Nutrition coverage on medical licensing examinations in the United States\textsuperscript{1-3}

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ABSTRACT The 1985 National Academy of Sciences report \textit{Nutrition Education in US Medical Schools} recommended that the National Board of Medical Examiners (NBME), which develops the US Medical Licensing Examination (USMLE), cover basic nutrition knowledge. According to the NBME, the USMLE includes nutrition on their Step 1 and 2 exams; however, this coverage has been questioned. To document whether the NBME adequately addresses nutrition, the 1986 Part I and Part II and the 1993 Step 1 and Step 2 exams, which replaced the Part I and II exams, were reviewed by five nutrition professionals. This review identified the nutrition-related areas of the two-part exams and how the extent of nutrition coverage changed from 1986 to 1993. Nutrition items were coded on four dimensions: 1) specific nutrition-related topic area, 2) normal or abnormal scenario, 3) related organ system, and 4) importance in clinical medicine. The percentage of nutrition-related items, as identified by the nutrition professionals, increased from 9% on the 1986 Part I exam to 11% on the 1993 Step 1 exam and from 6% on the 1986 Part II exam to 12% on the 1993 Step 2 exam. The percentage of nutrition items related to vitamin deficiencies increased from 1986 to 1993 on both halves of the exam. Nutrition coverage on the USMLE Step 1 and Step 2 seems adequate in amount, however, the content and appropriateness of the items were not evaluated. The observed increased focus on vitamin deficiencies should be further considered. \textit{Am J Clin Nutr} 1997;65:568-71.

KEY WORDS Nutrition, US Medical Licensing Exam, USMLE, National Board of Medical Examiners, NBME, medical students

INTRODUCTION

The inclusion of nutrition in medical education has been described and reviewed by numerous individuals since 1930 and has been extensively written about throughout the 1980s and 1990s (1-5). Many of these reports and research emphasize the nutrition topics that “should” be taught, with the assumption that nutrition will be incorporated into medical school curricula and licensure exams (6-11). The status of nutrition in medical education has been viewed by nutrition experts as “not improved over the past several decades” and many have hypothesized obstacles or barriers within the medical education system to explain this deficit (6, 12, 13). A few of these barriers include time constraints in the curriculum, the administrative structure of the basic science and clinical departments, and minimal coverage on licensing exams (13).

The 1985 National Research Council (NRC) report from the Nutrition in Medical Education Committee included a review of the nutrition content of the 1980, 1982, and 1984 Part I and Part II exams administered by the National Board of Medical Examiners (NBME) (14). This review indicated that \( \sim 4\% \) of the items on these exams covered nutrition-related topics. The NRC report stated that the percentage and distribution of nutrition topics were not satisfactory and that the NBME should create a means to increase nutrition coverage on the Part I and Part II exams for medical students (14). It is reasonable to postulate that the committee felt that their recommendations would result in an increase in the overall content of nutrition in undergraduate medical curricula.

More recently, testimony entitled \textit{Linking Nutrition Research to Medical Education and Practice} was presented to the US House of Representatives (6). In this hearing, possible alternative initiatives to enhance nutrition education and nutrition practice for physicians were recommended. The presenters suggested that there be a greater effort made to ensure that a significant number of nutrition questions be included on National Board exams for medical students, because medical schools would thus be more likely to include nutrition in their curricula (6). A recently published background report on the state of nutrition education in medical schools indicated that no means had been introduced by the NBME to ensure the inclusion of items on nutrition and health on the NBME Part I and Part II exams or on their revised versions, the US Medical Licensing Examination (USMLE) Step 1 and Step 2, since the NRC report (13).

