopenia; and male patients may require higher amounts of energy than female patients ⁽⁹⁾.

Modification of menus requires knowledge of the amounts of specific nutrients in terms of meal or day or week, depending on the nutrient. The importance of assessing hospital menus for nutritional adequacy was demonstrated by Trang et al (2015) in a study of regular and diabetic diets in three acute care Ontario hospitals. Researchers found energy content ranged from 1281 kcal to 3007 kcal and protein content from 49 grams to 159 grams per day. A comparison of the menus using DRIs and CFG revealed that menus did not consistently meet recommendations for macro- and micro-nutrients or for the number of servings cited in CFG ⁽¹⁴⁾. Similarly, a menu assessment conducted in Poland determined that of 222 samples obtained for theoretical qualitative and quantitative testing, 37.8% were inconsistent with Polish nutritional standards ⁽¹⁵⁾.

Only with menu assessment for nutritional composition can foodservice leaders identify when hospital menus provide inadequate, adequate, or excessive amounts of specific nutrients. In another Ontario study, Arcand et al (2012) offered an example of how menu assessment informs practice. Researchers examined the sodium content of standard non select menus and consecutive select menus for regular, diabetic and sodium restricted menus in three acute care hospitals. The study included patient selected menus (84 regular non-select, 633 regular, 628 diabetic and 973 low sodium) and found 86% of the non-select and 79% of the select menus exceeded the recommended 2300 mg of sodium per day ⁽¹⁶⁾. The researchers argued that the menus studied served a large group of nutritionally vulnerable patients and that it is important that low sodium food items be procured. In addition, they suggested the implementation of menu planning policies that lower sodium levels. Providing patients with a nutritionally adequate menu is an essential factor in combating malnutrition in hospitals. The prevalence of malnutrition in Canadian acute care hospitals was found to be 45% by the Canadian Malnutrition Task Force ⁽¹⁷⁾, which is consistent with the research of Velasco and colleagues (2010) that found the prevalence varied from 31.5% to 58.5 % depending on the nutritional screening tool used ⁽¹⁸⁾. The most significant findings were published in a study by Allard et al (2016). In a population of 409 hospitalized patients in Canada, these researchers found that of those patients who had weight loss of greater than or equal to 5% during admission, their nutritional status declined and their length of stay increased ⁽¹⁹⁾. These findings are of particular interest to health ministries and hospital administrators considering length of stay has a significant impact on costs and quality of life. Further, Dupertuis (2003) observed that at least 59% of hospitalized inpatients were not unfed due to disease state, but rather insufficient intake was related to inadequate suppers, therapeutic diet orders, length of stay, being of the male gender and a high body mass index ⁽²⁰⁾. This is congruent with the Canadian Malnutrition Task Force's recommendation to establish a "national standard for menu planning to ensure quality food is provided in hospitals and requires that foodservices staff provide adequate nutrients to meet the needs of diverse patients, as indicated in their nutrition care plans" ⁽²¹⁾. Calculating then assessing the nutritional composition of hospital menus is required to meet this recommendation. According to the Canadian Malnutrition Task Force, patients' incapacity to take enough food and fluids while in the hospital may be caused by their appetite and their refusal to accept the meal that was ordered ⁽²²⁾.

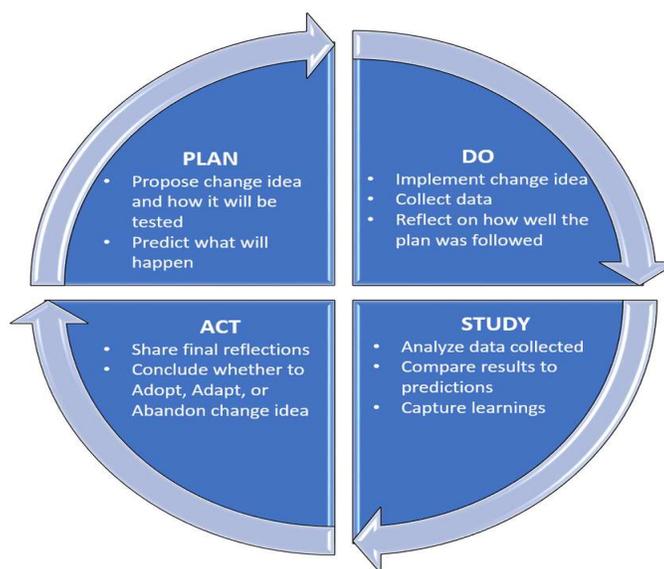
The task force's published studies presumed that food was both provided in adequate amounts and of high nutritional value, whereas Kondrup's (1998) results show that poor quality food can contribute to patients' weight loss in hospitals and that this is preventable with appropriately designed menus with regular and fortified foods ⁽²³⁾. Kowanko et al (2001) recommended that menus in acute care be reviewed and patients surveyed regularly to optimize the nutritional content of menus and patient satisfaction ⁽²⁴⁾. The quality of individual menu items directly affects the quality of hospital menus, and assessment of nutritional composition can illuminate poor quality menu items. Information elicited from focus groups comprised of nutritional personnel suggested that they view the provision of quality food appropriate for the patient population as a priority ⁽²⁵⁾. Benchmarking, setting targets, or continuous improvements in relation to the nutritional analysis of menus is overlooked in the literature and government documents although it was found to be commonly used in the United States. Johnson and Chambers (2000), in an American study, found internal benchmarking was used by 71% of foodservice leaders and external benchmarking was used by 60% ⁽²⁶⁾. Another study conducted by the same researchers (2006) using a Delphi process identified four categories of benchmarking for foodservice: operations, finance, customer service and human resources. Nutritional adequacy and patient satisfaction with menus were not among the categories ⁽²⁷⁾.

