



Basic Nutrition: What Patients Know and Don't Know

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ABSTRACT

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Objective: This study evaluates the nutritional knowledge of a non-disease-specific group of people. In the process, a nutritional questionnaire that focuses on nutritional information given by physicians was pilot tested.

Methods: Survey was completed by 232 participants (122 family practice clinic; 110 emergency department).

Results: Initial reliability and validity results of the scale were adequate. The average correct number of responses on the survey was 14 out of 24. There were no differences by age group, urban/rural/suburban residence, or self-reported adherence to a special diet. There were no differences in the responses of continuity family practice patients when compared to participants drawn from the emergency department after the effect of racial differences between the samples was removed. Females, Caucasians, and individuals with higher socioeconomic status answered more questions correctly. Basic nutritional label interpretation skills were found to be poor. Participants, on average, responded correctly to only two of four "food myth" questions (e.g., eating sugar causes diabetes).

Conclusion: This study discusses initial development of a nutritional knowledge questionnaire for primary care patients. It reveals that the nutritional knowledge is poor, with demographic variations consistent with the literature. Because adequate nutritional knowledge is a necessary first step in improving healthy dietary behavior, additional efforts to appropriately counsel patients are necessary.

INTRODUCTION

Family physicians see patients with a variety of illnesses. Many of these patients have medical conditions that require them to adhere to specific diets. For instance, a hypertensive patient must maintain a low-sodium diet and a hypercholesterolemic patient is expected to restrict intake of fats. Mounting evidence also links diet to the most prevalent chronic diseases, such as cardiovascular disorders, cancer, stroke and diabetes.(1) Physicians often instruct patients to adopt specific dietary regimens; however, adherence tends to be limited. One factor in patients' dietary noncompliance may be lack of basic nutritional knowledge.

Few studies have examined the average patient's nutritional knowledge. An extensive, recent study in England suggests serious gaps in adults' knowledge about even basic nutritional recommendations.(2) Although the literature investigating Americans' knowledge of general nutrition is sparse, numerous studies related to particular aspects of nutrition have been conducted. Existing research shows significant knowledge deficits in areas such as dietary fats and cholesterol, (3) general dietary guidelines, (4) and cancer prevention dietary recommendations. (5,6)

Investigations focusing on the nutritional knowledge of patient populations for whom dietary modifications have been recommended have generally found that knowledge in these groups is lower than desired. (7) For example, a 1995 survey study of cardiac patients revealed poor knowledge of heart-healthy dietary recommendations.(8) This study also revealed that most patients given written nutritional information do not fully understand the presented material and proposed that nutrition counseling should be given a higher priority in the care of patients with heart disease.

Significant differences have been documented in nutritional knowledge by a demographic group. Nutrition knowledge increases with education(2,3,6,9) and socioeconomic status.(2,10,11) However, even physicians, nurses and nurse-practitioners (presumably, among the highest in education and socioeconomic status) have been shown to have deficits in nutritional knowledge.(12,13,14) Women usually outperform men on tests of nutritional knowledge.(10,11) Levy and colleagues (1993) also found differences in knowledge about dietary fat and cholesterol by racial/ethnic group. The relationship of age to nutritional knowledge has varied across studies,(2) although generally middle-aged adults perform better on tests of nutritional knowledge than those who are older or younger.(3,10)

The current study sought to evaluate the nutritional knowledge of a non-disease-specific sample of patients. However, one difficulty in discussing the nutritional knowledge of patients is the lack of a “gold standard” nutritional questionnaire. Most of the instruments developed to examine nutritional knowledge have not been validated.(15) They only test a particular subtopic within the field of nutrition (i.e., knowledge of food fat content;(15) fat, fiber, and cholesterol.)(16) Many have been developed for international populations and, thus, employ questions about food items or terms not common in the American South.(2,17) Other questionnaires appear to have a reading level too advanced for the local population.(18) Therefore, a questionnaire was developed and pilot-tested in this study. Additional issues in the development of the current questionnaire were the desire to focus on nutritional information likely to be related to dietary advice given by a primary-care physician and to limit the length of the questionnaire to that which could reasonably be filled out prior to an office visit.

