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**PERSPECTIVES IN PRACTICE**

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## **Creating a clinical nutrition registry: Prospects, problems, and preliminary results**

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### **ABSTRACT**

There is a tremendous gap in the information available to support the practice of hospital-based dietitians and to address the issue of how the risk of developing protein-energy malnutrition can be avoided in the majority of patients. This article describes the rationale and benefits of creating a nutrition registry of within-hospital clinical nutrition care. A nutrition registry is made up of observational data, collected on an ongoing basis, of nutritional interventions provided to hospitalized patients. It is the first step in data gathering to demonstrate the effectiveness of clinical nutrition interventions. The methods and preliminary results of a nutrition registry that was established at The University of Illinois Medical Center, Chicago, Ill, are presented. Using subjective global assessment, 55% (257 of 467) of patients at admission and 60% (280 of 467) of patients at discharge were moderately or severely malnourished. Patients that were normal nourished at admission and became moderately or severely malnourished had higher hospital charges (\$40,329 for moderately malnourished patients, \$76,598 for severely malnourished patients) than those that remained normal nourished (\$28,368). This pattern held independent of admission nutritional status. Major challenges in implementation of a registry into the responsibilities of the staff dietitian are reviewed. The conclusion of this study is that nutrition registries can be established and will provide the much needed baseline data to document the impact of nutrition interventions on outcomes of medical care. *J Am Diet Assoc. 1999;99:467-470.*

**N**utrition care of hospitalized patients is a component of the physician-directed medical management of every patient and is the primary professional focus of hospital-based clinical registered dietitians and nutrition support team members. Despite the theoretic ability to adequately meet the nutrition needs of every patient, the prevalence of protein-energy malnutrition (PEM) in hospitalized patients remains at 40% to 50% (1). This level is strikingly similar to the malnutrition prevalence first documented by Bistrian et al in 1974 (2) and 1976 (3).

Investigations of the nutrition care of hospitalized patients have focused predominantly on parenteral and enteral formula feeding. A consensus statement issued by the National Institutes of Health, The American Society of Parenteral and Enteral Nutrition, and The American Society of Clinical Nutrition summarized the current body of knowledge pertaining to the use of parenteral and enteral nutrition (4). However, the vast majority of hospitalized patients receive all of their nutrition care from therapeutically adapted versions of conventional meals (5,6). Patients receiving parenteral and enteral nutrition contribute to less than 10% of the patient population in university-based hospitals and far less than 10% in veterans' and community-based facilities (5-7).

Current clinical practice guidelines for dietary management of hospitalized patients are described in protocols that have been developed over the years, but these protocols largely are not based on evidence. A small number of investigations have been conducted on the use of oral supplements in patient care, but these studies are more relevant to enteral tube feeding than to the dietary prescriptions applicable to most patients (8,9).

Thus, there is a tremendous gap in the information available to support the clinical practice of hospital-based dietitians and to address the issue of how the risk of developing PEM can be

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avoided in the majority of patients. As described here, creating registries of clinical nutrition care within hospitals may be a critical first step in filling this information gap, but doing so presents many challenges.

### CONCEPT AND RATIONALE

The first step in gathering data to demonstrate the effectiveness of clinical nutrition interventions is to create a clinical nutrition database, or registry, of nutrition interventions provided to hospitalized patients. This registry of observational data can support evaluation of the nutrition care being offered and identify which type of care is effective in reducing PEM and improving nutritional status. Clinical pathways can then be developed to streamline dietitians' practice patterns, reduce variability among practitioners, minimize cost, and enhance quality of care. In addition, a nutrition registry can help clinicians meet the 1995 standards developed by the Joint Commission on Accreditation of Healthcare Organizations, which, for the first time, specify required compliance with nutrition care standards (10).

Typical data to include in a nutrition registry are demographic information, a measure of the patient's nutritional status at admission and discharge, a list of all nutrition interventions provided, documentation of nutrition-related complications, patient charges, and length of stay. These data would allow assessment of the interventions that are associated with various positive and negative outcomes, including any impact of early vs late nutrition interventions. The primary goal of this study was to assess the impact that the changes in nutritional status of hospitalized patients had on complications and costs. Thus, an admission and discharge nutritional status was required.