Patient satisfaction with food and foodservice Payne-Palacio and Theis (2008) suggest that the ultimate test of a successfully planned menu is the degree to which patients are satisfied ⁽⁷⁾; thus, patient satisfaction is an essential indicator when assessing the success of a foodservice operation. Research results are mixed whether food quality or service is the more important contributor to patient satisfaction. Dubé et al (1994), in a small Canadian study, found food quality and customization to be the key dimensions in determining patients' overall satisfaction; with aspects of service, such as attitude of staff who deliver the meals, timeliness of meals and reliability, also contributing to patient satisfaction ⁽²⁸⁾. Research also identified food quality attributes such as presentation, variety, temperature, taste, aroma, portion size, and range of choice as influencing patient satisfaction or intake ^(29,30). Lau et al. (1998) found that food quality was the best indicator of overall patient satisfaction, and they also found that as patients' expectations were increasingly met, patients' ratings of quality continually increased ⁽³¹⁾. Several researchers argue that aspects of service attributes, such as quality, courtesy and attitude of staff, and timing and distribution of meal trays, have a greater effect on satisfaction than food attributes ⁽³²⁾. A director of patient services of a large American hospital reported that improving training for aides resulted in significant improvements in

food satisfaction ratings although food had not changed⁽³³⁾. Patient satisfaction with food can be assessed using waste audits, sensory panels, meal rounds, surveys, and tallies, whereas service is most often assessed with surveys, meal rounds and one-on-one conversations^(34,35).

Surveys are a commonly used patient satisfaction assessment tool that can be used at the department and corporate level. Departmental surveys often target specific dimensions of patient satisfaction, and their content and frequency can be easily modified depending on the need. Hospitals commonly use third parties to conduct organization-wide patient satisfaction surveys because they may not have the expertise and they seek assurances that the process is unbiased, and responses remain anonymous. Typically, these surveys contain one very general question related to the quality of food unless additional questions are added at a cost. Corporate level results can be compared to historical results, the Ontario average, or the highest score for comparable hospitals⁽³⁶⁾. A standardized approach is required to address deficiencies or gaps identified through nutritional analysis, patient surveys, or other mechanisms. The Model for Improvement Cycle is used when structuring quality improvement projects for health care systems and processes; and is therefore applicable to foodservice. It consists of three questions followed by the rapid cycle improvement process; a series of Plan-Do-Study-Act cycles as illustrated in Figure 1. A team comprised of staff with differing roles and expertise works through the improvement cycles.

Figure 1 Plan- Do – Study – Act (PDSA) Cycle



This exploratory cross-sectional study of AL-Khor hospital- Hamad Medical Corporation in Qatar foodservice and dietetics departments set out to determine the following objectives: 1. assess patient food intake and risk of malnutrition 2. assess patient satisfaction of the therapeutic diet menu.

