Resident Knowledge Acquisition During a Block Conference Series

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Objective: This study’s objective was to determine whether attendance at lectures in a block conference format improves residents’ knowledge. Methods: Seventeen family medicine residents were tested on the content of 27 lectures delivered in a block conference format over a 6-month period. For each lecture, residents completed a pretest, a short-term posttest, and a long-term posttest (1–3 weeks and 1.5–6 months after each lecture, respectively). Results: Mean short-term posttest scores were 10.3 points higher for lecture attendees than nonattendees. Mean long-term posttest scores did not differ significantly for attendees (62.2) versus nonattendees (60.0). Conclusions: Attendance at didactic lectures in a block conference format did not improve resident knowledge over the long term. These results lead us to question the value of a block conference format and raise the possibility that resident learning might be better served by maximizing clinical experiences and minimizing time in conferences.

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In 1999, the Accreditation Council for Graduate Medical Education (ACGME) began an initiative to improve residency education by focusing on the assessment of educational outcomes. As part of this process, they defined six competencies that all residents, regardless of specialty, must master. The competencies are in the areas of patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, and systems-based practice.

The ACGME defines the medical knowledge competency as follows: “Residents must demonstrate knowledge about established and evolving biomedical, clinical, and cognitive (eg, epidemiological and social-behavioral) sciences and the application of this knowledge to patient care.”

This competency reflects residency education’s time-honored role of transmitting state-of-the-art medical knowledge to residents.

Didactic lecturing in a conference format is one of the traditional methods used to teach medical knowledge to residents in all specialties. The new ACGME program requirements for family medicine require residencies to have “an educational rationale for use of conferences for the program.” A study by Hill et al on conference formats in family medicine residencies found that residencies commit an average of 4.5 hours per week to lectures. Sixty-three percent of residencies used noontime conferences for didactic lectures, making this the most popular conference format. Only 29% of programs concentrated their lectures into a half-day, block format. Despite this significant devotion of time to educational conferences, there is little evidence in the medical literature supporting the efficacy of didactic conferences in residency education.

We previously conducted a study in our residency program to test the benefit of noontime conferences on resident acquisition of medical knowledge. Our findings showed no correlation between noontime conference attendance and scores on long-term tests of lecture content. One hypothesis for this failure is that a lecture held at noontime, in the midst of a resident’s busy day, may be a less than optimal time for learning because residents may arrive late, be interrupted by pages, and
have difficulty transitioning rapidly from an active patient care role to a traditionally more-passive student role. A solution to these problems could potentially be found in a half-day block conference format, in which an extended block of time is devoted to conferences, and residents are relieved of clinical responsibilities to attend and focus on the conference.5

Our residency switched from daily noontime conferences to a weekly, half-day block conference format as a result of our noontime conference findings. The current study was conducted to test the hypothesis that attendance at lectures in a block format would lead to measurable improvements in residents’ long-term medical knowledge as evaluated by multiple-choice tests of lecture content.

Methods
This study was conducted at the JFK Family Medicine Residency Program, a suburban, community-based university-affiliated program, and the only primary care residency at JFK Medical Center, Edison, NJ. This study was approved by the Solaris Health System Institutional Review Board.

Beginning July 2003, our residency changed from a daily noontime 1-hour conference format to a once-weekly format, held Thursday afternoons from 1:30–5 pm. All residents were required to attend and were relieved of all clinical responsibilities during the conferences. The only exceptions to the attendance requirement were (1) the senior resident on the family medicine service rotation, (2) the first-year resident on the obstetrics rotation, and (3) residents absent from work because of illness, vacation, attendance at continuing education courses, or approved personal reasons.

Over a 6-month period from November 2003 through April 2004, we tested residents on the content of 27 lectures delivered by our family medicine faculty during the Thursday afternoon block conference time. Seven faculty members prepared and delivered the lectures, which were intended to convey clinical knowledge of various medical and psychosocial topics.