METHODS

Developing the Questionnaire Item Pool

Items were incorporated and modified from some validated measures of nutritional knowledge.(2,17) Practicing physicians were also surveyed about common themes in the nutrition counseling of their patients and items were developed to tap this content. Additional items were developed through reading the literature and consultation with local dietitians. The ability to accurately read nutritional labels was assessed through several items designed to gauge patients’ abilities to use the information provided to make informed food choices. Finally, several common food myths of the southern United States were included for examination. Items were refined based upon feedback after pilot administration to several medical residents and family-practice clinic patients. The resulting 24-item questionnaire was found to have a Flesch-Kincaid reading level of 5th grade (5.4) and takes approximately 10 minutes to complete. (Footnote #1)

Participants

A total of 232 respondents completed the survey (122 from the family practice clinic and 110 from the emergency department). Participants were recruited from a family practice residency training clinic associated with a suburban hospital. In order to obtain a broader patient sample,

additional subjects were recruited from the small emergency department of the same suburban hospital, which, traditionally serves as an urgent care facility for many local residents. Surveys were made available to patients upon check-in at each of the facilities. No efforts were made to track differences in those choosing to complete the survey and those patients who did not elect to complete the survey. All adult, English-speaking patients were eligible to participate and were provided with information about correct responses to the questionnaire following the measure's completion. The sample was predominantly female (66%), Caucasian (46%), and age 50 or younger (73%). The majority of participants lived in suburban areas (61%), with the remainder divided between urban (14%) and rural (25%) residences. The family practice clinic sample differed significantly from the emergency department sample on only one demographic measure: racial/ethnic designation [χ^2 (2, $N=231$)= 8.68; $p<.02$]. More detailed characteristics of the patient respondents by survey site are provided in Table 1.

In addition, a small sample ($n=16$; 69%) of physicians associated with the family practice clinic completed the questionnaire and provided feedback about the nutritional counseling needs of their patients.

RESULTS

Properties of the Questionnaire

Responses to the survey were submitted to principal components factor analysis. No meaningful factors emerged suggesting that the scale is unidimensional. The **Eigen value** for the one factor scale was 5.45, accounting for 22.65% of the variance in responses. The reliability of the full scale was found to be adequate (Cronbach's $\alpha=.84$). The internal consistency would not have been improved significantly by the deletion of any item. The score on each item was correlated with the total score of the questionnaire in order to examine the suitability of the question for inclusion in the scale. All questions achieved statistically significant ($p<.05$) item-to-total score correlations above .20 (range .27-.61; mean .46), which is often accepted as the cut-off point for removing items from a measure. A small-scale initial study of the instrument's construct validity was conducted by surveying physicians associated with the clinic from which patients were recruited. Consistent with hypotheses, physicians scored significantly higher on both the entire measure [Mean= 21; t (d.f. 32) =11.30, $p<.001$] and the label reading portion of the questionnaire [Mean=3.5; t (d.f. 25) =5.62, $p<.001$] (Footnote #2).

Patient Survey Results

Of a possible 24 content-based questions, the average number correct across the sample was 14. Only 28% of the total sample correctly answered 80% or more of the questions (a grade of 'B' or higher on a normal grading scale). Two questions were answered correctly by over 80% of respondents. The first asked respondents to identify the food highest in cholesterol from a list of four foods (bacon, banana, oatmeal, popsicle) to which 85% of the sample responded correctly. The second concerned the relative healthiness of animal fat versus vegetable fat (83% of the sample responded correctly). Only one participant achieved a perfect score on the measure.

Two questions were answered correctly by less than 40% of the participants. The first concerned whether hardboiled eggs contained fat (25% correct responses). The second queried the relative healthiness of salting food during cooking or after cooking (36% correct responses). Additional questions correctly answered by between 40% and 50% of the participants concerned the relative carbohydrate, fat, and fiber content in common foods. For example, the carbohydrate question

states, “Which food has the most carbohydrates?” Choices for response were limited to the following foods: “fried egg, toast, butter, lean steak.”

Demographic variables were used to form groups by which to compare the performance on the survey. There were no significant differences in performance on the questionnaire total score by age group, by urban/suburban/rural residence, or by self-reported adherence to a special diet (e.g., diabetic diet, vegetarian diet). Female participants scored significantly higher on the total questionnaire (Mean=15.10 questions correct) than male participants (Mean= 12.83 questions correct; t [d.f. 225] =3.19, $p < .002$). Analysis by racial/ethnic category revealed significant group differences ($F[2, 230]=8.60$, $p < .001$). Post hoc testing revealed that participants identifying themselves as Caucasian scored significantly higher than those identifying themselves as African American ($p < .001$). No other significant group differences were noted.

Because significant differences by race had been demonstrated and because participants differed on racial/ethnic designations by place of recruitment, an analysis of variance was performed to examine results by place of recruitment and by racial/ethnic designation together. There were no differences in the responses of participants drawn from the family practice center versus those drawn from the emergency department ($F[1, 225]=2.64$, NS) after the effect of racial differences between the samples was removed ($F[2, 225]=5.95$; $p < .003$). There was no significant interaction between the factors.

There were significant differences in performance based upon participants’ reported highest level of completed education ($F[3,224]=12.32$, $p < .001$). Post hoc testing revealed that the two groups with the highest level of educational achievement (those who reported having attended “some college” or more) answered significantly more questions correctly than those having less than a high school education. These differences were not mediated by age of respondents (there was no interaction between age and educational level). Respondents having less than a high school education did not differ significantly from those having earned a high school diploma/GED.