Methods

This is quality improvement cross-sectional study was conducted into two phases, over 12 months phase one from Jan – June (pre-diet modifications) and phase two from July- Dec. 2023(post diet modifications), at AL-Khor hospital – Hamad Medical Corporation (HMC) – the State of Qatar to evaluate inpatients’ satisfaction regarding their therapeutic diet, and its effect on their food intake and risk of malnutrition. The patient’s satisfaction was assessed through face- to- face interviews after each main meal by clinical dietitians while therapeutic diet intake was evaluated by dietetics coordinators. Malnutrition risk was calculated by using the appropriate criteria. Demographic and social variables like age, sex, socio-economic status, ethics, and beliefs, were out of the scope of this study. To be a comprehensive evaluation seven satisfaction dimensions with menus were included mainly taste, texture, temperature, appearance, quantity, service timelines, and food choices. food intake was assessed based on plate leftovers as: all, three-fourth, half, one-fourth, and none. The risk of malnutrition was assessed based on Nutrition Risk Index (NRI) and Geriatric Nutrition Risk Index (GNRI). The current study had a sample size of 810 inpatients from different wards including medical, surgical, obstetrics and gynecology and orthopedic, pediatric, and intensive care unit (ICU). Convenience sampling was used, because the number of patients who met

the study's inclusion criteria was limited. The inclusion criteria: oral therapeutic diet, able and ready for the interview by dietetics staff. exclusion criteria were being unable to participate, on a normal diet, (NPO), and / or on tube feeding. Therapeutic diet name: diabetic, high-protein, low protein, renal, gastric, and low sodium diets, and consistency: fluid, pureed, soft, and semi-solid diet were considered.

The satisfaction level was categorized into four categories: excellent, very good, good, and need improvement. Excellent and very good patient response considered as satisfied, while good and need improvement response considered as not satisfied. Patient satisfaction was evaluated as overall satisfaction, satisfaction per meal, and satisfaction per each indicator. Food intake was classified as adequate ($\geq 80\%$) and inadequate intake ($< 80\%$) of patient's requirements. Malnutrition risk was classified as: severe, moderate, mild and no risk when NRI is < 83.5 , $83.5-97.5$, $97.5-100$ and > 100 respectively based on nutrition risk index calculation $NRI = [1.519 \times \text{albumin } g/L] + [41.7 \times \text{weight}/\text{usual body weight}]$, while Geriatric Nutrition Risk Index (GNRI) was classified as: severe, moderate, mild and no risk when GNRI is < 82 , $82-92$, $92-98$ and > 98 respectively based on geriatric nutrition risk index calculation $GNRI = [1.489 \text{ albumin, } g/L] + [41.7 \text{ weight (kg)} / W_{lo} \text{ (ideal body weight)}]$.

Dietary modifications were carried out after phase one of this study based on assessment of patient satisfaction, food intake and malnutrition risk assessment. Diet modifications include four components: egg, protein source (meat, fish, chicken), cooked vegetables and soups. Egg modifications include addition little salt and herbs (pepper, coriander, cumin ...etc.) and changes in preparation method of egg white for renal diet from steamed to scrambled. Protein source modifications vary and include chicken breast to be cooked more, enhance taste by adding lemon and herbs. For fat free fish balls and fat free chicken balls, to be grilled and add lemon and herbs. salt addition within patient's requirement herbs, increase cooking time and add more spices for grilled chicken kofta, grilled beef with sauce and vegetables and beef stroganoff. Full therapeutic diet consistency for shredded chicken and vegetables of mechanical soft diet (MSD). Cooked vegetables modifications include adding sumac, lemon to the dish side and herbs addition for spinach, Pumpkin, potato, and mushroom. Sautéed Eggplant marrow, capsicum, green peas, and carrots instead of boiling. Soup modifications for chicken oats soup, chicken vermicelli soup, and carrot soup include addition of lemon, more herbs, spices, and salt. Data was gathered, managed, tabulated, and statistically analyzed to deduce results using SPSS (Statistical Package for Social Sciences, version 24, Chicago, IL, USA. Descriptive analysis (means and percentages) was used to describe general information. The t-test was conducted to highlight any significant differences ($P < 0.05$) in terms of patient satisfaction, food intake and risk of malnutrition pre and post dietary modifications.

Results

Table 1 shows the general characteristics of the study sample, 804 patients from phase one and 496 in phase two were included. Out of which 58.7% and 56.1% were males while 41.3% and 43.9% were females in phase one and phase two respectively. Length of stay of 74.5% and 83.7% was less than one week in phase one and two respectively. Only 21.5% in phase one and 19.8% in phase two were Qatari. Most patients were from surgical and medical wards 44.4 and 22.6 % in phase one compared with 37.1% and 13.5% in phase two. The mean age was 43.7 and 44.5 years in phase one and phase two respectively. In all, data was collected from 804 of the 891 patients included in phase one of the project with a response rate of (90.2%). All 804 responses were included in all analyses conducted in this study. While in the second phase 496 out of 538 patients were included, with a response rate of (92.2%). During phase one of the study period, 2155 main meals were served: 804 (37.3%), 779 (36.2%), and 572(26.5%) for breakfast, lunch, and dinner respectively, as well 566 snacks were served as: 196 (34.6%) morning (AM) snack, 262(46.3%) afternoon (PM) snacks and 108 (19.1%) (HS) snacks. In phase two 1488 main meals were served: 576 (38.7%), 549 (36.9%), and 363 (24.4%) for breakfast, lunch, and dinner respectively, as well 475 snacks were served as: 156 (32.8%) morning (AM) snack, 216 (45.5%) afternoon (PM) snacks and 103 (21.7%) (HS) snacks as shown in table1.