### FEASIBILITY STUDY

A nutrition registry based on the described concepts was developed at The University of Illinois at Chicago Medical Center in 1997 with small-grant funding from the Campus Research Board and other internal sources. We focused on long-term (more than 7 days), adult (older than 18 years), nonpregnant, nonlactating patients, reasoning that we could measure the impact of nutrition intervention on these patients if an impact existed. Our primary focus was to determine the incidence of hospital-induced changes in nutritional status and the clinical practices that were associated with these changes. Only patients who had both admission and discharge nutrition assessments were entered into the registry. Although records for patients who died while hospitalized could have provided additional information on outcomes, we were not able to measure change in nutritional status in the same fashion we were for all other participants, so they were not included in this initial data.

### DATA COLLECTION

The 4 major components of the registry were admission and discharge nutritional status as measured by subjective global assessment (SGA); information from the medical record at discharge on infections and physicians' orders for oral supplements, multivitamins, caloric counts, and parenteral or enteral support; a Nutrition Registry Form completed by all staff dietitians who saw the patient; and the patients' code at time of discharge, according to the *International Classification of Disease, 9th revision* (11), and total cost of hospitalization taken from a data set provided by the hospital's information technology department.

All eligible patients were screened using SGA, as described by Detsky et al (12) and Kovacevich et al (13), within 72 hours

of admission by a dietitian assistant who had been trained by the author, a nutrition support dietitian experienced with SGA. Using SGA, patients are rated as normal nourished (N), moderately malnourished (M), or severely malnourished (S) on the basis of historical, symptomatic, and physical parameters. At discharge, a second SGA was completed for all patients who were hospitalized for more than 7 days, and their medical records were reviewed for items described above. Only patients with admission and discharge SGA status measurements were entered into the registry.

The staff dietitians recorded all of their activities on the Nutrition Registry Form, which was placed at the back of the patients' medical records after the first contact with a dietitian. This prevented the form from being lost if the patient was transferred to a different unit and provided for continuity of care among clinicians. The form was updated each time the patient was seen by any dietitian. Basic demographic information, admission service and diagnosis, number of interventions by a dietitian, number of days from admission to a dietitian's initial intervention, and type of intervention by a dietitian (assessment, initiation of therapeutic diet, oral supplements, tube feeding, parenteral nutrition, multivitamin, caloric counts, or diet instruction) were all recorded on the registry form for each patient using a numeric coding system. The definitions for each of the numeric codes for each statement in the form were developed and pilot tested for 4 weeks before beginning the data collection. All clinical dietitians were involved in making decisions about the data to be gathered on the registry form, the development of the definitions, and the coding system. With the exception of nutritional status information at the time of discharge, all of the data gathered by the staff dietitians involved interventions that were existing components of their standard nutrition care. No additional tasks, other than the recording of their interventions in a uniform fashion, were required. The Nutrition Registry Form was obtained from the medical record at discharge by the dietitian assistant.

### IMPLEMENTATION AND PROBLEMS

The registry was funded to employ 1 dietitian assistant for 40 hours per week for 7 months. It was determined that, on average, approximately 260 patients were discharged each month from the University of Illinois at Chicago Medical Center with a length of stay (LOS) more than 7 days. Using a conservative estimate of 50%, it was hoped that approximately 900 patients would be entered into the registry during that interval. However, it became apparent within the first month that interviewing the patients just before discharge was problematic. The majority of discharges were not orchestrated in a systematic way. Typically, the attending physician would decide during morning rounds that a patient was ready to be discharged, and the necessary services would be coordinated. The study's dietitian assistants had to circulate through the hospital units throughout the day inquiring about impending discharges. They garnered this information from the unit clerks and staff nurses. It was an erratic, feast-or-famine type of data collection that had to be conducted in between completing admission nutrition screening. During the 7 months of data collection, more than 1,300 patients qualified for entrance into the registry. We were able to obtain complete discharge information for 36% (n=468) of these patients.

