

Effect of a Unit of Continuing Education on Pharmacists' Knowledge and Reported Practice

Mickey C. Smith
Jack E. Fincham

INTRODUCTION

This paper reports the results of a project that relates to two professional issues facing contemporary pharmacy: smoking and continuing education (CE).

Smoking and the sale of tobacco products are both relevant considerations for practicing pharmacists. It is obvious that the former is a personal health issue. The sale of tobacco products adds economic, ethical, and health concerns as well. Many pharmacists still smoke, and many more (perhaps most) community pharmacists continue to sell these commodities. There has been plenty of encouragement to pharmacists to stop selling cigarettes and other tobacco products. An example is the 1985 public policy statement of the American Public Health Association, in which the association,

Mickey C. Smith, Ph.D., is Assistant Director of the Bureau of Pharmaceutical Services, School of Pharmacy, University, MS 38677. Jack E. Fincham, Ph.D., is Acting Dean of the School of Pharmacy, Samford University, Birmingham, AL 35229.

Recognizing that cigarette smoking continues to be one of the leading causes of death and disability; and

Recognizing that many pharmacies and other health facilities continue to contribute to the spread of this problem by selling cigarettes; and

Noting that APhA has previously urged hospitals, health facilities, and educational institutions to discontinue the sale of cigarettes and to remove cigarette vending machines from their premises (1969), and has also urged a smoke-free society (1983), and further noting that the American Hospital Association (AHA) has passed a resolution recommending discontinuation of sales of cigarettes in hospitals; and

Acknowledging that legislation to control smoking has been shown to promote an environment in which smoking is considered to be unacceptable social behavior; therefore

1. Asks pharmacists and pharmacies to discontinue selling cigarettes;
2. Urges hospitals, health facilities, health professional schools, and pharmacies to prohibit smoking on their premises except in designated areas;
3. Urges state and local legislative bodies to enact legislation to restrict smoking in places where the public gathers (1).

There are also state laws regulating the sale of tobacco products to minors. Of course, these laws are rarely enforced. If they were, we would not find that more than half of the high school seniors who report daily smoking began smoking by the age of 14! But this situation can change. One recent experiment in California found that more than 80% of a sample of pharmacies sold cigarettes to minors engaged in the study as trained shoppers. After a series of educational interventions, this figure was reduced to about 40% in a second encounter (2). This number is still too high, but it is an improvement. In an editorial in *JAMA* commenting on this study, Dr. Donald Greydanus issued a warning: "Those who contribute to children's tobacco and drug use should be punished with costly penalties, and strict enforcement should be ensured. . . . Cigarettes,

alcohol and other drugs should not be sold to our children" (3)!

What about the obligation of affirmative action? Pharmacists in the California study commented that it was up to the patient to decide on the hazards of cigarette smoking, but they noted that pharmacists have a professional obligation to warn patients about the health dangers of smoking, among them the potential of interaction between the patients' medications and smoking.

Continuing education is a somewhat different issue. It is now required for relicensure by the majority of states, but clearly it is a professional responsibility, as evidenced by these words in the American Pharmaceutical Association Code of Ethics: "A pharmacist should always strive to perfect and enlarge professional knowledge. A pharmacist should utilize and make available this knowledge as may be required in accordance with the best professional judgement."

For better or worse, most pharmacists are forced to engage in some form of continuing education on a regular basis. Do they apply the new knowledge in practice? Nona, Kenny, and Johnson, in a comprehensive review of the literature of continuing education in the health professions, have identified the evidence available to answer those questions (4). They cite five studies showing continuing education activities improving the knowledge of pharmacy practitioners. They also found six studies of the effect of such programs on performance. In three of these studies, the programs were judged effective; in two cases, mixed; and in one, ineffective.

In this paper, we present evidence of effectiveness in another project as reported by the pharmacists who participated.

METHODS

In 1988, *Today's Therapeutic Trends* published the edited transcript of a panel discussion on the role of the pharmacist in smoking cessation (5). The publication included materials on smoking-drug interactions, motivating techniques to aid the patient in smoking cessation, and compliance counseling. The publication, containing CE objectives and 11 multiple-choice questions, was issued in booklet form for use by pharmacists. Pharmacists could obtain one hour of CE credit upon submission of an answer sheet containing at

least eight correct answers to the eleven questions posed. The booklet was distributed at pharmacy meetings, by mail request, and by the field staff of Lakeside Pharmaceuticals. Pharmacists could participate in the program by completing the answer sheet and submitting it by mail to the University of Mississippi Bureau of Pharmaceutical Services for grading.

A questionnaire was prepared and mailed to the first 500 pharmacists who submitted a test for grading. The questionnaire was mailed six months after the CE answer sheet was received at the Bureau of Pharmaceutical Services. The questionnaire was based on three learning objectives, as stated in the booklet. Respondents were asked if they had learned certain information and whether they used the new knowledge in practice. Respondents were also asked if they smoked and if the pharmacy in which they practiced sold cigarettes. Information about the age and sex of the respondent, size of the town, sales volume, distribution of sales among prescription and nonprescription drugs, and whether the practice site was a chain or independent pharmacy was also gathered.