Table 1. General Characteristics of the Study Sample

Variables	Pre Modifications (n = 804)		Post Modifications (n = 496)	
	F	(%)	F	(%)
Gender				
Male	47	58.7	278	56.1
female	2 33 2	41.3	218	43.9
Nationality				
Qatari	17	21.5	108	19.8
Non-Qatari	3 63 1	78.5	398	80.2
Ward				
ICU	80	9.95	53	10.7
Medical	18	22.6	107	21.6
Surgical	2	44.4	184	37.1
Pediatric	35	12.3	67	13.5
Obe/Gyne	7 99 86	10.7	85	17.1
Length of stay				
1-3	37	46.3	243	49.0
4-7	2	28.2	172	34.7
>7	22 7 20 5	25.5	81	16.3
Number of main meals				
Breakfast	80	37.3	576	38.7
Lunch	4	36.2	549	36.9
dinner	77 9 57 2	26.5	363	24.4
Number of nourishments				
AM (Snack)	19	34.6	156	32.8
PM (Snack)	6	46.3	216	45.5
HS (Snack)	26 2 10 8	19.1	103	21.7

The results of overall satisfaction indicated that significant improved during phase two (88.2%) compared with phase one (78.1%), (P = 0.03). Regarding each single meal, the finding shows a significant patient satisfaction improvement in phase two compared with phase one (89.2% vs 82.6 %) (P= 0.03), (86.4% vs78.5%) (P=0.01) and (88.9% vs 73.1%) (P= 0.01) for breakfast, lunch and dinner respectively, figure 2. The overall Nutritional intake was significantly improved in phase two (74.3%) compared with phase one (69.0%), (p =0.02), for each single meal patient intake improvement in phase two compared with phase one as: (74.9%, 70.7%, 77.3%) in phase two

compared with phase one (71.6%, 65.9%, 69.5%), (P=0.04,0.04, & 0.01) for breakfast, lunch and dinner respectively Figure 3. Patients' satisfaction, food intake and risk of malnutrition are summarized in table 2.

Figure 2 post patient overall and per meal satisfaction



Figure 3 Patients Meal intake Pre- Post, / meal & overall

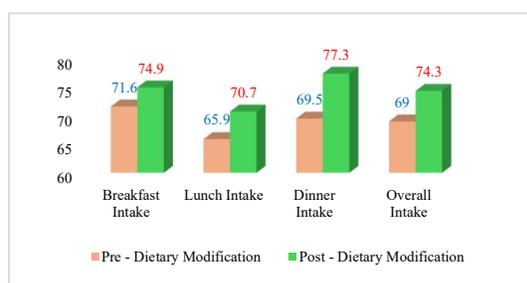
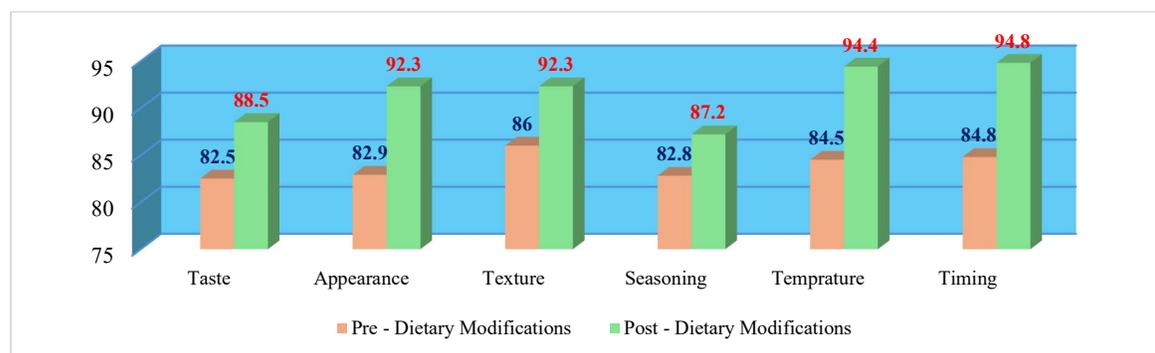


Table 2 Patients' satisfaction, food intake and malnutrition risk with Pre - Post dietary modifications

