Positive association between dietetics recommendations and achievement of enteral nutrition outcomes of care

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ABSTRACT

Objective To identify planned dietetics outcomes of care, dietitians' activities performed and recommendations made, and outcome achievement and its relationship to recommendations followed.

Design A multisite, single-group prospective pilot study was conducted to describe the care provided by dietitians to patients receiving enteral nutrition care.

Subjects/setting Participants were 172 patients (16 of whom died during hospitalization) receiving at least 75% of nutrient requirements from enteral nutrition products. Subjects were from six acute-care facilities and one rehabilitation facility in the Chicago metropolitan area.

Main outcome measures Dietitians identified planned outcomes of care to be accomplished and documented activities performed during the provision of care. Data were collected to measure outcome achievement and to determine whether dietitians' recommendations were followed.

Statistical analyses performed Descriptive data are reported as frequencies or means ± standard error. Odds ratios were constructed to estimate the association between dietitians' enteral care recommendations and the achievement of planned outcomes of care.

Results Whether or not enteral nutrition outcomes of care were achieved was positively associated with dietitians' recommendations. The odds of patients achieving the recommended energy intake goal (P<.001) or increasing (P<.01) or maintaining (P<.04) visceral protein stores were at least 4 times greater when dietitians' recommendations were followed than when they were not. In addition, dietetics activities performed at the local level were similar to established practices.

Applications Dietitians can identify and measure outcomes of dietetics-related care that demonstrate positive contributions to the interdisciplinary enteral nutrition care process.


The delivery and evaluation of health care are changing, with potential for greater recognition of interdisciplinary contributions. Delivery is shifting to managed care, where all medical services are "bundled" together for one all-inclusive fee (1,2), although many variations exist across hospital and health delivery models. The traditional model, with a fee charged for each service, is becoming less common. The quality and cost of care are now evaluated in part by outcomes (results) produced by these medical services (3-5). For example, a payer and provider could arrange a prospective fee for the interdisciplinary treatment of adult patients with diabetes that would include inpatient and ambulatory medical, dietetics (medical nutrition therapy), nursing, and other associated services. The payer and patient would expect comprehensive and satisfactory diabetic treatment outcomes, including, in part, self-managed glucose control through diet. The provider would balance resource usage and cost with achievement of efficient, effective outcomes. Reasonable, achievable outcomes should accommodate diverse interdisciplinary contributions and patient characteristics (6-8). This emphasis on outcomes is new, particularly for local and primary-care settings (9-11). Accordingly, research on the relationship between health outcomes and dietetics services is needed (1,12).

Well-defined and measurable outcomes provide a fresh approach for a nutrition department to define and evaluate the results and effectiveness of dietetics and nutrition services provided within an interdisciplinary team-oriented system. Dietetics services and activities provided during specific treatment processes and resulting nutrition outcomes must be specified, and then achievement of outcomes measured over the course of care (13). Outcomes can be evaluated intra- and interdepartmentally to determine if the care provided is effective and achieves accepted quality standards (13).

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Conducts nutrition assessment on patients requiring enteral nutrition support, including initial and ongoing evaluation of caloric, protein, and fluid needs, other nutrient requirements, laboratory data, and nutrition and medical history.

- Establishes outcomes of care based on nutrition assessment, develops and implements a care plan to achieve outcomes.
- Monitors patient progress evaluating clinical status, nutrient intake, laboratory data, and nutrition therapy tolerance.
- Recommends adjustments or changes in delivery of enteral nutrition therapy as necessary, based on initial and ongoing assessments and medical team members' observations and goals.
- Documents observations, plans, and recommendations in the medical record.

**FIG 1. Selected functions performed by registered dietitians while providing enteral nutrition support to patients (14,15).**

As an activity of the Chicago Dietetic Association's Clinical Dietetic and Research Committee (CDA), a group of clinical managers and a research mentor conducted a collaborative, multisite pilot study. Its purpose was to investigate dietitians' activities and the effectiveness of their recommendations for appropriate enteral nutrition therapy delivered in an interdisciplinary process composed of discipline-specific services including dietetics, medical, nursing, and pharmacology components. This effectiveness was a common issue across the sites, given the large numbers of patients receiving this therapy, substantial dietitian input, and high cost of products.