Seventeen residents (seven PGY-1, four PGY-2, and six PGY-3) participated in the study. For every conference in the study, residents were given a pretest immediately prior to the lecture, a short-term posttest 1–3 weeks later, and a long-term posttest 1.5–6 months after each lecture.

To avoid recall bias potentially created by residents seeing the same test items repeatedly, a total of 15 different multiple-choice questions were used for each conference. These 15 questions were randomly distributed to create a pretest, a short-term posttest, and a long-term posttest, each consisting of five questions.

The majority of the test questions were taken from previously published sources such as the American Board of Family Medicine In-training Exams and the Core Content Review of Family Medicine.6 When necessary, additional test items were written by the faculty member presenting the relevant conference and reviewed by one of the study’s authors for content and clarity. All tests were given in the same conference room where the lectures were held and were proctored by a faculty member.

Resident attendance was recorded for each conference. Because residents could be absent if they were post call, sick, or away on vacation, personal, or continuing medical education time, or the PGY-3 resident on the JFK family medicine service rotation or PGY-1 on the obstetrics rotation, a variable cohort of residents made up the nonattendees for each lecture. Residents who were not present for a test were administered the test as soon as possible after each conference.

Data Analysis
Mean test scores for attendees versus nonattendees, as well as for residents by PGY level, were compared using paired sample t tests. A general linear multivariate analysis of variance (MANOVA) was performed to determine if conference attendance and PGY level had an effect on test scores. Follow-up ANOVA testing was performed to assess effect of PGY level on pretest, short-term posttest, and long-term posttest scores. Tukey’s honestly significant difference (HSD) post hoc comparison test was also used to assess for differences in test scores based on conference attendance and PGY level. Three separate multiple regression analyses, one for each test type, were also conducted using conference attendance and PGY level as variables.

For the purpose of assessing power in this study, “G Power” computer software was used for post hoc analysis (Faul and Erdfelder, 1992). Results indicated our study had an observed power of 0.80 to detect a difference of 5.5 points and a power of 0.99 to discern a 9.7 point difference in test scores.

Results
Mean test scores, as well as short-term and long-term change in scores, are presented in Table 1. The short-term change in score for attendees (13.6) was 10.3 points higher than for nonattendees (3.1) (P ≤ .001). The long-term change in score for attendees (8.0), however, did not differ significantly from that for nonattendees (5.6) (P = .70).

Results for all residents (attendees and nonattendees combined) by PGY level are presented in Table 2. MANOVA analysis indicated significant effects on test scores for both PGY level (Wilks’ λ, F [6,902] = 3.3, P < .003) and conference attendance (Wilks’ λ, F [6,451] = 4.35, P < .005). Follow-up ANOVA tests revealed that PGY level had an effect on pretest (F [2,453] = 5.2, P = .006), and long-term posttest scores (F [2,453] = 5.0, P = .007) but not on short-term posttest...
Table 1

Effect of Attendance on Test Scores

<table>
<thead>
<tr>
<th></th>
<th>Attendees</th>
<th>Nonattendees</th>
<th>Attendees—Nonattendees</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest score</td>
<td>54.2 (26.2)</td>
<td>54.4 (25.3)</td>
<td>-0.2</td>
<td>.972</td>
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<tr>
<td>Short-term posttest score</td>
<td>67.8 (22.3)</td>
<td>57.5 (22.7)</td>
<td>10.3</td>
<td>.001</td>
</tr>
<tr>
<td>Short-term change in score</td>
<td>13.6</td>
<td>3.1</td>
<td>10.5</td>
<td>.001</td>
</tr>
<tr>
<td>Long-term posttest score</td>
<td>62.2 (24.2)</td>
<td>60.0 (26.3)</td>
<td>2.2</td>
<td>.752</td>
</tr>
<tr>
<td>Long-term change in score</td>
<td>8.0</td>
<td>5.6</td>
<td>2.4</td>
<td>.700</td>
</tr>
</tbody>
</table>

Table 2

Test Scores by PGY Level for All Residents (Both Attendees and Nonattendees)