Variable	Pre - Dietary Modification Mean ± SD	Post - Dietary Modification Mean ± SD	P- Value
Age	43.76±21.55	44.54±18.71	0.07
Weight difference	1.75±2.49	0.95±1.23	0.06
BMI	30.01±27.13	27.33±23.81	0.03
NRI	88.06±22.90	87.70±19.67	0.06
GNRI	95.30±16.41	99.86±18.74	0.04
Albumin	31.96±7.62	31.86±6.32	0.23
Osmolarity	286.92±48.32	304.28±38.61	0.19
Overall satisfaction	78.10±39.43	88.20±33.26	0.03
Breakfast Satisfaction	82.60±12.59	89.26±10.32	0.03
Lunch Satisfaction	78.50±11.52	86.45±9.06	0.01
Dinner Satisfaction	73.10±11.94	88.90±10.11	0.01
Overall intake	69.00±39.56	74.33±35.02	0.02
Breakfast intake	71.60±25.38	74.94±23.12	0.04
Lunch intake	65.90±25.31	70.71±21.27	0.04
Dinner intake	69.50±31.82	77.36±29.70	0.01

There was no significant difference between participant age, weight difference, nutritional risk index (NRI), albumin, and osmolarity pre- and post-diet modifications (P > 0.05) (Table 2). After the dietary modifications, Body Mass Index (BMI) and Geriatric Nutritional Risk Index (GNRI), were improved significantly (P= 0.03 and 0.04) respectively.

Figure 4. Satisfaction Parameters with Pre – Post Patients' Satisfaction



The results of study phase - one showed that food texture has the highest satisfaction 86% followed by food serving time and food temperature (84.8, 84.5 %) respectively while food taste has the lowest satisfaction (82.5%) followed by food seasoning and food appearance (82.8 & 82.9%) respectively. In phase two serving time has the highest satisfaction followed by food temperature (94.8 and 94.4%) respectively while food seasoning has the lowest satisfaction followed by food and food taste (87.2 and 88.5 %) respectively figure 4.

Discussion

During the first phase of the study, 804 completed surveys were collected. Data analysis revealed satisfaction scores for each meal were 82.6%, 78.5%, 73.1% for breakfast, lunch and dinner respectively with an overall satisfaction score 78.1%, while during the second phase of survey distribution 496 completed surveys were collected. Data analysis revealed satisfaction scores for each meal were 89.2%, 86.4% and 88.9% for breakfast, lunch and dinner respectively with overall score 88.2%. The highest rated satisfaction parameters during the first phase were texture 86.0% followed by meals time 84.8%, and food temperature 84.5 %, while the least rated satisfaction parameters were taste 82.5%, followed by seasoning 82.8%, and appearance 82.9%, while the highest rated satisfaction parameters during the second phase were 94.8% followed by food temperature 94.4%, food appearance 92.3% and, food texture 92.3% while taste the least rated 87.2% followed by seasoning 88.5% was. The Acute Care Hospital Foodservice Patient Satisfaction questionnaire (ACHFPSQ) defines a score of 4 out of 5 ($\geq 80\%$) as 'very good'. The results of the first phase of the current study, overall patient satisfaction was 78.1% was less than (ACHFPSQ) definition and it may seem inconsistent with the reported perception that the quality of hospital food at Al-khor Hospital is below average⁽³⁷⁾ stated that the food does not have to be of a high quality for the patient to be satisfied, as satisfaction is a comparison between an expectation and a reality or experience. Patients may expect the food to be very poor, and as a result will be inclined to rate 'ordinary' food well⁽³⁷⁾. It has also been suggested that patients tend to overinflate their satisfaction depending on any number of methodological influences⁽³⁸⁾. The role of dietetics staff in distributing surveys and assisting patients in their completion where needed that have influenced patients' responses. Conversely, respondents to the company-wide Gallup poll were surveyed anonymously over the phone.

In general, the measurement and quantification of foodservice satisfaction is difficult, as it is highly subjective and influenced by many variables. In its original study, the ACHFPSQ survey instrument was only able to explain 61.2% of the variance in overall satisfaction, indicating that other variables such as pain, loss of personal power, time of year, etc., may have an effect⁽³⁷⁾. In acute care, this is not unexpected given the nature of the experience for patients. Nevertheless, these results help establish a baseline for improvement. A score of 4 out of 5 may be defined as 'very good' by the ACHFPSQ but it can be postulated as below average when compared with the other 164 HCA hospitals. One of the strengths of ACHFPSQ is its ability to highlight very specific areas of the foodservice for quality improvement interventions such as the lowest scoring categories of foodservice^(37,39). Identifying Areas of Improvement, improvement interventions were decided in committee. Food quantity and quality issues were discussed, and many ideas were proposed for improvement. Several changes made were quick and easy to implement with a minimal influence on current food service activities. The goal was that several small changes would add up to a large impact on foodservice quality improvement. However, more time-intensive interventions may have had a larger impact on survey results.