The dietitian's role and expertise in providing enteral nutrition care have been described (Figure 1, 14,15). Braunischweig and colleagues (16) demonstrated their value, reporting that patients tolerated tube feedings better when dietitians' recommendations to the nutrition support team were followed. However, the dietetics contribution may not be fully realized. Skipper et al (17) reported that the most frequent recommendations dietitians made to physicians addressed initiating or changing enteral/parenteral feeding activities, yet less than half of those recommendations were implemented.

**OBJECTIVES**

The CDA investigators wanted to measure the contribution dietitians make to the enteral nutrition care process. Study objectives were to identify planned dietetics outcomes to be accomplished, identify dietitians' activities during provision of care, determine whether planned outcomes were achieved, determine whether dietitians' recommendations were followed, and determine whether following dietitians' recommendations correlated with successful outcome achievement.

**METHODS**

Seven facilities — six acute-care and one rehabilitation institute — in the Chicago, Ill, metropolitan area participated in the single-group descriptive study of the care dietitians provided to patients receiving at least 75% of nutrition requirements from enteral products through a feeding tube. Enteral nutrition services were provided by dietitians either as members of a formally organized nutrition support team in which all members collaborated and functioned as a whole or as individual unit dietitians who provided consultation to the responsible physician through discussion or chart notes.

Study implementation occurred in two stages: an exploratory survey followed by the full study. The exploratory survey addressed differences in practice patterns and patient characteristics across sites. If differences were great, consistency in data collection and analysis and interpretation of results could be problematic. Each site collected data on patient characteristics; diagnoses; reasons for enteral therapy; dietitian activities, including recommendations for energy and protein level; and evaluations of patient progress. These data were evaluated across institutions (by C.G., N.S.T., and D.W.). The few differences found were mainly matters of terminology and were resolved. The care provided across facilities was within established guidelines (14).

The full study was then implemented. Terminology and procedures were standardized and a protocol established to maintain consistency during data collection. The data collection instrument (Figure 2) was developed using quality assessment instruments in existence at several sites. It was organized to guide sequencing of the nutrition care process and designed for ease of completion using checklist and fill-in-blank formats. This instrument functioned as a worksheet and continuing documentation of the care process and dietitians' activities. Dietitians received instructions on the data collection protocol. The data collection process was pilot tested at least once at each site and the results reviewed (by C.G., N.S.T., and D.W.) for consistency. A telephone network was devised so participants could contact each other.

The study population consisted of a convenience sample. At each site, managers identified clinical dietitians who would participate and their respective patient care units, from which the study population would be drawn. All inpatients from these units who were receiving at least 75% of nutrient requirements from enteral nutrition products through a feeding tube were included.

Data were prospectively collected over 3 months (March 1991 through May 1991). Demographic data included patient age, length of inpatient stay, and number of inpatient days receiving enteral nutrition. Documentation of the nutrition care process in order of occurrence included (a) an initial assessment of weight, pertinent laboratory values, and current and recommended levels of energy, protein, and fluid intake; (b) planned outcome(s) or determination of goal to be achieved (eg, reach recommended energy intake, maintain current visceral protein stores); (c) activities performed by dietitian to accomplish goal (eg, assess and evaluate energy intake, suggest change in product); (d) complications occurring (eg, tube closing, diarrhea); (e) documentation of outcome(s) at end of study, patient discharge, or transfer (eg, record of final energy, protein, and fluid intake levels; final measurements of weight and/or laboratory values, including albumin for visceral protein stores; and dietitian's categorical yes/no evaluation of whether patient was weaned off parenteral nutrition or bridged to oral intake); and (f) acceptance of dietitian's recommendations, documented as categorical yes/no response to verbal or written recommendations.

Data were analyzed using Systat: The System for Statistics, version 5.03 (1990, Systat, Inc, Evanston, Ill).

