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Nutritional status and feeding practices in gastrointestinal surgery patients at Bach Mai Hospital, Hanoi, Vietnam

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Abstract

Background and Objectives—The nutritional status and hospital feeding practices of surgical patients in Vietnam are not well documented. Based on a cross-sectional study at Bach Mai Hospital (BMH), the prevalence of malnutrition was found to be 33% in the surgical ward using a body mass index (BMI < 18.5 kg/m²). We conducted an observational study over a three month period to evaluate the feeding practices in the gastrointestinal (GI) surgery ward at Bach Mai Hospital (BMH) in Hanoi, Vietnam.

Methods and Study Design—Investigators from the U.S. and the Vietnamese National Institute of Nutrition (NIN) enrolled 72 subjects admitted for elective GI surgery in an observational study at BMH. Baseline anthropometrics and changes over time, body mass index (BMI), Subjective Global Assessment (SGA) and daily kcal and protein intake from oral diet, tube feeding, and parenteral nutrition (PN) from admission until discharge were documented.

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AUTHOR DISCLOSURES

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Results—A total of 50% of subjects scored a B or C on the SGA; 48% of subjects had a BMI<18.5, while mean mid upper arm circumference was in the low-normal range (24±4 cm). Nearly all patients (98%) were given PN postoperatively, with oral feeding starting on an average of postoperative day 4. Only one patient was tube fed. Mean daily total calorie intake was 15 kcal/kg/day and protein intake was 0.61 g/kg/day during hospitalization. Micronutrient supplementation was minimal in subjects receiving PN.

Conclusions—Hospital malnutrition in surgical patients in Vietnam is a significant problem, peri-operative feeding appears suboptimal and use of early postoperative PN was routine.

Keywords

enteral nutrition; malnutrition; subjective global assessment; parenteral nutrition; Vietnam

INTRODUCTION

Patients requiring surgery for gastrointestinal (GI) disorders are often malnourished upon admission to the hospital. Despite inconsistencies in the assessment of nutritional status, the incidence of malnutrition in developed countries is estimated to be in the range of 30–55% of hospital admissions.^{1–3} Preoperative weight loss due to intolerance to oral foods, nausea, vomiting and/or diarrhea is common in patients presenting for GI surgery. Providing adequate nutrition support as oral supplementation, enteral tube feeding and/or parenteral nutrition (PN) in the peri-operative period, especially in malnourished patients, positively affects clinical outcomes.^{4–6}

The nutritional status and feeding practices of surgical patients in countries in transition such as Vietnam are poorly documented. Cross-sectional surveys have been performed at the community level to define nutritional status in both urban and rural areas of Vietnam,^{7–9} but, to our knowledge, little is known regarding nutritional status or specialized nutrition support practices in hospitalized patients. One available cross-sectional study, performed in the Mekong river delta, used the Subjective Global Assessment (SGA) in 274 hospitalized patients who had major abdominal surgery. In this study, the prevalence of malnutrition was very high (78%; SGA class B and C combined) possibly due to the high prevalence of cancer in this cohort.¹⁰

As a component of the Abbott Fund Institute of Nutrition Science (AFINS) project to develop clinical nutrition programs in Vietnam, investigators from Boston University, Emory University, and the National Institute of Nutrition (NIN) in Hanoi initially performed a cross sectional study to determine the prevalence of malnutrition among a broad cross-section of hospitalized patients at Bach Mai Hospital (BMH) in Hanoi. BMH is a 1900+ bed hospital with an established Clinical Nutrition Center (CNC). The results of this earlier study identified the prevalence of malnutrition in adults to average 33.3% with the highest prevalence at 50% in the surgical ward.¹¹ Thus, we hypothesized that current feeding protocols may be inadequate in specific wards of the hospital and designed this observational study to evaluate feeding practices in the general GI surgery ward. A major aim was to generate pilot data to inform development of comprehensive enteral and parenteral nutrition support strategies at BMH.

