Impact of Highly Interactive Multi-Session Educational Activities on Physician Behavior in Hypertension Management

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ABSTRACT

Background: This article describes the processes used to develop and implement a series of live, half-day, highly interactive continuing medical education (CME) programs that addressed identified knowledge, competency, and performance gaps in hypertension diagnosis and management in the primary care community and successfully changed physician behavior toward improved patient outcomes.

Methods: This case-based didactic program was designed to address the Institute of Medicine competencies of providing patient-centered care and employing evidence-based practice. Educational content was developed after conducting a thorough preliminary needs assessment to determine the specific needs of primary care physicians in the management of hypertension, via literature and discussions with key opinion leaders. Surveys were distributed to physicians (participants) who attended the program onsite during registration and then collected immediately after the educational activity. Fifty surveys were randomly selected for further analysis. Surveys were also distributed to 50 primary care physicians who did not participate in the program (non-participants) via e-mail. Answers to case study questions, current practice patterns, and perceived barriers to care were compared between participants and non-participants to assess differences in practice choices associated with program participation.

Results: Analyses and comparison of the survey results from participants and non-participants showed that participants chose evidence-based answers more frequently than non-participants to questions related to the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) guideline recommendations and appropriate antihypertensive therapy use in specific patients (eg, elderly patients and individuals at risk for stroke). The calculated educational impact was 52%. Based on the average number of hypertensive patients seen weekly by the 588 participants, at least 22,304 hypertensive patients are 52% more likely to receive evidence-based care than those seen by non-participants.

Conclusion: Participation in a half-day, highly interactive CME activity is associated with increased physician knowledge in the management of hypertension, as well as increased likelihood for patients to receive evidence-based care by the physicians who participated. Although additional data are needed to fully characterize the impact of CME on patient care, our data contribute to increasing the current understanding of the effect of CME on physician knowledge, competency, and performance, ultimately leading to improved patient care.

INTRODUCTION

The role of continuing medical education (CME) in improving patient care has been widely discussed. Theoretically, physicians who are educated on the most recent advances in evidence-based practice will make more informed decisions regarding patient management, leading to improved outcomes [1].

In October 2009, we implemented STOP Hypertension NOW! Recognize & Manage Your High-risk Patients, a novel, live, highly intensive, case-based CME initiative to address existing knowledge and practice gaps in hypertension management. An estimated 74 million Americans have diagnosed hypertension, and it is anticipated that the prevalence of hypertension will increase over the next 10 to 15 years, affecting more than 100 million Americans [2-4]. Approximately two-thirds of hypertensive patients are not meeting blood pressure (BP) goals defined by the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of
High Blood Pressure (JNC 7) guidelines [5]. Low physician adherence to guidelines and clinical inertia are significant factors that have been described in the literature, contributing to the low number of patients meeting BP goals [6-10].

In this article, we intend to show how interactive, case-based, live CME activities can help to close the existing knowledge and practice gaps in hypertension management. We also intend to demonstrate how this type of education can lead to more informed decisions regarding patient management, eventually leading to improved outcomes. The efficacy of the CME activity was measured using a case-based survey, which was developed to determine the consistency of diagnostic/therapeutic choices by participants compared with evidence-based guidelines.

**MATERIALS AND METHODS**

This educational activity was designed to address the Institute of Medicine competencies of employing evidence-based practice and providing patient-centered care. A regional series of 6 regional 4-hour meetings was developed by key opinion leaders in hypertension and based on a core curriculum. Each mini-conference was customized to highlight unique challenges in a particular region.

The program agenda was divided into 3 1-hour-long teaching modules, and each module consisted of 2 20-minute didactic lectures followed by case study discussion. The format incorporated audience response system (ARS) use and frequent question-and-answer sessions to emphasize attendee-faculty interaction throughout the activity. This program was not part of a larger conference, and participation was completely voluntary.

The educational objectives for the live program are as follows:

- Explain benefits and limitations of the Framingham and Reynolds risk scores as they relate to cardiovascular risk assessment in women
- Discuss the rationale for hypertension disparities in African Americans and management considerations in this population
- Manage an elderly patient with isolated systolic hypertension
- Identify strategies to improve adherence to antihypertensive regimens

**Outcome Surveys: Instruments and Analysis**

Evidence-based case vignettes were developed to assess the consistency of diagnostic and therapeutic choices by participants with clinical evidence presented during the CME activity, as well as similarities/differences between practice choices by participants and non-participants. A series of key measurement indicators focusing on hypertension management were also determined based on the learning objectives and educational content (Table).

Surveys were distributed to physicians who attended the CME program (participants) during registration, and then collected immediately following the activity. Fifty surveys were then randomly selected for further analysis. Surveys were also distributed via e-mail to non-primary care physicians who did not participate in the program (non-participants). Differences in practice choices associated with program participation were assessed.