The perception of food quality depends on several different attributes^(37,40) and interventions were more numerous and varied to address this wide range of influences represented in the survey questions. Protein source modifications vary and include chicken breast to be cooked more, add lemon and herbs. For fat free fish balls and fat free chicken balls, to be grilled and add lemon and herbs. increase lemon herbs, increase cooking time and add more spices for grilled chicken kofta, grilled beef with sauce and vegetables and beef stroganoff. Full therapeutic diet consistency for shredded chicken and vegetables of mechanical soft diet (MSD). Cooked vegetables modifications include adding sumac, lemon to the dish side and herbs addition for spinach, Pumpkin, potato, and mushroom. Sautéed Eggplant marrow, capsicum, green peas, and carrots instead of boiling. Soup modifications for chicken oats soup, chicken vermicelli soup, and carrot soup include addition of lemon, more herbs, spices, and little salt. Data was gathered, managed, tabulated, and statistically analyzed to deduce results using SPSS (Statistical Package for Social Sciences, version 24, Chicago, IL, USA. Descriptive analysis (means and percentages) was used to describe general information. The t-test was conducted to highlight any significant differences ($P < 0.05$) in terms of patient satisfaction, food intake and risk of malnutrition pre and post dietary modifications. To address differences among patients' unique taste and flavor preferences, the committee decided to do diet modifications including four components: egg, protein source (meat, fish, chicken), cooked vegetables and soups. Addition a little salt within the requirements and herbs (pepper, coriander, cumin ...etc.) and changes in preparation method for the standard diabetic, cardiac diet menus and renal diet. Cook time was adjusted to prevent under- or overcooking of vegetables such as carrots and green beans.

Monitoring Change

During the second phase of survey distribution, 496 completed surveys were collected. Initial data analysis indicated impressive improvement in the categories chosen for intervention. Overall satisfaction significantly increased post-intervention from 78.1 to 88.2% ($P = 0.03$), while food intake improved significantly from 69 to

74.3% ($p=0.02$) (Table 2). All satisfaction parameters scores (taste, appearance, texture, seasoning, temperature and service timing) were improved by (6.0, 9.4, 6.3, 4.4, 9.9, & 10.0%) for taste, appearance, texture, seasoning, temperature & food service timing respectively. After statistical analysis of all parameters, all of them were shown to be statistically significant (figure 4). These results were opposite to the findings of ^(39,41). Who report no significant improvement in the foodservice satisfaction score after interventions were made. In general, regardless of there is a benefit of using the ACHFPSQ or the lack of improvement in satisfaction scores, the quality management of nutrition department should continue administering the survey, at least on an annual basis, to detect any change in patient perceptions of foodservice quality. The survey tool is practical to administer within existing department resources with minimal disruption to work practices.

Conclusions:

Poor nutritional status and meal acceptance were found in therapeutic diet patients. There are opportunities to improve the meal and foodservice experience for this patient group to meet their nutritional requirements and expectations. Modifying the TASTE, texture and consistency-control are promising strategies for improving nutritional status and preventing weight loss. More high-quality research with follow-up and different interventions is required to generalize for larger populations. Future interventions should collaborate with food service to implement high-quality, nutritious therapeutic diets focusing on improving the nutrition content, appearance, flavor, taste, varieties and consistency. As well as demographics, investigations of the best foodservice system, and sufficient dietetic resources are required. to enhance nutrition care for inpatients on therapeutic diets.