METHODS

Study population

The study was approved by the medical ethics committee of NIN and the Internal Review Board of Boston University and was conducted by NIN personnel in cooperation with the BMH Clinical Nutrition Center (CNC) clinicians and the subject's individual surgeons between October 2011 and January 2012. All consecutive patients who were 18 years of age admitted to BMH for elective non-laparoscopic abdominal operations and whom signed the informed consent form were included in the study. Abdominal surgery did include surgery on the stomach, liver, pancreas, gallbladder, small intestine, colon and rectum (Table 1). Exclusion criteria were those who underwent an emergent or acute abdominal operation; patients requiring postoperative transfer to the ICU; pregnancy; or when pertinent baseline endpoints were unavailable.

Study methods

In general, we incorporated the following integrated approaches: (1) face-to-face communications and in-country training with our Vietnamese colleagues (nutrition specialists, pharmacists, nurses, surgeons, hospital administrative leadership); (2) prospective observations of current feeding practices in a specific patient subset previously determined to be at high risk for malnutrition;¹¹ (3) gaining culturally-specific information on patient and family preferences relevant to feeding; and (4) US-based training of Vietnamese collaborators and hospital leadership on strategies to optimize hospital enteral and parenteral nutrition support. The Vietnamese investigators were medical doctors and technical dietitians from the NIN in Hanoi. All investigators were trained in study procedures by the senior research personnel at NIN who were directly involved in this trial before data collection or they were given further guidance by AFINS investigators during data collection as needed.

Nutritional status assessment

Anthropometric measurements: The nutritional status of all subjects was assessed preoperatively as soon as feasible after hospital admission. This assessment included anthropometric measurements [body weight, height and mid upper arm circumference (MUAC)]. Body weight was measured using a Leica electronic scale with precision within 100 g. Every attempt was made to measure and record body weight at least weekly during the subject's hospitalization. Standing height was measured with a stadiometer board. Body weight loss prior to admission, if any, was assessed by asking patients for their estimated weight loss over both a two-month and six-month period prior to admission, in kilograms. It is important to note that not all weights were actually measured at home and we asked the patients to estimate their weight loss and categorize as mild, moderate or severe for weight loss at two months and six months prior to admission using a sub-item from the SGA. The percentage of weight loss during the hospital stay was calculated using the following formula: post-operative body weight (kg) subtracted from pre-operative body weight (kg), to give an overall weight change in kilograms, divided by pre-operative body weight times 100. Body mass index [BMI as kg body weight/height (m)²] was calculated and classified based on the World Health Organization (WHO) criteria^{12,13} for BMI as underweight <18.5;

normal 18.5–24.9; overweight 25–29.9; and obesity ≥ 30 kg/m², respectively. WHO recommends retaining the BMI classifications used as international classifications rather than using ranges for Asian populations. MUAC was measured on the non-dominant arm at the midpoint between the tip of the acromial process of the scapula and the olecranon process of the ulna. A non-stretchable flexible tape and three measurements were taken by trained investigators to the nearest 0.1 cm and averaged.^{14,15}

Subjective Global Assessment (SGA): The SGA tool¹⁶ was previously evaluated for use by Vietnamese health professionals at BMH by the AFINS investigators and showed fair inter-observer agreement in this observational study (Kappa=0.36, 95% confidence interval (0.19 to 0.53, $p < 0.001$). SGA was performed before surgery based on gastrointestinal signs and symptoms, recent weight change (at 6 months and 2 weeks), change of dietary intake, nutrition-related stress, and clinical examination by CNC investigators with prior training by AFINS investigators. The subjects were classified in one of three categories: well-nourished (A), moderate or suspected malnutrition (B) and severely malnourished (C). The tool was modified slightly to make the interpretation as easy as possible for the Vietnamese clinicians.¹⁶

Dietary intake (oral, tube food): The patient and/or family members were interviewed about food the patient consumed during each hospital day using the traditional 24-hour recall method by trained NIN investigators.¹⁷ The dietary intake of the patient was collected continuously from one day before surgery until discharge by NIN personnel and recorded in the case report form (CRF). The investigators included all sources of food the patients consumed, including that prepared by the CNC in the hospital kitchen or food brought in to the hospital by family members. Data on dietary intake was analyzed to generate intake of specific macronutrients using software developed by Vietnam NIN based on Vietnam Food Composition Tables.¹⁸

Parenteral nutrition—All prescribed parenteral fluids (i.e. PN, hydration fluids, intravenous medications) for patients from the day of their operation to the day of discharge were recorded in the CRFs. This information was obtained from the patient's medical record and the intake and output records available for the patient. All products utilized were recorded, including the nutritional composition (i.e. percent dextrose or amino acids and grams fat) and the total volume administered to the patient's for each hospital day. Additionally, the venous access site of the patient (peripheral or central venous catheter), and the duration of parenteral nutrition (what day started after surgery, number of days administered) were recorded.