When the questions pertaining to ability to read nutrition labels were examined independently, participants averaged 2.4 correct responses to these questions (out of a possible 4). Most survey respondents (80%) were able to correctly calculate the number of calories in two servings of the product. Patients were able to accurately identify the serving size (73%), but did not appear to understand that the nutritional information presented on the label was all descriptive of one serving of the food (46%). Patients were also less aware of the meaning of order in food label ingredient lists (51%). There were no differences in performance by age group, by area of residence, by place of recruitment (emergency department or family practice clinic), or by self-reported adherence to a special diet. Females performed significantly better on these items than males (t [d.f. 225]=2.77; $p < .007$). Analysis by racial/ethnic category also revealed significant group differences ($F[2, 230]=5.51$, $p < .006$). Caucasian participants were revealed by post hoc analyses to have scored higher than those identifying themselves as African American ($p < .003$). There were no differences between those identifying themselves by other racial designations and Caucasians or African Americans.

Four questions were categorized as food myths or “superstitions” by the authors (e.g., “Eating too much sugar can cause diabetes.”). The average patient responded correctly to two of the four questions. Most patients believed that “it is healthier to salt food while cooking than at the table” (64%), and many also believed that “eating too much sugar can cause diabetes” (41%). Questions about the wisdom of eliminating all fat and sugar from the diet and taking excess amounts of vitamin pills were answered correctly by 64% and 79% of patients, respectively. There were no significant differences in the superstition-related items based upon gender, age

group, where recruited, place of residence, or by adherence to a special diet. There were significant differences by educational level ($F[2, 230]=8.65, p<.001$) and racial/ethnic category ($F[3, 227]=4.95, p<.003$). Participants with less than a high school education (or GED certificate) answered significantly fewer questions correctly than those participants with “some college” education ($p<.02$) or “college degree or higher” ($p<.009$). These last two groups did not differ from each other or from those with a high school degree or GED, who also did not differ significantly from those with less than a high school education. Caucasian survey respondents were more likely to answer the food-myth questions correctly than were African Americans ($p<.001$) or those choosing other racial/ethnic designations ($p<.02$), who did not differ from one another.

Results of Physician Questionnaire

Physicians were asked to predict the ability of their patients to respond to the survey questions. Physicians estimated that patients would, on average, answer 12 questions (SD 2.54) correctly, which is a slight underestimate of the true mean of 14 correct responses. Physicians estimated that 59.73% (SD 35.82) of their patients would benefit from nutritional counseling and reported an average of 15 minutes (SD 10.96) per half day of clinic engaged in patient nutritional counseling. Written nutritional information was reportedly used often or occasionally by 30.8% of responding physicians. Of those patients provided with nutritional counseling, physicians reported that 28.57% (SD 21.25) asked questions to clarify the information. Only 13% of physicians believed they possessed adequate knowledge and skills to effectively counsel their patients on matters of nutrition. A majority of physicians (80%) believed that they should be giving more nutritional counseling than they now do. An open-ended question was used to assess barriers to physician nutritional counseling. The most commonly cited reasons for not engaging in nutritional counseling were time constraints (30%), competing medical demands (19%), and lack of nutritional knowledge (13%). Other responses included the belief that nutritional counseling was not part of the physician’s role, feelings of awkwardness due to physician physical (weight) characteristics, and the belief that patients were unlikely to change their behavior, therefore time spent in nutritional counseling was wasted.

DISCUSSION

As health promotion and prevention come into ever greater in focus for primary care physicians, accurate assessment of patients’ nutritional knowledge grows in importance. This study presents an initial attempt to develop a nutritional-knowledge questionnaire reflective of primary care needs (both informational and time-related) and adequate for a Southern (USA) primary care population.

Initial reliability and validity results of the questionnaire appear promising, although it is acknowledged that further reliability and validity studies (particularly to provide additional evidence of construct validity) are needed. Future tests of the measure are planned with sub-populations of patients, as well as investigations of test-retest reliability, and additional examinations of construct validity by repeating the administration of the measure to additional groups of individuals presumed to differ on nutritional knowledge.

Overall, performance on this measure of nutritional knowledge was rather poor, with half of all participants answering fewer than 60% of the questions correctly, a level that would result in a failing grade on standard educational grading scales. Results on the label-reading and food-myth portions of the survey were similarly discouraging, although not unanticipated, given the results of previous investigations of label reading ability/behavior.(18,19) These results reinforce, again,

that physicians must first establish, then possibly increase, a patient's level of nutritional literacy before they will be able to counsel effectively on dietary change. Although it is acknowledged that knowledge is only one of many possible barriers to appropriate dietary behavior, the importance of nutrition on long term-health and its status as one of the few controllable risk factors for chronic diseases makes the focus on knowledge an important first step.