Another major problem was obtaining completed dietitian Nutrition Registry Forms. Although the dietitians had input on the development of the registry form and participated in the pilot testing and follow-up form modification, only 59% of the forms (n=278) were placed in the medical records for the 468

**Table**  
Admission and discharge SGA<sup>a</sup> status, LOS<sup>b</sup>, hospital charges, and number of tube feedings, TPN, and infections for 467 patients

Admit SGA	Discharge SGA	No.	LOS (days)		Cost (\$) (mean±SE <sup>e</sup> )	Infections <sup>c</sup>		Tube feedings		TPN <sup>d</sup>	
			Median	Range		No.	%	No.	%	No.	%
N	N	126	17	8-25	28,368±2,076	21	17	6	5	2	2
N	M	59	10	8-74	40,329±5,907	12	20	6	10	2	3
N	S	24	13	8-66	76,598±28,290	6	25	3	13	3	1
M	N	49	14	8-69	35,280±5,139	9	18	9	18	3	6
M	M	73	13	8-16	51,074±6,871	28	38	6	8	3	4
M	S	28	14	8-69	42,189±7,813	7	25	11	39	4	14
S	N	18	13	8-55	37,018±8,073	8	44	5	28	2	11
S	M	36	13	8-58	36,982±6,885	8	22	7	19	5	14
S	S	54	15	8-72	47,343±6,248	12	22	17	31	11	20

<sup>a</sup>SGA=subjective global assessment. SGA ratings are as follows: N=normal nourished, M=moderately malnourished, S=severely malnourished.

<sup>b</sup>LOS=length of stay.

<sup>c</sup>Number of infections as determined by the number of positive blood, pulmonary, or wound cultures reported in the laboratory section of the medical record while a patient is hospitalized.

<sup>d</sup>TPN=total parenteral nutrition.

<sup>e</sup>SE=standard error.

subjects. Of these, many contained data for the initial contact only. The dietitians often did not document any of their activities or interventions on the registry form. The reason given by the dietitians for their lack of compliance was the long amount of time required to complete the form and the responsibility of performing new, additional tasks at discharge for patients. Unfortunately, we had relied on these forms for basic demographic data as well as all for a record of the dietitian's nutrition care.

### PRELIMINARY RESULTS

Because of the small number of complete Nutrition Registry Forms, a follow-up retrospective chart review was added to the study for the 468 subjects. Although much of the vital information is still being gathered via retrospective chart review, some preliminary results may be reported. Mean (±standard error) LOS was 18±18 days (median=13 days). Average age was 54±0.7 years, and there were approximately the same number of men (48%) as women (52%) in the study. The Table contains 9 categories of admission and discharge SGA measures and their respective LOS, charges, number of patients who received tube feedings (TF), total parenteral nutrition (TPN), and number of infections within each category. Because of the preliminary nature of the data, statistical results are not reported for the findings.

Moderate or severe malnutrition was found in 55% of patients at admission and 60% at discharge. Average LOS was 16.7±1.1 days for patients who were normal nourished at discharge (n=193) and 20±1.2 days for patients who were moderately or severely malnourished (n=275) at discharge. Of the 209 patients who were normal nourished at admission, 40% (n=83) declined in their nutritional status at discharge. Of those patients admitted with moderate or severe malnutrition (n=258), 40% (n=103) improved in their nutritional status and 49% (n=127) remained at their admission status at discharge. Twenty-eight (19%) of the patients who were moderately malnourished at admission were severely malnourished at discharge, and 52% (n=53) of patients who were severely malnourished at admission remained severely malnourished at discharge with an average weight loss of 5 kg during hospitalization. Patients who were normal nourished at admission and became moderately or severely malnourished at discharge had higher hospital costs than those who remained normal nourished. This pattern held independent of admission nutritional

status (ie patients who were admitted severely or moderately malnourished and improved their nutritional status while hospitalized had substantially lower costs than those who became or remained severely malnourished).

### DISCUSSION

It is premature to conclude anything regarding the role of nutrition intervention on LOS, charges, or complications based on the incomplete data presented here. The data presented provide information on incidence of iatrogenically induced PEM using a valid, reproducible method for nutrition classification in hospitalized medicine and surgical patients at a university hospital.