Clinical evaluation and postoperative complications

The investigators also recorded specific clinical parameters related to feeding tolerance and gastrointestinal function on a daily basis from the day of surgery to hospital discharge. This information was obtained directly from the patients, the medical record and/or physician notes. This documentation included clinical signs used to assess food tolerance and gastrointestinal symptoms (i.e. nausea, vomiting, abdominal pain, etc.).

Postoperative complications were recorded. These included infectious complications as defined by the consensus of the Society of Critical Care Medicine,¹⁹ as the association of leukocytosis (>10000 cells/mm³ or $> 15\%$ young forms), fever (temperature <35.5 C or >38.5 V), or increased C-reactive protein (CRP) concentrations in serum, with purulent sputum, microorganisms at bronchioalveolar lavage, or new infiltrate on chest x-ray, as pneumonia; microorganisms in the urine (10^6 on urine culture), as urinary tract infection; $>10^5$ microorganisms on biopsy, as wound infection or, two concomitant positive blood cultures, as bloodstream infection. Antibiotics were recorded if prescribed for postoperative infection. The condition of the wound (dehiscence, leakage, bleeding, infection) was also monitored and recorded daily.

Pertinent laboratory tests, such as electrolytes, glucose, renal function and complete blood count, drawn on each patient were recorded.

Statistical analysis

The data analysis for dietary intakes in this paper was generated using SASR software, Version 9 of the SAS System for Windows (SAS Institute 2011).²⁰ Other data analysis was performed using StataR 11.0 software (StataCorp. 2009).²¹ Categorical data were expressed as n (%). Continuous data with a normal distribution were expressed as mean \pm SD, and, when continuous data were not normally distributed, expressed as median (25th–75th percentile). We categorized patients as having lost $<5\%$ or $\geq 5\%$ of their body weight during hospitalization for additional analysis. Between-group comparisons were made using the chi-square test, Fisher's Exact test, student's *t*-test, or Wilcoxon-Mann-Whitney test as appropriate.

RESULTS

The sample analyzed

Over a three-month period, 72 consecutive patients were enrolled in this pilot trial. The average age was 56.1 ± 14.9 , 48% were men and 52% women. Complete baseline and hospital anthropometric data was available on 46 patients, including both pre-operative height and body weight and post-operative body weight. Pre- and post-operative weights were available on 48 patients and eight of these included a recalled body weight. These subjects were included in the analysis. We examined the differences between those that had complete anthropometric measures (n=46) versus those with missing, mostly postoperative, anthropometric data (n=23) and there were no differences in age, sex, SGA and BMI risk nor MUAC.

Anthropometrics and SGA

Table 1 describes gender, type of surgery and pre- and post-operative anthropometrics and the length of hospital stay by percent weight loss during hospitalization. Seventy two percent of the patients had a diagnosis of cancer; either gastric, rectal/colon or pancreas. Surgical procedures included: subtotal gastrectomies with gastrojejunostomies, rectal or partial colon resections. None of the patients had a non-resectable cancer. Other non-malignant diagnoses included cholecystitis, or biliary obstruction. No patient required ICU care postoperatively.

Both BMI and MUAC decreased and LOS increased in the group with 5% weight loss versus those with less weight loss, but these trends did not reach statistical significance.