<table>
<thead>
<tr>
<th>PGY Level</th>
<th>Pretest Score Mean (SD)</th>
<th>Short-term Posttest Score Mean (SD)</th>
<th>Long-term Posttest Score Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pretest &lt; short-term posttest***</td>
<td>Short-term posttest &gt; long-term posttest*</td>
<td></td>
</tr>
<tr>
<td>PGY-1</td>
<td>52.1 (25.0)</td>
<td>61.5 (24.2)</td>
<td>57.1 (25.2)</td>
</tr>
<tr>
<td>PGY-2</td>
<td>50.6 (25.1)</td>
<td>63.7 (21.3)</td>
<td>57.0 (24.9)</td>
</tr>
<tr>
<td>PGY-3</td>
<td>60.2 (25.6)</td>
<td>66.5 (21.9)</td>
<td>65.4 (24.2)</td>
</tr>
</tbody>
</table>

PGY-1 residents Pretest < short-term posttest***
Pretest < long-term posttest*
Short-term posttest > long-term posttest*

PGY-2 Residents Pretest < short-term posttest***
Pretest < long-term posttest**
Short-term posttest > long-term posttest*

PGY-3 Residents Pretest < short-term posttest***
Pretest < long-term posttest*
Short-term posttest > long-term posttest

* p < .05
** p < .01
*** p < .001
scores ($P=.148$). Tukey’s HSD post hoc comparison test indicated that PGY-3 residents scored significantly higher on pretests ($P=.004$) and long-term posttests ($P=.006$) than PGY-1 residents. Additionally, conference attendance was shown to affect short-term posttest scores ($F[1,453]=10.9$, $P≤.001$) but not pretest ($P=.943$) or long-term posttest scores ($P=.70$).

The first of the three regression analyses indicated that PGY level was predictive of scores on the pretest ($β=.144$, $T=3.1$, $P=.002$). That is, more senior residents scored higher on the pretest compared to their junior colleagues. This analysis also showed that conference attendance was not predictive of pretest scores ($P=.758$) (i.e., attendees and nonattendees had comparable pretest scores). The second regression analysis indicated that both PGY level ($β=.174$, $T=3.7$, $P≤.001$) and conference attendance ($β=.101$, $T=2.1$, $P=.029$) were predictive of scores on the short-term posttest (i.e., more senior residents who attended the conferences scored significantly higher on short-term posttests than more junior residents who did not attend). The third regression analysis showed that PGY level was predictive of long-term posttest score ($β=.142$, $T=3.0$, $P=.002$), but conference attendance was not ($P=.96$).

**Discussion**

Dreyfus describes a five-stage model of knowledge and skill acquisition that is relevant for educating and training physicians. In this model, learners start as novices, and as they acquire basic knowledge and skills, progress to become advanced beginners. With more experience and practice in applying their knowledge to different contexts as well as with increasing responsibility, students grow to become competent, then proficient, and finally expert. A student enters medical school as a novice and graduates at the level of advanced beginner. Residency programs have the task of developing advanced beginners into competent physicians. The ACGME’s six general competencies help structure residency education and promote the development of competent physicians.

Epstein and Hundert expanded on the ACGME’s competencies in their article “Defining and Assessing Professional Competence.” They propose that professional competence is “the habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values, and reflection in daily practice for the benefit of the individual and community served.”

They describe how each component of competence is assessed on four levels: knows, knows how, shows how, and does. The knows level consists of the basic ability to recall facts. Their analysis of the literature on assessing professional competence found multiple-choice questions to be a reliable way to evaluate factual knowledge and basic problem-solving skills.

We used multiple-choice questions to test our residents’ knowledge at the “knows” level about the content of 27 conferences presented in a block conference format over a 6-month period and were unable to demonstrate any effect of conference attendance on long-term knowledge acquisition. This result is consistent with a previous study we conducted of hour-long noontime conferences, which also showed no correlation between conference attendance and long-term test scores. The current study does not support the block conference format as a more-beneficial learning experience than a noontime conference series.