Data were analyzed using the Statistical Package for Social Sciences (SPSS 17.0; SPSS Inc., Chicago, IL, USA). Differences between participant and non-participant responses were evaluated by determining the effect size, according to a method published by Collier [13]. An effect size was calculated to establish the degree of difference between evidence-based responses from participants and non-participants. Effect size is calculated using the Cohen's d formula and is expressed as a non-overlap percentage, or the percentage achieved by participants that was not reflected in the evidence-based responses of non-participants. An important potential educational impact was demonstrated by any positive difference between the 2 groups where the content is relevant to the participants’ patient populations. Based on total attendance, preliminary power analysis demonstrated that sample data from 50 participants and 50 non-participants were needed to demonstrate a significant ($P \leq .10$) 30% difference in educational index between the physician groups.

**RESULTS**

**Demographics: Participants and Non-Participants**

The average attendance for each program was 98 participants (total, 588 participants), consisting of physicians (MDs/DOs 67%), nurses (23%), and physician assistants (10%). Participants and non-participants were demographically similar in terms of medical degree, medical school graduation year, specialty, major professional activity, practice location, and number of hypertensive patients seen weekly. A similar number of participants and non-participants specialized in internal medicine and family practice, and the majority of these individuals were involved in direct patient care activities (participants, 93.3%; non-participants, 100%). Participants and non-participants saw a similar number of patients with hypertension weekly (participants, 38 patients; non-participants, 35 patients).

**Survey Responses**

Survey analyses showed that participants (n = 50; randomly chosen from 588 completed surveys) chose evidence-based answers more frequently than non-participants (n = 50). For example, significantly ($P = .005$) more participants (78%) compared with non-participants (51%) selected the appropriate BP goal for the specified patient (<130/80 mmHg) based on JNC.
7 guideline recommendations (Figure 1). However, similar responses between participants and non-participants were observed when asked about the classification of the patient’s stage of hypertension given a specific BP range. When asked about ethnic disparities, significantly \( P < .001 \) more participants (57%) were aware that African-American women were more likely to suffer a stroke event than another ethnic group/gender; most non-participants (88%) selected “African-American men” as having the highest prevalence of stroke.

For the survey question regarding initial pharmacotherapy for an African-American

<table>
<thead>
<tr>
<th>Performance Indicators</th>
<th>Case 2: 72-year-old Asian man</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-year history of hypertension, untreated for ~10 years</td>
<td>Patients with hypertension and comorbid diabetes or kidney disease have a lower BP goal and lower BP threshold for initial use of two-drug combinations [4]</td>
</tr>
<tr>
<td>Retired, walks daily, eats traditional diet of rice and noodles</td>
<td>The BP goal in a hypertensive patient (baseline BP &lt;160/100 mmHg) with comorbid diabetes is &lt;130/80 mmHg [4]</td>
</tr>
<tr>
<td>1 year ago: fasting glucose, 154 mg/dL; HbA(_1c), 7.4%</td>
<td>Combination pharmacotherapy should be initiated for a hypertensive and diabetic patient with a BP reading that is &gt;20/10 mmHg above goal [4]</td>
</tr>
<tr>
<td>Patient has gained 10 lb over past year</td>
<td>Characteristics of hypertension in the elderly include increased systolic BP, pulse pressure, left ventricular hypertrophy, arterial stiffness, elevated and total peripheral arterial resistance, as well as decreased cardiac output, pulse rate, renal blood flow, plasma renin activity, angiotensin II levels, arterial compliance, blood volume, and diastolic blood pressure [11]</td>
</tr>
<tr>
<td>On examination: BP, 182/84 mmHg; heart rate, 86 beats per minute, regular; soft systolic murmur</td>
<td></td>
</tr>
</tbody>
</table>
man who recently suffered a cerebrovascular accident, significantly ($P = .020$) more participants (53%) chose the more appropriate answer of a “renin-angiotensin system (RAS)-blocking agent plus a thiazide-type diuretic or a calcium channel blocker (CCB)” compared with non-participants (30%). Monotherapy with a RAS-blocking agent was chosen as the most appropriate initial therapy by the majority of non-participants (36%). Similarities in responses were observed between participants and non-participants in regard to selection of fasting glucose testing to help determine the best antihypertensive agent for an overweight African-American woman with newly diagnosed hypertension and a family history of diabetes and hypertension, along with determination of the most appropriate first-line therapy for this patient, a thiazide diuretic.

Looking at compelling indications, more participants than non-participants (84% versus 52%, respectively; $P = .001$) chose the most appropriate answer of combination therapy with an angiotensin-converting enzyme (ACE) inhibitor and a diuretic (Figure 2) for an elderly Asian man with severe systolic hypertension, diabetes, and recent weight gain (Case 2). However, for a middle-aged Hispanic woman with a history of hypertension and chronic kidney disease, the majority of participants (76%) and non-participants (70%) did not choose the most appropriate therapy to improve long-term cardiovascular morbidity and mortality. A similar number of participants and non-participants identified increased pulse pressure as the characteristic of hypertension in the elderly (Figure 3).

**Educational Impact of the Program**

Calculated educational impact or the likelihood for a patient seen by physicians who participated in **STOP Hypertension NOW!** **Recognize & Manage Your High-Risk Patients** to receive evidence-based care was 52%. Data indicate that at least 22,304 hypertensive patients are 52% more likely to receive evidence-based care than those seen by healthcare providers who did not participate in the activity, based on the average number of patients with hypertension seen weekly by the 588 healthcare providers who attended this activity [13].