Table 2 shows data from the patients with actual body weight measurements documenting a preadmission weight loss at 2 and 6 months prior to admission. A total of 31 of 48 at 2 months prior to admission and 32/48 at 6 months prior to admission had both measured their weight before admission and had post hospital weights measured to determine their percent weight loss during hospitalization. No relationship between preadmission weight loss and weight lost during hospitalization was noted. Overall, all patients lost some body weight during their hospitalization. The mean admission weight for the 48 patients who had both an admission (pre) weight and a discharge (post) was 47.2 ± 8.7 kg and the mean post weight was 45.2 ± 8.4 kg for a statistically significant weight loss which averaged 2 kg $p < 0.001$.

A total of 20/71 patients (28%) were considered to be have moderate malnutrition (SGA=B) and 16/71 patients (22%) were considered to be severely malnourished (SGA=C). The prevalence of patients at nutrition risk in this sample is 50% and thus similar to that found in other international surgical studies.^{1,2}

Macronutrient intake

Oral food and administration of nutrient-containing intravenous fluid intake was recorded from postoperative day 1 until hospital discharge among patients who received nutrition support (n=70/72). All intravenous feedings were infused peripherally, no central lines were placed for feeding. Table 3 lists the total energy and protein intakes and Table 4 the energy from parenteral and oral routes. Data are presented for postoperative days 1, 3, 5, and 7 and total for the entire length of stay.

The majority (~85%) of calories were delivered parenterally during the first 5 postoperative days. In general, mean total caloric intake for the subjects entire hospital stay was insufficient to meet the estimated energy requirements based on both Vietnamese and US RDA's as well as the known increased requirements associated with surgery. Oral caloric intake was ~300–350 kcal/day by day 7, or about 20–25% of estimated requirements of ~1400 kcals/day (30 kcal/kg for a 47 kg person based on the mean body weight). All but two patients were fed intravenously postoperatively; intravenous feedings started by postoperative day 0.7 ± 0.9 and continued for an average of 6.1 ± 2.6 days. Oral feeding was initiated on postoperative day 4.1 ± 1.7 and only one subject received tube feeding. There was no difference in calorie and protein intakes in the groups that lost <5% of their body weight (n=26) versus those that lost 5% of their body weight (n=22) during hospitalization (<5% 684 ± 204 versus 5% 675 ± 186 kcals/day, respectively, and 28 ± 11 versus 28 ± 10 grams protein/amino acid, respectively; each NS-data not shown). These caloric intakes were only ~50% of the total estimated energy requirements of the subjects. Oral diets were analyzed using the Vietnamese nutrient database developed by the NIN.¹⁸ Oral and/or intravenous vitamins and trace elements were administered sporadically, despite the daily administration of parenteral macronutrients.

Few postoperative complications were reported and included: pneumonia (n=1), surgical wound infection (n=2) and reoperation (n=1). No deaths occurred during the study period.

DISCUSSION

To our knowledge, this is the first study that describes hospital feeding practices among gastrointestinal surgical patients in Vietnam. Our group and others have published preliminary information on the nutritional status of patients hospitalized in southern Vietnam¹⁰ and at BMH in northern Vietnam,¹¹ respectively. Based on these limited data, the rate of surgical adult patients at nutrition risk is estimated at approximately 50%, and, if left unrecognized and untreated, many of these patients will continue to decline nutritionally.²²

In this pilot observational study, approximately 50 percent of the 71 patients were assessed as having some degree of malnutrition using the SGA tool. Of the initial 72 patients enrolled in this study, 27 patients (38%) were admitted with a BMI<18.5 and the average MUAC at admission was 23.5 which has previously been described as a borderline low value.²³ The degree of weight loss prior to admission was more difficult to quantify, as only approximately 60 percent of patients had measured their weight at home, but those that did weigh themselves sustained a clinically significant degree of weight loss in the range of 5–7%. Not unexpectedly, there was a trend for the subset of patients undergoing gastric surgery to present with a slightly greater weight loss than the other gastrointestinal surgeries.

This pilot data clearly reveals that hospital malnutrition is prevalent and that hospital feeding practices in Vietnam are extremely varied and suboptimal, largely due to lack of standard operating procedures for specialized nutrition. In this trial, the large majority of gastrointestinal surgical patients are fed intravenously with various components of PN, but with no clear nutrition care plan to ensure macronutrient and, especially, micronutrients requirements are met. Multiple commercial brands of parenteral nutrition were used postoperatively (depending on surgeon preference), but none of which met the patient's energy and protein requirements. Additionally, micronutrients in the form of intravenous multivitamins were administered only occasionally and, as with PN, there was no clinical protocol or guidelines to manage utilization.

