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*Original Article*

# Workshop versus Lecture in CME: Does Physician Learning Method Preference Make a Difference?

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**Abstract:** *Is learning enhanced when the continuing medical education (CME) intervention corresponds to the physician's preferred learning method? Eighty-eight primary care community-based physicians were involved in this study. Each physician attended one of three 2-day CME programs based on a needs assessment of community-based primary care physicians. Each program consisted of both plenary lectures and workshops. Learning method preference and demographic profile were captured by an individual electronic touch pad that allowed each physician's responses to be uniquely identified by the system. A pre- and post-test for each workshop and each lecture was carried out. Responses were noted via touch pad. Mean test score improvement occurred for each intervention and was statistically significant for 12 of 14 interventions. Mean test score improvements for workshops and for lectures were not different. Mean test score improvements were not affected by physician learning method preference. These results are not explained by gender, year of graduation, or rural/urban differences of physicians. Contrary to our hypothesis, our data suggest that physicians do not necessarily learn more when the type of CME intervention is concordant with their preferred learning methods. Further, workshops, small groups, and other interactive CME activities may not always be more effective than didactic methods such as lectures. Further study is warranted. In the meantime, it may be more efficient for CME teachers and providers to use methods with which they are comfortable or that they consider more appropriate to the content.*

**Key Words:** Continuing medical education (CME), didactic versus interactive, electronic touch pad, intervention study, knowledge outcome, lecture versus workshop, multiple choice questionnaire, physician learning method preference, post-test, pretest

With the continuing medical education (CME) trend toward self-directed learning comes the assumption that the physician will learn best when the type of CME intervention matches his preferred learning method. A large body of literature takes

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this view, but no studies of the educational or clinical impact of learning method preference on the effectiveness of various types of CME intervention could be found. There is some data on learning style, but this is quite distinct from learning method preference.[1,2] Further, none show clear correlations with learning outcomes. Some studies of the relationship of learning style to instructional preference have been undertaken, but no CME intervention was tested.[2–8] Curry and Putnam hypothesize that "Presumably a match between an individual's learning style and the program of learning would result in less frustration and more efficient learning."[9] For physician learners, controlled studies have not yet been carried out so the effect of learning method preference on physician learning remains unknown.

Further, interactive approaches in CME are thought to be more effective than didactic interventions in physician education. As adult learners, physicians may wish to be involved in their own learning.[10] However, in a survey of 700 Canadian family physicians, Jennett and Swanson note that only 25% as yet perceive practice-based CME as superior to traditional (often didactic) CME.[11]

Intervention studies with new knowledge skills or attitudes as outcome variables are few and far between and have design flaws that make generalizability questionable. Wade and Kaminski found that surgical residents engaged in independent study were more likely to perform well at board examinations, but this study had no controlled intervention.[12] Wensing and Grol carried out a meta-analysis of 75 studies of strategies to improve care provided by general practitioners and found no difference between group education, written materials, and reminders.[13] Davis et al., in an extensive search of over 6000 papers, found only 99 CME studies meeting the criterion of randomized controlled trial.[14] Of these 99, only two studied learning outcomes by comparing discrete CME methods.[15,16] Of these two, only one addressed problem-based learning versus didactic CME; however, a high dropout rate, failure to carry out crossover evaluation, and other methodological problems rendered their results inconclusive.[15] So, no controlled study of interactive versus didactic CME addressing the same educational endpoints in a controlled environment has been undertaken. Learning outcomes along the didactic–interactive continuum remain relatively unexplored in CME; the impact of physician learning preference on effectiveness of didactic and interactive CME likewise remains unknown.

CME providers need hard data to know what factors facilitate physician learning. Hence, the following study was carried out to determine if physicians learn best when the type of CME intervention is concordant with preferred learning method.

## Methods

### CME Program

Based on a needs assessment of community-based primary care physicians, three 2-day CME programs were developed by a panel of family physicians and specialists. Clinical cases to be used in the CME programs were developed by the family physicians. To validate the cases, a pilot program was carried out for 10 additional family physicians in the spirit of peer review. On the basis of their feedback, the cases were revised and the pilot program was repeated with these same 10 participants.