It is interesting to note that posttest scores (both short term and long term) were higher than pretest scores for all groups (both attendees and nonattendees and for each PGY level).

One hypothesis to explain these findings and that can explain a lack of difference between attendees and nonattendees is that knowledge gained by attendees in conference could have been disseminated to nonattendees via informal communication in clinical or social settings. Another hypothesis is that the higher posttest scores simply reflected knowledge gained over time by all residents from experiences on clinical rotations. This second hypothesis seems more consistent with the progressive increase in scores from pretest to short-term posttest, to long-term posttest scores in nonattendees. It is further supported by the effect of level of resident training on test scores.

An explanation for the more marked increase in short-term posttest scores for attendees could be a “booster effect” of the lecture, followed by a decline in long-term posttest scores as the “booster” wore off. It is possible that multiple boosters on the same topic might lead to improved long-term knowledge retention for that subject. Residencies may want to consider narrowing the breadth of lectures they teach and repeating selected important topics to take advantage of this potential booster effect.

Despite the requirement that educational conferences be provided in family medicine residencies, review of the literature does not reveal any studies of family medicine residents that demonstrate long-term knowledge gain as a result of conference attendance. Several studies of residents in various specialties, including family medicine, reported short-term knowledge improvement after specific educational interventions. Consistent with this literature, our current study also shows short-term knowledge gain attributable to conference attendance. For knowledge gain to be meaningful, however, there must be long-term retention of that knowledge. The only two studies of family medicine residents that tested long-term (up to 6 months) knowledge improvement following lectures failed to show any effect.

Few studies in other specialties have incorporated long-term tests of knowledge acquisition. Of these,
only three showed sustained improvement attributable to lecture attendance.\textsuperscript{15-17} The surgery and radiology literature does suggest efficacy of resident-prepared conferences in enhancing long-term knowledge.\textsuperscript{17,19} The largest body of literature examining effectiveness of formal conferences consists of studies of continuing medical education (CME). These studies repeatedly show that purely didactic CME sessions have no discernable impact on physician behavior.\textsuperscript{20-25}

Limitations
This study has several limitations. First, it represents the experience of only one residency. Our program is fairly typical of family medicine residencies, however, based on our program’s 2003 ABFM in-training composite score of 490 (45th percentile) and being a community-based, university-affiliated program. Given our program’s limited size, randomization of residents was not practical, but our use of pretests and statistical analysis showing a lack of correlation between attendance status and pretest scores help to compensate for this limitation. Additionally, the relatively small number of questions on each test may have limited our ability to fully assess residents’ knowledge.

Another limitation is that this study attempts to assess only one dimension of knowledge, i.e., the kind of factual knowledge that can be assessed by choosing the correct answer on a multiple-choice question. We did not address the efficacy of lectures in changing residents’ analytical abilities, attitudes, or application of knowledge.

This study also was not designed to assess possible nonacademic benefits of lectures, such as resident socialization and faculty role-modeling. While these nonacademic benefits are potentially very important, analyzing them would require a study design and measurement techniques that go beyond the scope of one residency program. Therefore, we chose to focus on measuring factual knowledge that could be assessed with multiple-choice questions because this is a validated assessment tool readily available to all residencies.

Conclusions
Despite these limitations, our study has significant implications for family medicine education at a time when the discipline is rethinking the structure of its residency training based on the Future of Family Medicine project and the new Preparing the Personal Physician for Practice (P4) initiative.\textsuperscript{26,27} It raises the possibility that residents’ learning might be better served by maximizing clinical experiences and minimizing time spent in conferences. Especially in the setting of ACGME duty hour requirements, the value of devoting an entire half day per week or every noontime to conferences needs to be scrutinized.

Existing literature suggests that if conferences are to be included in residency curriculum, they will be most effective when they are resident prepared, case-based, interactive, and use a combination of teaching modalities. Additional research is needed to further identify the most efficacious teaching methods and learning experiences that will help promote the development of competent family physicians.

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References