Enteral nutrition (tube feedings) was rarely used. There is an overall lack of available enteral products and feeding tube options in Vietnam and thus little knowledge as to how to utilize enteral feedings. Also, nutrition therapy is not reimbursed in Vietnam, and, with little commercial insurance, many patients are required to pay out of pocket. As opposed to current best practices in Western countries that favor early enteral feeding,²⁴ PN was generally started on the first postoperative day; patients are allowed to advance oral diet as tolerated, typically by day 4 postoperatively, and PN was typically discontinued a few days after the oral diet was started.

The BMH CNC consists of nutrition-trained physicians, a nurse manager, diet technicians (trained in community nutrition with limited experience in wards) and food service personnel. Physician nutritionists are consulted on complex nutrition cases in the hospital but typically do not recommend how every individual patient is fed. That is decided by the patient's primary hospital physician. In concert with best practice guideline training provided by the AFINS project, the roles and responsibilities of the CNC personnel have

steadily expanded; consults are more frequent and recommendations for feeding are generally followed by the primary physicians.

As shown in Table 3, total energy and protein intakes were clearly suboptimal in this cohort and probably explains some of the body weight loss which occurred during the hospitalization in the majority of patients. This pilot observational study in elective surgical patients informs the design of subsequent studies that focus on developing standard operating procedures for both EN and PN at BMH. Weight loss during hospitalization, even in elective surgery patients is not uncommon,²⁵ especially when the gastrointestinal tract is involved. It may oftentimes take up to ten days before patients are eating a “full” diet and this suboptimal intake, especially if coupled with pre-existing nutritional deficits is associated with increased morbidity, hospital length of stay and mortality.²⁶ Energy intakes in our small cohort never approached the estimated total energy requirements based on the Vietnamese Recommended Dietary Allowances (RDA).²⁷ Poor nutritional status upon discharge is also associated with an increased rate of hospital readmissions, which in the United States depending upon diagnosis, is not reimbursed.²⁸

The limitations to this study include the small sample size exacerbated by the lack of postoperative measurements on some patients and lack of complete data in additional subjects; thus generalizations regarding hospital-wide nutrition practices cannot be made. Developing and improving clinical research capabilities and capacity is one of the goals of the AFINS project, and we expect to see improvements in the accuracy of data collection in our prospective intervention trial. Further, our results cannot be generalized to elective GI surgery patients in other low-resource countries given country-specific hospital resources for nutrition support and different routines and capacities for medical and surgical care. However, our integrated training approaches as discussed in the Methods section, could be applied to observational and implementation studies in other developing countries.

The coordination of efforts from clinicians at BMH, the governmental NIN, and collaborative expert partners in the United States allowed us to perform this study. The AFINS project represents initial implementation research to empower the nutrition professionals at NIN and BMH to develop expertise and to emphasize to BMH physicians, nurses, other health professionals and hospital leadership the importance of nutritional assessment and care. Based on our results, we developed a pragmatic intervention trial designed to test the feasibility and clinical utility of comprehensive EN and PN feeding protocols in GI surgical patients at BMH. Such protocols are designed to safely improve macro- and micronutrient nutritional intake, standardize product utilization and costs, and ultimately improve patient outcomes in this major urban tertiary care hospital.

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Table 1

General characteristics by percent body weight loss during hospitalization

	All n=48	<5% Weight loss n=26	5% Weight loss n=22	p-value
Age (years)	56.1±14.9	54.8±13.3	57.6±16.7	0.29
Pre-OP BMI (kg/m ²) [†]	18.8±2.7	18.9±2.7	18.7±2.8	0.83
Post-OP BMI (kg/m ²) [†]	18.0±2.8	18.5±2.5	17.4±2.8	0.18
Pre-OP MUAC (cm) [†]	23.3±3.3	23.6±2.6	22.8±3.3	0.37
Post-OP MUAC (cm) [†]	23.0±3.2	23.8±2.9	22.0±3.3	0.20
Length of stay (days) [†]	12.6±5.4	12.1±4.4	13.1±6.6	0.76
Time between pre- and post-OP body weight measurements (days)	9.1±3.1	8.5±3.2	9.8±3.1	0.10
Gender				
Men	23 (48)	14 (54)	9 (41)	0.40
Women	25 (52)	12 (46)	13 (59)	
Type of surgery [‡]				
Gastric	16 (33)	5 (19)	11 (50)	0.09
SI/colon	16 (33)	10 (38)	6 (27)	
GB/Liver/pancreas	16 (33)	11 (42)	5 (23)	