**DISCUSSION**

There is an increasing need to better characterize the impact of CME activities on physician knowledge, competency, and practice performance, as well as patient outcomes [14]. Participation in this educational activity resulted in increased knowledge and competency in a variety of areas related to hypertension management and was also associated with a projected increase in physician performance because participants are 52% more likely to provide evidence-based medicine to their patients.

Increased knowledge regarding a variety of topics, including JNC 7 guideline recommendations and hypertension management strategies for various patient populations, was not surprising. More importantly, results of our study demonstrated that participation resulted in increased competency in recognizing patient BP goals, as well as choosing the most appropriate therapy for a specific patient based on guideline recommendations and efficacy studies. With a shift in focus from increasing knowledge to increasing competency, there have been few data documenting the effect of CME on physician ability to provide optimal healthcare over the past few years. A study by Peterson et al demonstrated that participation in a 2-day course resulted in a significant increase in self-assessed competency. Appropriate evidence-based management decisions were more likely to be made by participants who reported substantial gains in competency than non-participants [15].

In our study, the quality of education index of 52% suggested that improved physician competency will directly translate into an increased probability to provide guideline-driven and evidence-based healthcare.

Studies have shown variable effects on physician competency, performance, and
ultimately patient care with various educational formats [14]. A 2007 meta-analysis of more than 68,000 literature citations by the Agency for Healthcare Research and Quality demonstrated increased efficacy on short- and long-term behavior with the use of interactive versus non-interactive techniques, live versus print media, and multimedia versus single media [16]. The instructional approach used in the STOP Hypertension NOW! conference series is different than the traditional didactic presentations of many CME activities. These mini-conferences were highly interactive. The agenda was broken into teaching modules, and each module emphasized faculty-participant interaction via responses to knowledge- or competency-based ARS questions and discussion of clinical practice preferences, along with sufficient time for open discussion. Brief lectures focused on data that were most applicable to clinical practice. Each presentation was short and crisp, with rapid changes in topic, to keep the audience engaged and prevent monotony, as has been emphasized in a variety of instructional models. Our approach allowed for approximately 600 physicians to receive education, consequently impacting the care of more than 22,000 patients.

Our outcomes methodology relies on assessing responses to a series of case vignette questions from physicians who participated in a CME activity and comparing these responses with those obtained from a comparable group of physicians who did not receive the same education. CME providers have been challenged to find ways to accurately evaluate the impact of educational activities on physician performance and competency due to greater emphasis on high-level outcomes in the literature discussing adult learning. The ultimate endpoint is the impact of physician education on patient outcomes. Assessment of quality must ultimately rely on measures that are reliable, able to adequately control for case-mix variation, and preferably inexpensive. Case vignettes have gained considerable support for their value in predicting physician practice patterns. They are a valid and comprehensive approach for assessing a physician’s process of care in actual clinical practice, compared with standardized patients and chart review. Case vignettes...
are also more cost-effective and less invasive than other ways of measurement [17,18].

In this study, participants completed the case vignette surveys directly after the activity, thereby capturing immediate improvements in knowledge, competency, and intention to change practice behavior. Surveying participants weeks or months after an educational program is favored as a way for assessing long-term retention, along with evaluating performance change that occurred after physicians return to practice. We decided to collect completed surveys immediately after the activity to promote physician willingness to participate, but this may have resulted in an increase in the educational impact level. If physicians had been surveyed after return to practice, a different level of educational impact would be expected. Nevertheless, our data project an impact on physician behavior and strongly support the benefits of CME for improving physician willingness to participate, but this may have resulted in an increase in the educational impact level. If physicians had been surveyed after return to practice, a different level of educational impact would be expected. Nevertheless, our data project an impact on physician behavior and strongly support the benefits of CME for improving delivery of guideline-recommended patient care.

Our methodology may be limited by an imperfectly matched control group. Looking at the demographics data, there were similarities between the participants and non-participants, such as number of hypertensive patients seen per week (mean), specialty (internal medicine and family practice), practice location, and direct patient care activities. However, other potential key confounders, such as previous hypertension training and attitudes toward hypertension management, were not taken into consideration. Assessing participants prior to the activity and comparing pre-activity results with those obtained after the activity may have provided a more objective measure of educational impact. We preferred the methodology of comparing data from participants and matched nonparticipants because pre-and post-assessments are usually associated with a high attrition rate, which would complicate further analysis.

Finally, our survey allowed for assessment of perceived barriers to the optimal management of hypertensive patients. Physician reluctance to intensify therapy (clinical inertia) and low adherence to management strategies by patients were perceived as important barriers by both participants and non-participants. These findings highlight a need for education on these topics to empower healthcare providers to successfully overcome these barriers and provide optimal care. Additionally, awareness of the various barriers was greater among participants than non-participants, demonstrating the efficacy of CME for increasing awareness and impacting the physician’s ability to overcome barriers to optimal hypertension management.

ACKNOWLEDGMENTS

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