Each of the three final programs consisted of both plenary lectures and workshops. The workshops of each program were carried out in a sequence corresponding to a patient's clinical evolution and presentation to the physician over time. Each workshop had two leaders: a family physician facilitator and a consultant resource person. Each workshop consisted primarily of participant interaction concerning the clinical case at hand, in discussion groups of six to eight attendees followed by discussions with the two workshop leaders. The plenary lectures were presented between workshops and dealt with the same topic. Each plenary lecture was presented before or after the workshop to which the clinical case and

educational points corresponded. The lecturer was the consultant resource person. Minimal participant interaction was allowed for during the plenary lectures.

### Study Population and Data Collection

A total of 88 primary care community-based physicians attended one of the three CME programs. Demographic profile and learning method preference were captured by an individual electronic touch pad that allowed each physician's responses to be uniquely identified by the system. Learning method preference choices were limited to workshop or lecture.

Multiple-choice questionnaires reflecting intended educational points were designed for each workshop and lecture. These were administered as pre- and post-tests using the computerized audience response system. The audience response system was not used as an interactive tool during the experiment. Educational points were made clear during workshops and lectures but test results and summary responses were not provided to the audience. Furthermore, lecturers, workshop leaders, and researchers remained blind to responses until the experiment was complete.

### Study Design

Preferred learning method (lecture or workshop) was treated as a predictive variable. Pre- to post-test score improvement was treated as the outcome variable. Gender, year of graduation, and rural/urban practice were also tested for association with test score improvement and with preferred learning method.

### Statistical Analysis

Data collected through the touch pads immediately before and after each session were printed and re-entered into a dBASE file and analyzed using SPSS-PC+. Mean scores were calculated for the pre- and post-test. Differences between pre- and postsession scores were tested by the Wilcoxon matched-pairs signed-ranks test. Analyses of variance were conducted to evaluate differences in the main outcome (improvement in score) both for workshops and lectures and the potential impact of variables, such as gender, year of graduation, place of practice, and preference of method of learning.

Because the maximum possible score to be obtained varied from one session to another, improvement in scores was taken as the percentage increase in the post-test score above that of the pretest score. The choice of the statistic (Wilcoxon test) was also based on the fact that the maximum possible score was low (4) for most sessions.

### Limitations of the Study

Pre- to post-test differences reflect immediate learning only. Subsequent effects on physician performance and patient outcomes were not determined. Only two types of CME interventions were studied and a small number of physicians were studied. Further, since only a few questions were used for each pre- and post-test, ceiling and/or floor effects could have limited the apparent knowledge gained.

## Results

A total of 88 subjects were enrolled. There were three times as many male doctors attending the sessions as there were female doctors, 75% and 25%, respectively. Fifty-six percent of physicians had graduated in the past 20 years, 52% of all participants practiced in an urban center, and 54% cited workshop as their preferred method of learning. These proportions remained fairly constant across programs.

Complete pre- and post-test data were available for 66 subjects, who did not differ from the 88 attendees. The mean post-test score was higher than the mean pretest score, that is, knowledge was gained after each intervention. This difference was statistically significant for all but two interventions (Table 1).

**Table 1 Mean Scores Obtained by Participants in the Pre- and Post-tests for Each Intervention**

| CME | | (N) | MPS* | Pretest Mean | Pretest (SD) | Post-test Mean | Post-test (SD) | p Value† |
|---|---|---|---|---|---|---|---|---|
| *Program 1* | | | | | | | | |
| Workshop | 1 | 21 | 4 | 1.6 | (1.0) | 3.1 | (0.9) | .0003 |
| | 2 | 26 | 4 | 1.5 | (0.8) | 1.6 | (0.9) | .4 |
| | 3 | 25 | 4 | 1.3 | (0.7) | 2.6 | (1.1) | .0003 |
| | 4 | 24 | 4 | 0.8 | (1.0) | 1.5 | (0.9) | .01 |
| Lecture | 1 | 25 | 4 | 1.6 | (1.0) | 3.1 | (0.9) | .0001 |
| | 2 | 25 | 3 | 0.3 | (0.5) | 0.5 | (0.7) | .2 |
| *Program 2* | | | | | | | | |
| Workshop | 1 | 19 | 12 | 8.2 | (1.2) | 10.3 | (1.3) | .0004 |
| | 2 | 16 | 7 | 2.4 | (1.2) | 5.1 | (0.9) | .0004 |
| Lecture | 1 | 18 | 10 | 5.1 | (1.3) | 6.1 | (1.9) | .04 |
| | 2 | 16 | 4 | 1.0 | (1.2) | 2.7 | (1.1) | .001 |
| | 3 | 20 | 4 | 2.0 | (1.1) | 3.1 | (1.1) | .006 |
| *Program 3* | | | | | | | | |
| Workshop | 1 | 21 | 10 | 4.3 | (1.6) | 6.8 | (2.0) | .0006 |
| Lecture | 1 | 20 | 4 | 2.0 | (0.8) | 3.0 | (0.9) | .002 |
| | 2 | 20 | 5 | 2.2 | (1.0) | 4.2 | (0.9) | .0003 |

