What Should Physicians Know About Hypertension? The Implicit Knowledge Requirements in the Maintenance of Certification Self-assessment Module

Amy L. Lee, MD; Andrea E. Gordon, MD; Allen F. Shaughnessy, PharmD

Background and Objectives: The American Board of Family Medicine (ABFM) Maintenance of Certification process requires family physicians to have a core knowledge base in key areas such as hypertension and diabetes care but does not define this knowledge in specific terms. We developed a method of content analysis to evaluate what type of knowledge is assessed on the ABFM’s Hypertension Self-assessment Module (SAM) to better understand what the implied knowledge of a family physician should be. Methods: In this qualitative descriptive analysis, we categorized the 60 questions comprising the knowledge assessment portion of the Hypertension SAM, version 2.20.03, into diagnosis, treatment, or etiology/general knowledge questions. Diagnosis and treatment questions were graded for relevance to typical family practice. Diagnosis questions were coded regarding importance. Treatment questions were subdivided into drug or nondrug treatments. Drug treatment items were categorized as testing knowledge of safety/tolerability issues, effectiveness issues, or cost considerations. Results: The 60 questions represented 213 specific items of knowledge. Most (71%) of the items on the SAM focused on therapy, with the remainder evaluating knowledge of diagnosis issues or general knowledge. Of the therapy-related items, the items were evenly split between knowledge of safety/tolerability and knowledge of effectiveness (47.1% each). The remaining items required knowledge of nondrug therapy. No items evaluated knowledge of the relative cost of treatment or cost-effectiveness. With regard to the relevance of the tested information, only 70% of the items test knowledge that would be commonly needed in the practice of family medicine. Conclusions: There is currently no consensus on the discrete set of skills and knowledge that should be held by a competent family physician. In the absence of a comprehensive set of goals and objectives, the knowledge content being assessed in the SAMs can at least inform teaching programs about what their learners will be required to know to maintain certification. For the content area of hypertension, most of the knowledge required was regarding drug treatment. Interestingly, 30% of the knowledge content being assessed was found to be neither important nor commonly needed in the care of patients. We recommend that more work be done to define the specific knowledge and skills required for a competent family physician and that future maintenance of certification modules be written to assess mastery of these core requirements.

(Fam Med 2007;39(4):280-3.)

When the American Board of Family Medicine (ABFM) implemented the Maintenance of Certification (MOC) process in 2004, there was a shift in the goals for recertification. In addition to passing an examination on general knowledge every 7–10 years, family physicians now have to complete Self-assessment Modules (SAMs) on various core topics in family medicine and perform practice assessments. Part of the impetus for this change was the acknowledgment that medical knowledge changes rapidly. Therefore, physicians need to develop methods to continually update their knowledge and skills and to improve the care of patients.

The self-assessment aspect of the MOC process implicitly assumes that there is a body of skills knowledge that a family physician needs to be “competent.” However, these skills and knowledge are not explicitly described either by the Board or by any other body or organization. Since answering these self-assessment questions correctly is required for completion of the SAMs, and thus for maintenance of certification, the
questions themselves reflect the de facto learning objectives required by the Board.

To prepare our family medicine residents for the MOC process, we wanted to better understand the knowledge content being assessed by the ABFM in the SAMs. To do this, we needed to analyze the content of the SAMs. At the time of this study, the ABFM had produced four SAM modules. We chose to evaluate the hypertension SAM for this project and used the diabetes SAM to develop and refine our methodology. Our goal was to use the diabetes module to develop a method of content analysis for the SAMs, apply it to the knowledge assessment aspect of the Hypertension SAM, and evaluate the results.

**Methods**

We used the knowledge assessment portion of the Hypertension SAM, version 2.20.03, dated January 2006, which consists of 60 questions. We conducted this study using the method of content analysis, which has been defined as a systemic, replicable technique for compressing text into content categories based on explicit rules of coding. The validity of this method relies on a high agreement among two or more coders working independently rather than an evaluation using absolute criteria or large numbers of coders. For example, categorizing the current weather as a "sunny day" with this method relies on two people independently making this judgment rather than the use of specific criteria such as the percentage of cloud cover, degree of brightness, etc.