According to the NBME, this assertion was unjustified. The committees charged with redesigning Parts I and II of the exams explicitly intended to systematically include nutrition in...
the new Step 1 and 2 exams (15). There were two gastrointes-
tinal- and nutrition-related task forces created in 1989 and
1990, one for Part I and one for Part II. The Part I task force
members included a gastroenterologist, a surgeon, a pathol-
gist, two PhD physiologists, and one biochemist. The Part II
task force included three gastroenterologists, a surgeon, and a
psychiatrist. The configuration of the task forces was deliber-
ately multidisciplinary, reflecting, at least in part, the variety of
groups with an interest in nutrition. In addition, traditional
discipline-oriented committees were systematically assigned
items covering nutrition content and asked to submit nutrition-
related items depending on the needs of the item pools. The
new Step 1 and 2 exams were introduced in 1992 as a result of
the comprehensive redesigns of the Part I and Part II commit-
tees (16).

Because it has not been documented whether the NBME has
adequately addressed the nutrition competency of medical stu-
dents, the purpose of this research was to assess to what extent
nutrition issues were covered on the 1986 NBME Part I and
Part II exams and the 1983 USMLE Step 1 and Step 2. The
study identified the percentage of nutrition-related items rep-
resented on the exams that were reviewed, the nutrition-related
topic areas covered, and the change in nutrition coverage from
1986 to 1993.

METHODS

To assess the percentage of items covering nutrition content
on the NBME Part I and Part II exams and the USMLE Step 1
and Step 2, the June 1986 Part I, September 1986 Part II, June
1993 Step 1, and September 1993 Step 2 exams were reviewed by
five nutrition professionals known for their expertise and
interest in medical education. These reviewers were faculty
members of nutrition or medicine departments who develop
and teach nutrition courses at their respective medical schools.
The principal investigator also participated concurrently in the
review process with the four invited experts.

To prepare for the review process—which took place on
December 5, 6, and 7, 1994—the published content outlines for
the 1986 Part I and Part II and the 1993 Step 1 and Step 2
exams were mailed to the reviewers and used to identify
nutrition-related topics (17, 18). This information was used to
develop coding sheets that would be used by the reviewers to
classify nutrition items by nutrition-related topics; to determine
whether these nutrition items pertained to normal or abnormal
function, structure, or both; and to identify the organ system
most likely described.

The reviewers also rated the nutrition items according to
their importance in clinical medicine on a five point Likert
scale: 1) not important, 2) low importance, 3) moderate impor-
tance, 4) important, and 5) very important. The reviewers based
their “importance” rating on the frequency that an underlying
problem is seen in clinical practice, the prevalence of the
specific disease, or its associated morbidity and mortality.

Before the actual review process, the principle investigator
trained the reviewers on the coding scheme that would be
implemented during their review of the exams. To facilitate
training, sample tests—each consisting of 46 items—were de-
veloped to simulate the Part I, Part II, Step 1, and Step 2 exams.
These training tests were organized from retired item test
booklets and from the practice items published in the 1986 and
1993 General Instructions, Content Description, and Sample
Items (17, 18). The nutrition items on these sample tests were
coded in advance by the principal investigator to reflect items
within each topic, normal or abnormal scenario, and organ
system. During the actual review, each reviewer was started on
different test booklet within each exam to control for test
fatigue and the learning process (ie, the time it takes for the
reviewers to learn how to code their responses) that may occur
during the review process. The reviewers were also provided
with answer keys for all exams.

After the individual reviews, the group discussed each item
when there was a discrepancy about whether the item was
related to nutrition. For the items that were agreed on as being
nutrition-related, the group came to a final consensus about
the specific nutrition-related topic, normal or abnormal scenario,
organ system codes, and importance. When the reviewers’
importance ratings indicated more than three-point differ-
ence, the item was discussed by the group and the extreme
responses were adjusted. The individual ratings of the review-
ers were averaged to obtain a mean importance score for each
nutrition item, based on the reviewers’ subjective opinions.

These importance scores for each item were totaled and aver-
ged based on the total number of nutrition items identified for
each exam.