*MPS = maximum possible scores. †Differences tested by the Wilcoxon matched-pairs signed-ranks test.

Improvement in score was measured by taking the percentage increase over the pretest level.

**Table 2 Mean Percent Score Gained (Post-test Minus Pretest Score)* by Type of Intervention**

| CME | Mean % Gained | % SD | p Value† |
|---|---|---|---|
| *Program 1 (N = 26)* | | | |
| Workshops | 29.3 | 26.5 | .2 |
| Lectures | 23.6 | 20.4 | |
| *Program 2 (N = 18)* | | | |
| Workshops | 26.1 | 13.6 | .9 |
| Lectures | 28.0 | 20.6 | |
| *Program 3 (N = 20)* | | | |
| Workshops | 25.2 | 22.9 | .5 |
| Lectures | 32.1 | 21.8 | |

*Mean gain is calculated as the percentage of the maximum possible score represented by the difference of the post-test score minus the pretest score. †Differences tested by the Wilcoxon signed-ranks test.

Immediate mean knowledge gain ranged from 23.6% and 32.1% for all interventions. Within each program, mean knowledge gain did not differ by learning method (p = .2, .9, and .5, respectively). Across programs, the range of mean knowledge gained after workshops (between 25.2% and 29.3%) was not significantly different from that obtained after lectures (23.6% to 32.1%) (Table 2).

The overall percent improvement for all workshops (29.3%) was not significantly different from that for all lectures (27.6%; p = .4). Furthermore, physicians did *not* learn more when attending their preferred type of CME intervention than they learned when attending other CME sessions (Table 3). These results are not explained by gender, year of graduation, or rural/urban differences of physicians.

More recent graduates gained more knowledge than their counterparts after attending workshops (38.1% vs 21.9%; p = .03). Recent graduates also gained more knowledge, on average, after

**Table 3 Mean Percent Score Gained by Type of Intervention and by Learning Method Preference**

| | Workshop | Lecture | |
|---|---|---|---|
| **Variables** | **Mean % Gained** | **Mean % Gained** | **p Value*** |
| Overall % score gained | 29.3 | 27.6 | .4 |
| Preference | | | |
| Workshop | 28.9 | 25.6 | .3 |
| Lecture | 29.9 | 29.8 | .9 |

*Differences tested by the Wilcoxon signed-ranks test.

attending workshops than after attending lectures (38.1% vs 27.3%; p = .04). However, stratification of this variable showed that preferred method of learning does not change the level of improvement in knowledge.

The same results were obtained when knowledge gain was studied as categories of "no improvement" (zero gain) compared to "any improvement" and as categories of low level of improvement (at most 49%) and high level of improvement (at least 50%). Further, results were unaffected by pretest score, order of intervention (workshop or lecture first), and difficulty or complexity of the clinical cases studied. Physicians did not gain more knowledge after attending CME interventions corresponding to their preferred learning method.

## Discussion

In this study, all interventions resulted in increased scores, and there was no difference in the degree of improvement following workshops or lectures. Contrary to our hypothesis, our data suggest that physicians do not necessarily learn more when the type of CME intervention is concordant with preferred learning methods.