**RESULTS**

A total of 172 patients were evaluated, 16 of whom died during hospitalization. Results from the 156 patients discharged alive, including 129 acute-care and 27 rehabilitation patients, are reported. Inclusion of rehabilitation patients could have made the data less representative of an acute-care sample. However, no significant differences between groups with and without inclusion of the 27 rehabilitation patients were found with respect to age (mean age=69.9 and 62.7 years, respectively, P>.37), length of inpatient stay (26.2 and 23.3 days, respec-
(6 patients), abdominal distention (6 patients), vomiting (4 patients), infection (4 patients), and tube clogging (3 patients). In at least 25 (54%) of 46 complications documented with complete data, complications were resolved, and/or goals were met, and/or the dietitian's recommendations were followed. Although this small sample precludes stronger analysis, further investigation into relationships among dietitians' contributions, complication resolution, and positive outcomes of care is suggested.

**Measurement of Outcomes of Care and Dietitians' Recommendations**

The number and percentage of patients meeting outcomes, criteria used to measure outcome achievement (investigators' clinical judgment determined criteria for continuous level variables), and number of times dietitians' recommendations were followed are presented in Table 1.

Cases with missing continuous level data for energy intake, visceral protein stores, and body weight outcomes of care categories (Table 1) were not included in the analysis. Postdischarge reviews of medical records were requested to obtain these missing data. Thirty-two serum albumin values and 15 body weights were missing from the records, possibly because they were not performed.

When a recommended value or goal was not achieved but an increase in final value was reported, investigators determined that steady progress had been made. A "steady progress" category was included because a goal might not always be
Table 1
Planned outcomes of care, criteria to measure outcome, outcome achievement, and disposition of dietitians' recommendations when delivering enteral nutrition care to 156 patients.

<table>
<thead>
<tr>
<th>Planned outcomes (In descending order)</th>
<th>n</th>
<th>Criteria to measure outcome</th>
<th>Outcome achieved</th>
<th>Dietitian's recommendations followed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
<td>%</td>
</tr>
<tr>
<td>Reach recommended* energy intake goal</td>
<td>123</td>
<td>± 50 kcal</td>
<td>69</td>
<td>56</td>
</tr>
<tr>
<td>Bridge to oral intake</td>
<td>50</td>
<td>Dietitian's judgment</td>
<td>43</td>
<td>86</td>
</tr>
<tr>
<td>Increase visceral protein stores</td>
<td>38</td>
<td>≥3 g/L serum albumin</td>
<td>25</td>
<td>66</td>
</tr>
<tr>
<td>Maintain visceral protein stores</td>
<td>38</td>
<td>± 1 g/L serum albumin</td>
<td>20</td>
<td>53</td>
</tr>
<tr>
<td>Increase body weight</td>
<td>26</td>
<td>≥1 kg</td>
<td>12</td>
<td>46</td>
</tr>
<tr>
<td>Maintain body weight</td>
<td>7</td>
<td>± 1 kg</td>
<td>2</td>
<td>29</td>
</tr>
<tr>
<td>Wean off parenteral nutrition</td>
<td>5</td>
<td>Dietitian's judgment</td>
<td>4</td>
<td>80</td>
</tr>
</tbody>
</table>

*The same data were not collected on all 156 patients. Data collected depended on planned outcomes and variables used to measure outcomes.

**Criteria used to measure outcome achievement between recommended and final measurement.

*Steady progress* described patients who did not reach goal but were progressing towards it based on continuous variable data.

*Due to missing observations, the number of cases for dietitian's recommendations followed do not match total number.

Ten cases with missing data not included.

Thirty-two cases with missing data not included.

One case measured by transferrin ≥55g/100 mL.

Fifteen cases with missing data not included.

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completely achieved, for example, because of the severity of illness or the advent of complications. Describing steady progress in these instances may be informative.

Odds ratios were constructed to estimate the association between dietitians' recommendations and the attainment of the three most frequent outcomes measured by continuous data (Table 3). In computing the ratios, "steady progress" cases were collapsed into the "not meeting outcome" category. These ratios indicate the odds of patients' reaching energy intake goals and increasing or maintaining visceral protein stores are at least four times greater when dietitians' recommendations are followed than when they are not followed.

**DISCUSSION**

Research addressing the dietetics contribution to health outcomes is needed (1,12). This pilot study provides direction at the local level for identifying and measuring dietetics-related enteral nutrition care outcomes. However, findings are limited by the lack of a randomly assigned comparative control group, a short time frame prohibiting longer activity and outcome measurement, small sample size, and inclusion of facilities with varying care missions and patient characteristics.