RESULTS

The percentage of nutrition-related items increased from 9%
of the scored items on the 1986 Part I Exam to 11% on the 1993
Step 1 exam. Nutrition coverage on the Part II exam also
increased, from 6% in 1986 to 12% in 1993. Most of the
nutrition items classified by topic on both the Part I and Step 1
exams were metabolic and physiologic mechanisms and func-
tion, representing 60% of the nutrition items in 1986 and 56%
in 1993. Nutrition items relating to the diagnosis of disease on
the first half of the exams (Part I and Step I) increased from 8%
in 1986 to 17% of the nutrition items in 1993. Nutrition items
that were classified as “diagnosis of disease” on the second half
of the exams (Part II and Step 2) represented the majority of the
nutrition items: 55% in 1986 and 46% in 1993 (Table 1).

Most of the nutrition items classified by system on the 1986
Part I (58%) and the 1993 Step I (59%) exams represented
biochemistry and cellular respiration, a finding not unexpected
given the emphasis on metabolic and physiologic mechanisms
of disease in these exams. For the 1986 Part II and 1993 Step 2
exams, items appeared to be more evenly represented in the
various organ systems (Table 2).

On the 1986 Part I Exam, vitamin deficiencies represented
6% of the nutrition items, increasing to 11% of the nutrition
items on the 1993 Step 1 exam. An even greater increase was
from 12% in 1986 on the Part II exam to 22% in 1993 on the
Step 2. Other changes on the Step 2 exam occurred within the
cardiovascular system, representing 6% of the nutrition items
in 1986 and 14% of the nutrition items in 1993. The percentage
of nutrition items related to the renal system decreased from
13% in 1986 to 4% in 1993 on the Part II/Step 2 exams.

Nutrition items were also classified as scenarios describing
normal or abnormal structure and function. The normal sce-
narios were described most often on Part I (63%) and Step 1
(57%) exams, whereas the abnormal scenarios were depicted most often on Part II (89%) and Step 2 (92%) exams. The importance of the content of the nutrition items in clinical medicine changed very little from 1986 to 1993. Specifically, the mean importance rating of the nutrition items was 3.3 (out of 5) on the 1986 Part I exam, 3.1 on the 1993 Step I exam, 3.6 on the 1986 Part II exam, and 3.7 on the 1993 Step 2 exam.

**DISCUSSION**

The percentage of items related to nutrition increased from 1986 to 1993. On the first half of the exams (Part I and Step 1), most items related to the topic category of metabolic and physiologic mechanisms and function and to the system category of biochemistry and cellular respiration system. In contrast, the percentage of items that were concerned with growth and development and health maintenance on the first half of the exams (Part I and Step 1) was small and stable. On the second half of the exams (Part II and Step 2), most items were related to aspects of disease (mechanism and diagnosis of disease, and disease management) and this number increased from 1986 to 1993. The greatest increases in nutrition items classified by system on the Step 2 exam were as follows: cardiovascular, intestinal, neoplasm, and vitamin deficiencies. The reason for the increase in items related to vitamin deficiencies is unclear.

The systematic changes in test design made between 1986 and 1993 with the introduction of the USMLEs (17) probably account for the increase in nutrition coverage observed in this review. For the 1993 exams, the traditional, discipline-oriented committees were systematically assigned to write items covering nutrition content. Nutrition items were submitted by various committees from a variety of disciplines (18): anatomy, behavioral sciences, biochemistry, microbiology, pathology, pharmacology, and physiology for the first half of the exam and medicine, obstetrics and gynecology, pediatrics, preventive medicine and public health, psychiatry, and surgery for the second half of the exam. Based on this research, the NBME’s effort to revise the design of the comprehensive Part I and Part II exams, as described previously, most likely contributed to the increase in nutrition coverage.

Because nutrition is a topic that can be integrated within the framework of common clinical problems, it is possible that nutrition coverage also increased as a result of efforts to make the Step 1 and 2 exams more integrated and clinically oriented. These exams were designed to assess students’ ability to integrate concepts and knowledge from a variety of disciplines.