References

1. Viveky, N., Billinsky, J., Thorpe, L., Alcorn, J., Hadjistavropoulos, T., & Whiting, S. J. (2013). Challenges in planning long-term care menus: That meet dietary recommendations. *Canadian Journal of Dietetic Practice and Research*, 74(2), 84–87. doi:10.3148/74.2.2013.84
2. National Health Services Choices. Results for hospitals in Leckhampstead. Retrieved September 12, 2016, from <http://www.nhs.uk/service-search/Hospital/LeckhampsteadBuckinghamshire/Results/3-0.942/52.037/7/12447?distance=25>
3. Long Term Care Home Reports (2008). Retrieved May 9, 2016, from <http://publicreporting.ltchomes.net/en-ca/homeprofile.aspx?Home=2872&tab=1>
4. Demir, C., & Celik, Y. (2002). Determinants of patient satisfaction in a military teaching hospital. *Journal For Healthcare Quality*, 24(2), 30–34. doi:10.1111/j.1945-1474.2002.tb00416.x
5. Sheehan-Smith, L. (2006). Key facilitators and best practices of hotel-style room service in hospitals. *Journal of the American Dietetic Association*, 106(4), 581–586. doi: 10.1016/j.jada.2006.01.002
6. Mayerson, D., & Thompson, K. (2013). *Menu Planning in Long Term Care and Retirement Homes A Comprehensive Guide* (2nd ed.). Toronto, Ontario.
7. Payne-Palacio, J., Theis, M. (2008). *Introduction to foodservice* (10th ed.). New York, NY, United States: Pearson Education. p. 153-185
8. Khan, M. A. (1990). *Concepts of foodservice operations and management* (2nd ed.). New York: Van Nostrand Reinhold International. p. 40-66
9. Puckett, R. P., & Green, C. (2004). *Food service manual for health care institutions* (3rd ed.). San Francisco: Jossey-Bass Inc., U.S. p. 502-503
10. Ontario Long Term Care Act, Regulation. Retrieved July 18, 2016, from <https://www.ontario.ca/laws/regulation/r10079>
11. Wright, O. R. L., Connelly, L. B., Capra, S., & Hendrikz, J. (2011). Determinants of foodservice satisfaction for patients in geriatrics/rehabilitation and residents in residential aged care. *Health Expectations*, 16(3), 251–265. doi:10.1111/j.1369-7625.2011.00711.x

12. Tranter, M. A., Gregoire, M. B., Lafferty, L. J., & Fullam, F. A. (2008). Can patient written comments help explain patient satisfaction with food quality? *Journal of the American Dietetic Association*, 108(9), A68. doi: 10.1016/j.jada.2008.06.172
13. Ducak, K., & Keller, H. H. (2011). Menu planning in long-term care: Toward Resident-centred menus. *Canadian Journal of Dietetic Practice and Research*, 72(2), e126–e133. doi:10.3148/72.2.2011.83
14. Trang, S., Fraser, J., Wilkinson, L., Steckham, K., Oliphant, H., Fletcher, H., Tzianetas, R., & Arcand, J. (2015). A multi-center assessment of nutrient levels and foods provided by hospital patient menus. *Nutrients*, 7(11), 9256–9264. doi:10.3390/nu7115466
15. Konecka-Matyjek, E and M Jarosz. "Evaluation of Quality of Nutrition in Polish Hospitals." *Ann Nutr Metab* 63 (2013): 1791
16. Arcand, J., Steckham, K., Tzianetas, R., L'Abbe, M. R., & Newton, G. E. (2012). Evaluation of sodium levels in hospital patient menus. *Archives of Internal Medicine*, 172(16), 1261. doi:10.1001/archinternmed.2012.2368
17. Canadian Malnutrition Task Force. Retrieved August 6, 2016, from <http://nutritioncareinCanada.ca/take-action/recommendations/>
18. Velasco, C., García, E., Rodríguez, V., Frias, L., Garriga, R., Álvarez, J., ... León, M. (2010). Comparison of four nutritional screening tools to detect nutritional risk in hospitalized patients: A multicentre study. *European Journal of Clinical Nutrition*, 65(2), 269–274. doi:10.1038/ejcn.2010.243
19. Allard, J. P., Keller, H., Jeejeebhoy, K. N., Laporte, M., Duerksen, D. R., Gramlich, L., ... Lou, W. (2016). Decline in nutritional status is associated with prolonged length of stay in hospitalized patients admitted for 7 days or more: A prospective cohort study. *Clinical Nutrition*, 35(1), 144–152. doi: 10.1016/j.clnu.2015.01.009
20. Dupertuis, Y. (2003). Food intake in 1707 hospitalised patients: A prospective comprehensive hospital survey. *Clinical Nutrition*, 22(2), 115–123. doi:10.1054/clnu.2002.0623
21. Canadian Malnutrition Task Force, Recommendations. (2016). Retrieved June 22, 2016, from <http://nutritioncareinCanada.ca/eradicating-malnutrition/recommendations>
22. Keller, H., Allard, J., Vesnaver, E., Laporte, M., Gramlich, L., Bernier, P., Davidson, B., Duerksen, D., Jeejeebhoy, K., & Payette, H. (2015). Barriers to food intake in acute care hospitals: A report of the Canadian malnutrition task force. *Journal of Human Nutrition and Dietetics*, 28(6), 546–557. doi:10.1111/jhn.12314
23. Kondrup, J. (1998). Outcome from nutritional support using hospital food. *Nutrition*, 14(3), 319–321. doi:10.1016/s0899-9007(97)00481-4
24. Kowanko, I., Simon, S., & Wood, J. (2001). Energy and nutrient intake of patients in acute care. *Journal of Clinical Nursing*, 10(1), 51–57. doi:10.1046/j.1365-2702.2001.00436.x
25. Keller, H. H., Vesnaver, E., Davidson, B., et al. (2013). Providing quality nutrition care in acute care hospitals: Perspectives of nutrition care personnel. *Journal of Human Nutrition and Dietetics*, 27(2), 192–202. doi:10.1111/jhn.12170
26. Johnson, B. C., and Chambers, M. J. (2000). Expert panel identifies activities and performance measures for foodservice Benchmarking. *Journal of the American Dietetic Association*, 100(6), 692–695. doi:10.1016/s0002-8223(00)00201-7
27. Johnson, B. C., and Chambers, M. J. (2000). Foodservice Benchmarking. *Journal of the American Dietetic Association*, 100(2), 175–180. doi:10.1016/s0002-8223(00)00056-0
28. Dubé, L., Trudeau, E., & Bélanger, M.-C. (1994). Determining the complexity of patient satisfaction with food services. *Journal of the American Dietetic Association*, 94(4), 394–401. doi:10.1016/0002-8223(94)90093-0
29. O'Hara, P. A., Harper, D. W., Kangas, M., Dubeau, J., Borsutzky, C., and Lemire, N. (1997). Taste, temperature, and presentation predict satisfaction with Foodservices in a Canadian continuing-care hospital. *Journal of the American Dietetic Association*, 97(4), 401–405. doi:10.1016/s0002-8223(97)00100-4