Weinsier et al (14) evaluated the nutritional status of 134 patients consecutively admitted to the general medical area using 8 nutrition-related parameters. They found that 48% of the patients had a high likelihood of malnutrition, which correlated with a longer LOS (20 days vs 12 days for patients with a low likelihood of PEM) and an increased mortality rate (13% vs 4%). In patients hospitalized more than 2 weeks (n=27), the likelihood of malnutrition increased to 69%. This study was repeated 12 years later by Coats et al (15). They found that 38% of the 228 patients had a high likelihood of malnutrition, and this increased to 41% in those patients with hospitalizations longer than 14 days (n=54). Recently, Naber et al (1) investigated PEM in nonsurgical patients (n=155) using SGA as well as the Nutritional Risk Index and the Maastrich Index. They found PEM in 45% of their patients as assessed by SGA at admission and discharge. Discharge SGA measurements completed in 90 patients (58%) showed that PEM increased from 41% to 51%. Duration of hospital stay was 18.4±13.1 days in malnourished patients and 14.2±11.3 days in well-nourished patients. This data is strikingly similar to our findings.

### APPLICATION

#### Feasibility of a Nutrition Registry

The problems we encountered establishing our registry are not insurmountable. Our 2 major problems were the difficulty of coordinating discharge data collection and poor compliance by staff dietitians in completing the Nutrition Registry Form. Systems could be devised for hospital ward clerks to notify dietitian assistants of pending discharges. This would allow for more complete data collection. Linking completion of the

registry form by the dietitians to their annual performance evaluation and making it a routine component of their daily responsibilities would improve compliance. Removing all of the discharge data (items 26 to 30 on the registry form) from the dietitian's responsibilities would remove the majority of additional tasks required and eliminate much of the resistance for completing the task.

### Future Use of Registry Data

Measurement of the impact of nutrition care on patient outcomes is in its developmental stages. Confounders such as severity of illness at admission, existence of other underlying disease conditions, and randomness of quality of care must be measured. Also, nutrition interventions are almost always an adjunctive therapy and, therefore, must be measured in conjunction with numerous other disease-specific therapies. A nutrition registry that contains carefully selected variables that define patients' risks, outcomes, and nutritional interventions allows a multivariate analysis to estimate the expected outcomes for patients that controls for their risk profile. This type of data collection provides a vital link for dietitians to demonstrate the impact of their interventions and the role of medical nutrition therapy in patient outcomes.

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## OF INTEREST TO YOU

### Food logs: The diary that saves records can also save worry

I have been told that they are annoying, obnoxious, and depressing, and that they may make patients feel guilty.

I have also been told that they are great tools that can make a difference, that they make patients realize what they are really eating.

"They" are food logs, and the comments I receive about them are as diverse as the population of people who keep them. This includes teens, young adults, middle-aged adults, menopausal and pregnant women, geriatric patients, and even other health-care providers. I find that when my patients keep food logs properly, the logs can serve many purposes and are a very important tool for diet modification.

Of course there are many in the profession who question whether or not patients keep accurate food logs. Especially when it comes to dining out, portion size and hidden fats may be difficult to determine, and therefore nutrient accuracy may be compromised. Patient reporting of foods and portions consumed has been questioned in many studies using self-report methods (1).

One patient of mine, however, demonstrated another important use for the infamous food log. My patient, a 51-year-old

obese woman who was desperately trying to lose weight, kept her food log with much frustration. During the time I was counseling her, I learned of a news story about a food handler in Wantagh, NY, (near my patient's home) who had developed hepatitis A. Not long after, I received a frantic call from my patient. She wanted to know if I kept her completed food logs, and I told her I did.

She asked me to check which day she had eaten pork chops, because she had eaten at that establishment and suspected it was the same time the infected worker was serving food. Unfortunately, it was the same time. Fortunately for my patient, she was tested for hepatitis A and the results were negative. The food log information proved invaluable for this patient.

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*This article was adapted from an essay by Elyse Sosin, RD, of the Adolescent Health Center at Mount Sinai Medical Center in New York, NY, who also has a private practice.*