**TABLE 1**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Part I and Step 1</th>
<th>Part II and Step 2</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1986</td>
<td>1993</td>
<td>1986</td>
</tr>
<tr>
<td>Growth and development</td>
<td>2</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Metabolic and physiologic mechanism and function</td>
<td>60</td>
<td>56</td>
<td>8</td>
</tr>
<tr>
<td>Health maintenance and life cycle</td>
<td>1</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Mechanism of disease</td>
<td>15</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>Diagnosis of disease</td>
<td>8</td>
<td>17</td>
<td>55</td>
</tr>
<tr>
<td>Disease management</td>
<td>13</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>Other (defined as those not coded in the above categories)</td>
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<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

**TABLE 2**

<table>
<thead>
<tr>
<th>System</th>
<th>Part I and Step 1</th>
<th>Part II and Step 2</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1986</td>
<td>1993</td>
<td>1986</td>
</tr>
<tr>
<td>Biochemistry and cell respiration</td>
<td>58</td>
<td>59</td>
<td>8</td>
</tr>
<tr>
<td>Hematopoietic</td>
<td>6</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Nervous</td>
<td>5</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Connective tissue</td>
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<td>2</td>
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<tr>
<td>Musculoskeletal</td>
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<tr>
<td>Respiratory</td>
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<td>0</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Intestinal</td>
<td>11</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>Renal</td>
<td>4</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td>Pregnancy</td>
<td>2</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Endocrine</td>
<td>4</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Infectious</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Neoplasm</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Immunologic</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Vitamin deficiency</td>
<td>6</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>Other (defined as those not coded in the above categories)</td>
<td>0</td>
<td>3</td>
<td>13</td>
</tr>
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</table>
similar to what is expected of physicians. On the other hand, many nutrition advocates express the need to have separate nutrition departments, separate nutrition courses, and separate nutrition lectures in medical school. These recommendations do not consider the current trend, as supported by the General Professional Education of Physicians Report, to integrate topics and limit lecture time (19). The NBME has recognized that nutrition is an important topic that should be covered by the USMLE and has attempted to systematically incorporate nutrition into the content outline and the item writing assignments, all within the context of an integrated exam.

The Step exams focus on content that is necessary for the practice of medicine and are designed to be an independent assessment of what medical students need to know, regardless of whether or not the topics are taught in all medical schools (20). These new Step exams are broad-based and used for certification rather than as distinct achievement tests in the basic science and clinical disciplines (21). The NBME attempts to update its exams to “keep pace” with the medical curriculum and the practice of medicine by carefully selecting content experts representing a wide geographic distribution of US medical schools (20, 22) to write exam items for the USMLE.

If one takes into account all the other topics that medical students are expected to have knowledge about for the USMLE, nutrition coverage on the USMLE Step 1 and Step 2 seems adequate. However, it is important to keep in mind that the present research was conducted on exams from only 2 y, 1986 and 1993. Data analysis from other years may lead to different conclusions. In addition, if another group of medical experts reviewed these same exams, they may code the same items entirely differently, depending on the criteria that were established. The group of experts for the present review also did not evaluate the content or appropriateness of the items. Therefore, making value judgments on the adequacy of nutrition content of the items based solely on the percentage of items related to nutrition would not be appropriate. On the other hand, the reviewers noted that the balance of topics covering vitamin deficiencies needed further investigation, and others, such as preventive nutrition, identification of nutritionally at-risk patients, and enteral and parenteral nutrition support were not covered adequately.

In conclusion, because nutrition is an essential factor for prevention and treatment of disease, medical students will be required to show competency in nutrition to manage and treat patients, to answer nutrition-related questions, as well as to provide screening and preventive counseling. On the basis of the present research, we found that the NBME has responded to the need to assess the competency of medical students’ knowledge of nutrition by including nutrition-related items on the Step exams (23). It is important to remember that this study addressed only nutrition coverage. How well students performed on these items or the competencies that are required for the practice of medicine are topics for future studies.

REFERENCES