Demographic variations in nutritional knowledge demonstrated by this study are largely consistent with the published literature. As noted in previous studies of nutritional knowledge,(2,18) being female and having attained higher educational levels was associated with improved performance on this survey. Similar to the results obtained by Levy and colleagues (1993), Caucasians demonstrated higher nutritional knowledge in our study than those identifying themselves as African-American. Participants choosing other racial/ethnic designations typically scored between the Caucasian and African-American groups on most variables. These results suggest that physicians should be particularly careful in providing dietary advice to males, non-Caucasians, and those of lower educational status. These patients are more likely to need basic information in order to implement any dietary changes, which should also be discussed in an extremely detailed fashion.

In contrast to portions of the literature,(3,18) the current study found no significant variations in nutritional knowledge based upon age group. This may be due to our sample not being representative of all age groups.

Surprisingly, those participants who identified themselves as following a special diet (e.g., diabetic diet, heart healthy diet) did not evidence increased nutritional knowledge in comparison to patients without specific dietary needs. This suggests that patients may not have been given adequate information by their physician to implement the recommended diet, and/or may not have understood the information they were given.(8) This conclusion is supported by the relatively brief estimates of time spent in nutritional counseling and the lack of provision of written nutritional information reported by many of the physicians surveyed for this study.

As patients typically view their physician as their primary source for accurate nutritional information,(20) the lack of increased knowledge in patients for whom diet is particularly important indicates a need for increased focus on nutritional counseling by healthcare providers. This is reinforced by the fact that continuity family practice patients were not better informed, nutritionally, than those patients recruited from the emergency department. Although emergency department patients were not surveyed about their usage of primary care services, a prominent majority of the patients typically seen in this emergency department present for non-emergent issues. As most physicians surveyed were aware of their need to provide additional nutritional information to patients, this study highlights the importance of decreasing barriers to nutritional counseling by physicians. The logical first barriers to address may be the knowledge and skill deficiencies which physicians perceive themselves to have. Increased focus on basic nutritional facts and on counseling techniques, such as the application of the transtheoretical(21) model of change and motivational interviewing,(22) in residency training and CME activities should help remedy these issues over time. Appropriate skills will also help to address the discouragement felt by many physicians due to poor patient compliance. Barriers more difficult to address include time constraints and competing medical demands, which were noted by physicians in this and other studies, and barriers previously cited in the literature, such as difficulties in nutritional counseling reimbursement.(12,14,23)

Contrary to what was hypothesized based upon previous tests of nutritional knowledge in physicians(24) and at odds with the physicians' own lack of confidence in their nutritional

knowledge, the small sample of physicians in our survey performed well on the questionnaire (87% average score). This may reflect relative ease in our survey questions, due to the fact that the questions were chosen, in part, based upon knowledge an individual would need to comply with a physician's dietary recommendations. Alternatively, the difference may be ascribed to our sample of physicians not being representative of the medical population as a whole. Physicians were also fairly accurate in their predictions of patients' responses, only slightly underestimating the mean performance level of the patient sample.

Limitations of this study include the fact that the sample was not randomly chosen from those presenting to the healthcare facilities surveyed, which included only one emergency department and one family practice clinic in one metropolitan area. Therefore, there may be inherent differences in this sample which renders its members unlike the general population. Compared to the population of this state, minorities were over-represented in the sample, as were women. The survey participants' age distribution was also slightly younger than the population of the region. These sample characteristics limit the generalizability of the results to the total population in the area. In addition, it is acknowledged that the sample may be biased by the fact that some patients chose not to complete the survey. Although the responses of physicians associated with the surveyed healthcare facilities were included only to provide additional perspective and to aid in the initial investigation of validity, the ability to generalize their responses to other healthcare providers is significantly limited by the small number of physicians who participated.

Future research will examine the association of knowledge based upon this questionnaire and nutritional choices/food behaviors. Although the association between an individual's knowledge of nutrition and subsequent dietary behavior has not always been direct or clear,(25,26) knowledge does, logically, appear to be a necessary precursor to making appropriate food choices. Indeed, when psychometrically appropriate measures are used, knowledge appears to be highly predictive of nutritional behaviors.(2) Increases in knowledge are only a first step in changing dietary behaviors. Additional factors necessary for change have been extensively documented.(21,27) However, gaining adequate understanding of patient's nutritional knowledge will continue to be an important foundational procedure in designing appropriate dietary interventions for our patients and our practices.

FOOTNOTES

- 1 Interested parties can obtain a complete copy of the questionnaire by contacting the first author.
- 2 Due to significant results of Levene's test for equality of variances, t-test for unequal variances was employed.

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