GB: gallbladder; OP: operation; MUAC: mid upper arm muscle circumference; SI: small intestine. % Weight loss was defined as pre-operative (on date of data collection) to post-operative weight loss during hospitalization.

Values represent mean±SD or N (%). Age was not normally distributed so a Wilcoxon rank-sum test used. Fisher's exact test was used for gender and type of surgery analysis.

[†] Sample sizes vary due to missing data as follows: pre- and post-OP BMI (n=46); pre-OP MUAC (n=44); post-OP MUAC (n=21); and length of stay (n=47)

[‡] One subject who underwent SI/Colon/Gastric surgery had missing data on body weight.

Table 2

Body weight loss before and during hospitalization

	All	Weight loss [†]		p-value
		<5%	5%	
Pre-admit weight loss				
2 months-measured (kg)	n=31	n=16	n=15	
	3.1±2.7	3.3±2.8	2.8±2.7	0.63
6 months-measured (kg)	n=32	n=16	n=16	
	2.9±4.2	3.4±4.9	2.4±3.4	0.92
Hospital stay weight loss				
Change in weight (kg)	n=48	n=26	n=22	
	-2.0±1.6	-0.98±1.2	-3.2±1.2	<0.01
Change in MUAC (cm) [†]	n=48	n=26	n=22	
	-0.79±1.2	-0.58±0.61	-1.1±1.8	0.94

MUAC: mid upper arm muscle.

Values are mean±SD.

[†]MUAC was available in 20 patients.

Postoperative intake of calories and protein

Table 3

Dietary intake	Post-operative day					Total [†] n=48
	1 n=45	3 n=48	5 n=45	7 n=43	7 n=43	
Total energy (kcal)	604±294 600 (400–700)	757±367 703 (506–1034)	727±389 774 (376–1036)	674±356 585 (394–976.1)	680±194 664 (531–807)	
Total energy (kcal/kg)	13±7 12 (9–16)	17±10 16 (12–23)	16±9 17 (8–23)	15±9 13 (8–20)	15±6 14 (11–18)	
Total protein/amino acids (g)	19±20 12.9 (0–27.9)	25.3±16 25.8 (25–27.9)	32.1±19.3 28.9 (19.3–50)	35.1±21.1 29.9 (19.1–55.8)	28±10.2 26.9 (21.2–35.4)	
Total protein/amino acids (g/kg)	0.39±0.41 0.36 (0–0.67)	0.56±0.39 0.57 (0.42–0.73)	0.69±0.42 0.7 (0.36–1.04)	0.76±0.47 0.63 (0.41–1.24)	0.61±0.26 0.60 (0.44–0.73)	

Values represent mean±SD and median (25th–75th percentile).

[†]Total Intake is the average daily dietary intake that each patient received during post-operative care.

Table 4

Postoperative caloric intakes by parenteral or oral

	Post-operative day					Total
	1	3	5	7		
Dietary intake by route	n=45	n=48	n=45	n=43	n=48	
Parenteral nutrition (kcal)	n=45	n=47	n=40	n=26	n=48	
	598±288	750±352	682±352	531±391	546±210	
Oral nutrition (kcal)	n=1	n=7	n=30	n=41	n=48	
	600 (400–700)	703 (503–1036)	652 (400–1036)	400 (200–1036)	548 (378–682)	
	--	152±132	181±138	370±234	134±86	
		109 (64–198)	149 (72–264)	366 (179–504)	118 (68–195)	

Values represent means±SD and median (25th–75th percentile) for patients receiving parenteral and or oral nutrition.