**Outcomes of Care and Dietetics Activities**

Our findings suggest that planned outcomes, such as reaching individual energy intake requirements or increasing/maintaining visceral protein stores, can be identified and achievement measured. Our results verify the dietitian's important role in caring for enteral fed patients. Outcomes are more likely to be met when dietitians' recommendations are followed, a finding similar to that of Braunschweig et al (15), although our study differed in design and methodology. However, it is important to note that improvement in visceral protein stores may not be a direct reflection of dietitians' recommendations or impact on care per se, but rather of improving clinical status (eg, convalescence after surgery, resolution of infection). Whether dietitians made their recommendations in person or in writing or which format was more successful was not measured. Skipper et al (17) reported that dietitians were more successful in having recommendations accepted through oral communication with physicians.

Efforts to identify planned outcomes of care led to discussions among the investigators. Asked to list outcomes in advance, one dietitian stated, "Oh, you want to know what we are thinking." Gates (18) reported that dietitians may not perceive themselves as making clinical judgments, in this case explicitly specifying a planned outcome. In addition, more experienced dietitians may make decisions based on intuition and not be aware of their decision-making processes (18). Nevertheless, a conscious awareness of a goal is necessary when dietitians communicate decision rationales across disciplines and evaluate the appropriateness of service.

We believe dietitians are key in reaching a successful nutrition outcome because they communicate and integrate impor-


**Table 3**

<table>
<thead>
<tr>
<th>Dietitian recommendations</th>
<th>Reach energy intake goal&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Outcome</th>
<th>Maintain protein visceral stores&lt;sup&gt;c&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Met</td>
<td>Not met</td>
<td>Met</td>
</tr>
<tr>
<td>Followed</td>
<td>53</td>
<td>21</td>
<td>20</td>
</tr>
<tr>
<td>Not followed</td>
<td>12</td>
<td>27</td>
<td>2</td>
</tr>
</tbody>
</table>

<sup>a</sup>Odds ratio = 5.7, P< .001.
<sup>b</sup>Odds ratio = 11.7, P< .01.
<sup>c</sup>Odds ratio = 4.4, P< .04.

Dietetics Activities Across Facilities

At the outset of our study, there was concern about the appropriateness of patient care activities provided across facilities with different patient characteristics and care missions. Dietetics activities performed in our area are consistent and appropriate to the dietitian's role as recommended by The American Dietetic Association (14). Winkler's (15) findings also indicate that some variation in level of application can be expected, depending on the dietitian's role.

Dietetics Contributions to the Interdisciplinary Care Process

This study indicates that the effectiveness of the dietetics component of an interdisciplinary process can be measured. Dietetics recommendations can help outcomes and patient care. Winkler (15) has stressed the importance of collecting and documenting these dietetics-related data to share with interdisciplinary colleagues. In our study, for example, discussions about how missing laboratory values' prohibit full evaluation of increased visceral protein stores and body weight outcomes would be appropriate. A nutrition department can identify and measure its own planned outcomes. A flexible mindset at the outset is necessary, as the various dietetics and total medical services provided may require adjustment based on patient response and severity of illness.

APPLICATION TO PRACTICE

Dietetics practice must mirror the emphasis on managed care and positive treatment outcomes to promote high-quality, cost-effective care. Our study presents a process dietitians can use to identify and measure outcomes of dietetics-related care and demonstrate positive contributions provided within an interdisciplinary treatment process. Once identified, the quality and efficiency of both dietetics and interdisciplinary activities and outcomes can be evaluated. Local dietetics practitioners can and should collaborate to evaluate their services and compare them with recommended care guidelines. They must then share these findings with their interdisciplinary colleagues.

For their contribution to the research project, the authors acknowledge The Chicago Dietetic Association and the dietitians at Cook County Hospital, Chicago, Ill; Edward Hospital, Naperville, Ill; Loyola University Medical Center, Maywood, Ill; Rehabilitation Institute of Chicago, Chicago, Ill; and VA West Side Medical Center, Chicago, Ill.

References