Statistical analysis of the data was accomplished through a stepwise discriminant analysis. There were two groups in the discriminant analysis: the pharmacists who indicated they had changed their approach to counseling patients about their use of nicotine polacrilex gum as a result of the CE program and those who had not. Analyzing how the two groups vary allows one to determine whether CE programs might be planned and implemented to affect the counseling behavior of pharmacists.

The Rao's V method of discriminant analysis was used. The Rao's V method of variable inclusion is based upon a generalized distance measure. The variable producing the largest discrimination between group centroids is selected first (6). The next variable added is the one that when added to the previous variable(s) contributes most to an increase in V . When there are many cases, the change in V has a chi-square distribution with one degree of freedom so that it can be tested for statistical significance.

The discriminant analysis was carried out using the following independent variables as possible candidates for inclusion: the seven questions listed in Table 1, sex, age (broken into a median split of less than 50 years and over 50 years), pharmacy type (com-

TABLE 1. Knowledge Variables and Respondents' Responses

Question	Responding Yes (%)
Did you learn about serious interactions between smoking and any medication?	94.3
Have you told any of your smoker/patients of the danger of such interactions?	62.2
Have you taken any steps to have a smoker/patient's medication changed because of potential interactions?	14.3
Did you learn new information about which are the more effective methods of encouraging smoking cessation?	91.3
Have you informed any of your patients about one or more of these methods?	74.3
Have you employed any of these methods to help a specific patient?	42.3
Did you learn new information about the way nicotine-containing gum should be used in order to be effective?	81.7

munity or chain), population of community (less than 50,000 and greater than 50,000), and annual sales volume of the pharmacy (less than \$750,000 and greater than \$749,999). Multicollinearity was not a problem with the variables because none of the independent variables was intercorrelated with an absolute value of r greater than 0.504; as such, all variables were included in the analysis.

Evaluation of the results of the discriminant analysis was accomplished by scrutinizing the canonical correlation, by examining the measures of the residual discrimination, and by examining the ability of the discriminant function to correctly classify the two groups. The canonical correlation (r^*) measures the association between groups and the discriminant function. The canonical correlation squared is the proportion of variation in the discriminant function that can be explained by the study groups (7). Wilks's lambda can be converted into an approximation of chi-square to determine the significance of the residual discrimination (7). By examining the percentage of correctly classified cases, one can ascertain the predictive ability of the discriminant function to separate the two groups.

RESULTS

Table 2 provides a description of the characteristics of the respondents. There were 225 completed returns for a 45% response rate. Most respondents were nonsmokers (89.1%); however, a large segment practiced in pharmacies where cigarettes are sold (69.1%). Table 2 shows the tabulation of responses to the questions involving knowledge gained and actions taken "as a result of . . . study of the booklet." (These words were part of the instructions for completing the questionnaire.)

The percentage of respondents who reported learning from the material ranged from 81.7% to 94.3%. A majority indicated that they had told one or more patients about interactions, but few had attempted to change a medication for that reason. Three-fourths had told patients about effective methods of smoking cessation, but less than half had employed such a method in helping a patient. Most

TABLE 2. Demographics of the Study Sample*

Demographic	Percentage
Sex	
Male	60.9
Female	32.6
Not reported	6.5
Age	
20-29	28.7
30-39	30.9
40-49	16.0
50-59	17.0
60+	7.4
Pharmacy Type	
Independent	16.5
Chain	73.5
Other	10.0
Population Size of Practice Site	
< 5,000	2.2
5,000 - 14,999	9.1
15,000 - 24,999	12.2
25,000 - 49,999	17.0
50,000 - 99,999	19.1
100,000 +	37.8
Not reported	2.6
Annual Sales Volume (\$)	
< 200,000	5.7
200,000 - 399,999	6.5
400,000 - 599,999	17.0
600,000 - 749,000	12.2
750,000 - 999,999	12.2
1,000,000 +	30.4
Not reported	16.1

TABLE 2 (continued)

Demographic	Percentage
Proportion of Sales (mean) [†]	
Prescription drugs	58.2
OTC drugs	21.8
Other	29.6

*Total sample size = 225

†Total does not equal 110% due to missing values and individual variance.

had changed their approach to counseling patients who use nicotine polacrilex gum.

In addition to the discriminant analysis, a series of chi-square analyses was performed to assess the relationship between question responses and the demographic/practice variables. Several statistically significant relationships were found (all at the $p < 0.05$ level of significance):

- Male pharmacists and older (over 40) pharmacists were more likely to have told patients about the dangers of interactions.
- Male pharmacists and pharmacists practicing in independent pharmacies were more likely to have taken steps to change a medication because of potential interactions.
- Pharmacists practicing in chains were more likely to report a change in approach to counseling patients receiving nicotine polacrilex gum.