30. Stanga, Z. (2003). Hospital food: A survey of patients' perceptions. *Clinical Nutrition*, 22(3), 241–246. doi:10.1016/s0261-5614(02)00205-4
31. Lau, C., and Gregoire, M. B. (1998). Quality ratings of a hospital foodservice department by inpatients and postdischarge patients. *Journal of the American Dietetic Association*, 98(11), 1303–1307. doi:10.1016/s0002-8223(98)00291-0
32. Messina, G., Fenucci, R., Vencia, F., Niccolini, F., Quercioli, C., & Nante, N. (2012). Patients' evaluation of hospital foodservice quality in Italy: What do patients really value? *Public Health Nutrition*, 16(04), 730–737. doi:10.1017/s1368980012003333
33. Coulston, S. (2011). Hospital foodservice and patient experience: What's new? *Journal of the American Dietetic Association*, 111(8), 1118–1123. doi: 10.1016/j.jada.2011.06.017
34. Donini, L. M., Castellaneta, E., De Guglielmi, S., De Felice, M. R., Savina, C., Coletti, C., Paolini, M., & Cannella, C. (2008b). Improvement in the quality of the catering service of a rehabilitation hospital. *Clinical Nutrition*, 27(1), 105–114. doi: 10.1016/j.clnu.2007.10.004
35. Watters, C. A., Sorensen, J., Fiala, A., & Wismer, W. (2003). Exploring patient satisfaction with foodservice through focus groups and meal rounds. *Journal of the American Dietetic Association*, 103(10), 1347–1349. doi:10.1016/s0002-8223(03)01077- 0
36. NRC Pickers Patient Survey -all questions by unit's patient satisfaction survey. Retrieved from http://www.kdhospital.com/site_published/kdh/document_render.aspx?documentRender.IdType=5&documentRender.GenericField=&documentRender.Id=2373
37. Capra, S., Wright, O., Sardie, M., Bauer, J., & Askew, D. (2005). The acute hospital foodservice patient satisfaction questionnaire: The development of a valid and reliable tool to measure patient satisfaction with acute care hospital foodservices. *Foodservice Research International*, 16, 1-14.
38. Sitzia, J. (1999). How valid and reliable are patient satisfaction data? An analysis of 195 studies. *International Journal for Quality in Health Care*, 11, 319-328.
39. Fallon, A., Gurr, S., Hannan-Jones, M., & Bauer, J. D. (2008). Use of the acute care hospital foodservice patient satisfaction questionnaire to monitor trends in patient satisfaction with foodservice at an acute care private hospital. *Nutrition & Dietetics*, 65, 41-46.
40. Wright, O. R. L., Connelly, K. B., & Capra, S. (2006). Consumer evaluation of hospital foodservice quality: an empirical investigation. *International Journal of Health Care Quality Assurance*, 19(2), 181-194.
41. Porter, J. & Cant, R. (2009). Exploring hospital patients' satisfaction with cook-chill foodservice systems: a preliminary study using a validated questionnaire. *Journal of Foodservice*, 20, 81-89.