This method allowed us to objectively and systematically identify the specific learning objectives implied by the questions comprising the SAM. To perform the study, two of the authors, practicing family physicians, categorized each item in the self-assessment.

**Recording Units**

The recording unit for this study was the individual questions, with the exception of questions that have one or more correct answers. Each answer for these questions was treated as a separate unit. Table 1 shows a typical multiple-answer question. For the question shown in Table 1, each possible response was coded as a true/false question and therefore five distinct units of knowledge were coded.

**Coding Categories**

The goal in developing this coding scheme was to establish coding categories and subcategories that were complete, mutually exclusive, and that would exhibit a high degree of intercoder reliability. Content analysis can use either emergent or a priori coding. The categories were developed using an emergent coding process. Emergent coding establishes categories following an examination of the content instead of establishing categories prior to the analysis, usually based on a theoretical construct. Initial categories were developed by one of the authors not involved in the actual analysis. The categories were then pretested on the diabetes mellitus SAM to refine them.

Both investigators were trained in the use of the taxonomy. For training and to further refine the categories, the two coders applied the categories to three sets of 15 practice items. These fabricated practice questions were similar in style and content to the SAM questions. After this practice, they applied them to sets of 15 items from the actual hypertension SAM until their interrater agreement was 100%.

Each investigator independently categorized the items without knowledge of the scores from the other investigator. All authors made coding decisions in the case of disagreement between coders.

The final categories of questions were questions of diagnosis knowledge, treatment knowledge, and etiology/general knowledge about hypertension or its causes (Figure 1). The diagnosis knowledge category items were further subcategorized with regard to the relevance of the knowledge to typical family practice and to the importance of knowing this information. To determine relevance, the coders independently decided whether the question addressed a clinical issue that is either frequent or uncommon in typical family practice. To make this determination, the coders called upon their own experience in clinical practice as well as their experience as preceptors in a family medicine residency. For example, the coders determined that essential hypertension is a common diagnosis in the typical practice of family medicine, whereas pheochromocytoma is an uncommon diagnosis.

Importance was coded as important knowledge necessary for family medicine practice such as distinguishing a time-sensitive diagnosis from a less-important benign/incidental diagnosis. A time-sensitive diagnosis would mean the patient would be adversely affected if the diagnosis was not made promptly. For example, recognizing and diagnosing an acute coronary syndrome would be time sensitive, but the diagnosis of metabolic syndrome would not, since complications of this syndrome do not occur for many years.

<table>
<thead>
<tr>
<th>Table 1</th>
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<tbody>
<tr>
<td>Sample Question</td>
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<tr>
<td>Hyperkalemia is a potential side effect of which of the following? (Mark all that are true.)</td>
</tr>
<tr>
<td>• Enalapril (Vasotec)</td>
</tr>
<tr>
<td>• Amiloride (Midamor)</td>
</tr>
<tr>
<td>• Felodipine (Plendil)</td>
</tr>
<tr>
<td>• Labetalol (Trandate, Normodyne)</td>
</tr>
<tr>
<td>• Losartan (Cozaar)</td>
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</table>
The treatment knowledge category items were also subcategorized with regard to relevance (common versus uncommon treatment modalities used in common practice) and were further subdivided into nondrug and drug treatment categories. The drug treatment category was further subdivided with regard to focus of the question. Drug treatment items were categorized as testing knowledge of safety/tolerability issues, effectiveness issues, and cost considerations. Safety/tolerability issues were described as involving monitoring for side effects, identification of a side effect, and knowledge of interactions with other drugs, foods, or herbs.

Data Analysis

Descriptive statistics were used to evaluate the coding of the items. Intercoder agreement was assessed using Cohen’s kappa. The agreement between the two coders was 91.3% (K=0.619), indicating “substantial” agreement.

Results

The 60 questions of the knowledge assessment are either fill-in-the-blank questions, requiring a written answer (n=5), or multiple-choice questions with five or fewer response options. As a result, the 60 questions represent 213 specific items of knowledge.