The results of the discriminant analysis are presented in Table 3. Six steps were required to reach the maximum discrimination possible. Of these six steps, five produced a statistically significant change in Rao's V ($p < 0.05$). These five variables were learning of new information from the CE program, the type of pharmacy, sale of cigarettes in the pharmacy, having informed patients of smoking cessation methods, and taking any steps to have a smoker's/patient's medication changed because of potential interaction. These

results indicated, for the most part, that those pharmacists who stated they had changed their counseling behavior related to nicotine polacrilex gum were employed in a chain pharmacy, had learned new information in the CE program, had cigarettes for sale in their pharmacies, had informed patients of smoking cessation methods, and had not taken any steps to have a smoker's/patient's medication changed because of potential interactions.

The remaining step (informing smokers/patients of the danger of drug-smoking interactions), although assuring significant separation of the groups, did not result in a significant change in Rao's V . Because there were two groups in the analysis, only one discriminant function was derived. The statistics pertinent to the derivation of the discriminant function included a canonical correlation (r^*) value of 0.5831 and a Wilks's lambda value of 0.66 ($X^2 = 71.053$, $df = 6$, $p = 0.0000$).

These results indicate that the two groups were significantly separated before the derivation of the discriminant function by their responses to the independent variables. Interpretation of the square of the canonical correlation indicated that 34% of the variance in the derived discriminant function could be explained by the 2 groups.

A summary of the classification portion of the discriminant analysis can be found in Table 4. A total of 82.6% of the cases were correctly classified. The highest percentage of correct classification occurred in the group predicted by the discriminating variables to have changed nicotine polacrilex gum counseling behavior (92.2%). Hair and colleagues suggest the use of a criterion of "25% greater than chance" when interpreting the significance or non-significance of the classification portion of discriminant analysis (8). The proportional chance criterion, which takes into consideration the prior probability assignment of two groups with uneven numbers of individuals per group, should be applied to the results of this study. The classification results using the proportional chance criterion of the discriminant analysis produced a 33.2% greater than chance classification. This finding indicates that the variables in the discriminant analysis were significantly differentiating the two groups of pharmacists.

TABLE 3. Summary of Rao's *V* Stepwise Variable Inclusion

Step	Variable Entered	Wilks's Lambda	Sign.
1	Learning of new information	.7636	.0000
2	Pharmacy type	.7119	.0000
3	Cigarettes for sale in the pharmacy	.6938	.0000
4	Has informed patients about methods of smoking cessation	.6789	.0000
5	Has taken steps to have a smoker's/patient's medication changed because of potential interactions	.6661	.0000
6	Has informed smoking patients of potential drug-smoking interactions	.6600	.0000

DISCUSSION

There is no suggestion made here that the sample of pharmacists on which this report is based is representative of all pharmacists. Conclusions should not be drawn beyond the 225 participants in the survey. However, these results do indicate that practice behavior was positively influenced by a CE unit. It should also be noted that some responses were contingent upon pharmacist opportunity to take action as a result of newly gained knowledge. Corporate phar-

Rao's $\underline{V}$	Sign.	Change in Rao's $\underline{V}$	Sign.
53.86948	.0000	53.86948	.0000
70.42771	.0000	16.86948	.0000
76.42771	.0000	6.37823	.0116
82.28284	.0000	5.54769	.0193
87.22954	.0000	4.94670	.0261
89.63612	.0000	2.40658	.1208

macy policies may have prevented a cessation of tobacco sales, for example. Also, awareness of the interactions between dispensed medications and smoking and the lack of taking steps to change therapies may only be indicative of the lack of opportunity to do so.

Overall, we conclude that this program achieved its objectives and, in doing so, contributed in some significant way to better health care through the indication that practicing pharmacists can be and were influenced in their practice behavior by a unit of continuing education.

TABLE 4. Classification Results of the Discriminant Function

	<u>Predicted Group Membership</u>	
	<u>Changed Counseling Approach</u>	<u>Did Not Change Counseling Approach</u>
Changed counseling approach	154 (92.2%)	13 (7.8%)
Did not change counseling approach	26 (45.6%)	31 (54.4%)

Group cases correctly classified = 82.5%

REFERENCES

1. American Public Health Association. Cigarette sales and smoking in pharmacies, health facilities, and health agencies: American Public Health Association policy statement No. 8410. *Am J Public Health* 1985;75(3):300.
2. Altman DG et al. Reducing illegal sale of cigarettes to minors. *JAMA* 1989;261(1):80-3.
3. Greydanus DE. Routing a modern Pied Piper of Hamelin. *JAMA* 1989;261(1):99-100.
4. Nona DA, Kenny WR, Johnson DK. Effectiveness of continuing education as reflected in the literature of the health professions. *Am J Pharm Educ* 1988;52(2):111-6.
5. Smith MC et al. Role of pharmacist in smoking cessation. *Today's Ther Trends* 1988;Suppl. 1.
6. Nie N, Hull C, Jenkins J, et al. Statistical package for the social sciences. 2nd ed. New York: McGraw-Hill, 1975.
7. Klecka WR. Discriminant analysis. Beverly Hills: Sage Publications, 1980.
8. Hair J, Anderson R, Tatham R. Multivariate data analysis. 2nd ed. New York: McMillan, 1987.