It is interesting that almost all interventions led to improvement in test score, regardless of method. Certainly, the CME trainers were experienced. Further, the physicians may have had their attention stimulated by the novelty of the touch pad at pretest, or by the expectation of a post-test. In their careful review of educational strategies, Davis et al. suggested that formal CME activities had little impact on physician performance or health care outcome, in the absence of enabling or practice reinforcing strategies.[14] However, meta-analysis imposes the study design limitation that particular formal CME activities could not be further broken out, as our intervention study permitted us to do. Our study shows that formal CME has a positive effect on *immediate learning*. The longer term effects of immediate learning on the cascade of learning—retention, assimilation, change in practice, and change in patient outcomes—remain unknown.

It is noteworthy that the amount of improvement in test scores obtained after workshops did not differ from those obtained in lecture; interactive and didactic approaches were equally effective. Interactive methods have long been purported to be more effective than didactic methods.[17–21] Foley and Smilansky state unequivocally that small groups are more effective than large, that discussions are more effective than lectures, and that student-centered learning is more effective than instructor centered for the goals of retention, application, and problem solving.[22] However, no experimental data with adequate control groups could be found to show that lectures may be less effective CME interventions than workshops. Other intervention studies are confined to comparing educational intervention to intervention plus follow-up; in this case, the key element could be the number of educational interventions carried out, rather than their nature.[13,23] It could be argued that the audience response system rendered both types of intervention interactive and blurred the difference between workshop and

lecture in our study. We think this unlikely since, as was stated in methods, the touch pad was never used during any lecture or workshop, and since audience response remained unknown to lecturers, workshop leaders, and audience alike. It could be argued that results of a study of only two methods and few subjects is not conclusive and that further study is merited. Here, the authors would agree.

Most importantly, we found that physicians did not necessarily learn more when the type of CME intervention was concordant with their preferred learning methods. The CME literature often cautions us to take into account learning preferences and learning styles when planning educational interventions. However, no previously published intervention studies concerning learning method preferences and performance of individual learners across more than one CME method could be found. Ward may be on the right track when she states, "Unfortunately, some adult-learning theorists have created a pretext for learning that seems more akin to the self-actualization of humanist psychology than it does to education or training. Such orientations are inappropriate for continuing medical education which functions to foster learning of a professional nature rather than a personal nature."[24]

It is possible, of course, that the level of educational need of our study population was intense, and that learning was stimulated by a steep learning curve regardless of preference. This explanation seems less likely when we consider the finding that pretest scores did not predict learning, but this may have been due to the narrow range of scores. It is also possible that physicians in general or these particular physician study subjects were highly motivated learners regardless of learning method. However, we do not see how the selection of our study subjects differs from that of other studies of continuing education for physicians.

## Implications of the Study

Our findings add to the literature in that we studied clear learning outcome measures in a controlled intervention trial. Workshops, small groups, and other interactive CME are more expensive and time consuming than didactic methods such as lectures, and have not been shown to be more effective. CME providers should reassess present assumptions that workshops are always better and continue to search for other factors that enhance learning. It may be more efficient for teachers and CME providers to use methods with which they feel more comfortable and that they feel are more appropriate to the content. Further, some CME accreditation standards give more weight to interactive activities[25,26] as they are thought to be more effective. Our study suggests that this practice bears further examination.

Finally, *preferred* learning method may not be the most *effective* for an individual physician. It is not known to what degree the physician selects CME based on learning method preferences. If physicians were more aware of their most *effective* learning method, they might make CME choices accordingly.

## Conclusion

In this study, all interventions resulted in increased scores, and there was no difference in the degree of improvement following workshops or lectures. Contrary to our hypothesis, our data suggest that physicians do not necessarily learn more when the type of CME intervention is concordant with preferred learning methods. Workshops, small groups, and other interactive CME activities are more expensive and time consuming than didactic methods such as lectures and may not be more effective. Factors other than learning method preference and type of CME intervention may have a more important impact on learning (e.g., topic, provider, convenience, and collegiality may play a role). It is not known to what degree improved test scores lead to better clinical practice and improved health outcomes. Further study is required to determine if physician selection of CME intervention would be influenced by self-knowledge of the most *effective* personal learning method. CME planners

could provide physicians with individual assessment and advice.

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