Most of the items on the assessment focused on therapy (71.8%), with the remainder evaluating knowledge of diagnosis issues or general knowledge (Table 2). Of the therapy-related items, the items were evenly split between knowledge of safety/tolerability and knowledge of effectiveness (47.1% each). The remaining items required knowledge of nondrug therapy. No items evaluated knowledge of the relative cost of treatment or cost-effectiveness (Table 3).

Most (70.1%) of the questions tested knowledge that would be commonly needed in the practice of family medicine. A majority of the diagnosis knowledge items were judged to focus on rare issues (58.1%) whereas only 9.2% of the therapy items were judged to represent rarely needed information.

Discussion

In this evaluation of the knowledge content assessed in the Hypertension Self-assessment Module offered by the ABFM, we found that the majority of the items assessed knowledge that would be commonly held and used by family physicians. Questions about therapy were the most numerous, and the therapies being discussed were frequently used in family medicine practice. Diagnostic questions made up about one third of the SAM but were more likely to address uncommon diagnoses than common ones. General and background knowledge made up only a small percentage of the ques-

| Table 2 |
| Analysis of Items by Category (n=213)* |

<table>
<thead>
<tr>
<th>Category</th>
<th>Distribution of Items n (%)</th>
<th>Focus on Common Issues %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnosis</td>
<td>31 (14.6)</td>
<td>41.9</td>
</tr>
<tr>
<td>Therapy</td>
<td>153 (71.8)</td>
<td>90.1</td>
</tr>
<tr>
<td>General knowledge</td>
<td>29 (13.6)</td>
<td>NA</td>
</tr>
</tbody>
</table>

* The 60 questions are composed of a total of 213 separate items of information. See text.
Content analysis, the method we used to categorize the knowledge tested by the SAM, is rigorous and is based on the inter-rater agreement, not outside standards, to determine reliability. Our high agreement (kappa) between the raters ensures that our results are both reproducible and generalizable. Our pretesting established stability and reproducibility, the two aspects of reliability, for our coding rules. This process is used by many types of researchers evaluating content.

One of the reasons we undertook this study was the feedback we heard from family physicians taking the SAMs, who reported that some of the content being assessed was rare, irrelevant, or unimportant in daily practice. After evaluating the hypertension SAM, we found that about 30% of the content involved information irrelevant to or seldom used by family physicians. More emphasis could have been given to common versus uncommon diagnoses, and cost-effectiveness of therapies could have been addressed. However, in general, the information being assessed in the Hypertension SAM seems to be mainstream knowledge needed by family physicians to appropriately care for patients.

Little work has been done by our specialty to identify a discrete set of skills and knowledge that should be held by a competent family physician. Competency is often defined as many define art: “I know it when I see it.” Simply declaring that a family physician's knowledge should be adequate for the typical practice of family medicine is a tautology.

The Accreditation Council for Graduate Medical Education (ACGME) Outcome Project requires that US residency programs prove the competency of their residents in several categories (patient care, professionalism, etc), but each residency is left to define the specific objectives. The Royal College of General Practitioners has produced a draft statement that includes the general goals of a curriculum in general practice but has not defined specific objectives. The Council of the European Academy of Teachers of General Practice also has an educational agenda with general goals.


c|Accessibility | Effectiveness | Cost-effectiveness, Price, Cost Efficiency | Non-drug Therapy |
---|---|---|---|---|
Safety/tolerability | 72 (47.1) | 72 (47.1) | 0 | 9 (5.9) |

* Number of items (%)

By clearly defining the essential knowledge and skills needed for core topics in family medicine, the learner can focus on that critical knowledge instead of spending time accumulating obscure or irrelevant information that may be on a test. This is the advantage that a maintenance of certification process has over a testing recertification process: to ensure that learners have mastered crucial data instead of merely retaining random knowledge for as long as it takes to pass the test.

This method of determining competencies, by working backward from a self-assessment process, is not ideal. A better approach would be the creation of a specific set of competencies and then addressing these in residency training. However, given the reality that the Maintenance of Certification process is one major measurement of competency, educators need to prepare residents with an eye toward this process. We hope that our method of content analysis can be used in the future to assist educators and evaluators in defining what the essential knowledge base of the family physician should be.

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**References**