

Physician Attitudes Toward Strategies to Promote the Adoption of Medical Evidence Into Clinical Practice

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Background: Promoting the adoption of medical evidence into clinical practice has been advocated as one approach to improving healthcare quality and reducing medical errors. Data describing the effectiveness of different strategies to achieve this goal in real-world settings are limited.

Objective: To determine the effectiveness of selected interventions on the adoption of medical evidence into clinical practice.

Study Design: A cross-sectional survey of a random sample of physicians selected from the American Medical Association's Physician Master File.

Patients and Methods: We examined the perceived effectiveness of 7 strategies (represented by 27 individual interventions) and 5 general approaches for promoting the adoption of medical evidence into clinical practice in 1100 practicing physicians. Respondent exposure to interventions was also determined. Regression analyses were performed to identify factors that affected effectiveness ratings. Analysis of variance was used to test the hypothesis of equal mean scores across different comparison groups.

Results: Of 1100 surveys mailed, 63 (5.7%) were excluded and 431 were completed (response rate = 41.6%). Mean \pm SD effectiveness scores for the 27 individual interventions on a 5-point Likert scale ranged from 2.0 ± 0.9 (literature received from insurance companies and managed care organizations) to 4.2 ± 0.8 (one-on-one communication with respected colleagues). Ranges for the 7 strategies were 2.6 ± 1.0 (patient-mediated interventions) to 3.6 ± 0.9 (educational meetings) and for the 5 general approaches were 1.98 ± 0.9 (administrative interventions) to 3.3 ± 0.8 (provider education). The hypothesis of equal mean effectiveness scores was rejected for all comparisons ($P < .001$). Frequency of exposure was the only variable to predict effectiveness ($P < .001$ for all regression models).

Conclusion: From the perspective of practicing physicians, the frequency of exposure to strategies for promoting the adoption of medical evidence into clinical practice strongly affects their perceived effectiveness.

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The quality of care provided in the United States has emerged as a significant health concern.^{1,2} A review³ of published studies found that only half of the people in the United

States receive recommended preventive services and that only 60% receive recommended care for chronic conditions. Similarly, a national study of Medicare beneficiaries found a median performance rate of 69% across 24 standard prevention and treatment process-of-care measures, such as biennial eye examinations for patients with diabetes mellitus and receipt of angiotensin-converting enzyme inhibitors by patients with a hospital discharge diagnosis of congestive heart failure.⁴ In another example, a study⁵ of hospital quality found that differences in 30-day mortality rates after myocardial infarction could largely be explained by differences in the use of aspirin and β -adrenergic blocking agents, two relatively simple and well-established interventions.

At issue is the "gap" between current knowledge or "evidence" as published in medical research literature and the Cochrane Database and actual physician practice. Efforts to close this gap have included the development and implementation of strategies intended to promote the adoption of medical evidence into clinical practice.^{6,7} There is little evidence to date to suggest that, on the whole, these efforts have had much impact on the behavior of primary care providers, who deliver most medical services on a widespread basis.⁸ Studies^{6,9,10} examining the success of different

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methods for changing provider behavior have generally rated interventions as weak or as having little or no effect (eg, dissemination of published and unpublished literature and didactic educational sessions),¹¹⁻¹³ moderately or variably effective (eg, patient-mediated interventions, audit and feedback, and local consensus development),¹³⁻¹⁷ and highly or generally effective (eg, physician reminders, academic detailing, and educational outreach).¹⁸ The ideal use of this experience would be to help inform medical decision makers regarding the most appropriate strategies to use in improving quality of care and emphasizing those that are effective, affordable, and implementable in typical practice settings.¹⁹ However, issues regarding barriers to specific interventions in practice seem to be complex and include multiple factors that vary in importance by disease, provider and patient characteristics, and healthcare setting.^{20,21}

Many studies exploring the effectiveness of interventions to change provider behavior have been performed in academic settings, raising concerns about the generalizability of these findings.²² We believe that as primary care physicians' exposure to and experience with these different interventions increases over time, they can offer important insights regarding their actual effectiveness when deployed in real-world settings. We therefore conducted a survey of a national sample of practicing physicians to answer the following questions: What is the perceived effectiveness of interventions intended to change physician behavior and promote the adoption of medical evidence into clinical practice? What is the relative exposure of physicians to different interventions? What factors determine the physicians' rating of the perceived effectiveness of different interventions?

METHODS

Literature Review

We performed a comprehensive review of the MEDLINE and HEALTHSTAR databases to identify interventions used to change physician behavior. A primary list of strategies to promote the adoption of medical evidence into practice was adapted from a recent overview of the findings of systematic reviews on this topic¹⁹ and from the Cochrane Effective Practice and Organization of Care's Data Collection Checklist. A set of more general approaches was then identified to obtain a broader perspective of physicians' views of the impact of these interven-

tions on process, health, and economic outcomes. The literature review further identified the respondent characteristics that have been shown to affect physician performance of preventive practices.

Survey Questionnaire

A 1-page, 2-sided questionnaire was developed comprising 3 sections. The first section represented 7 strategies adopted from the Cochrane Collaboration: (1) dissemination of information from a variety of sources, including information provided directly to physicians or published in medical journals or on the Internet; (2) didactic educational sessions, including conferences, lectures, or interactive workshops; (3) patient-mediated interventions, such as clinical data collected from other sources (eg, blood pressure measurements obtained at work site screening programs) and provided by patients to physicians; (4) academic detailing and educational outreach, including information conveyed through one-on-one communication with respected colleagues, local opinion leaders, or other health professionals; (5) physician "reminders" or the presentation of specific clinical information before, during, or after a patient visit; (6) audit and feedback, such as reports of personal practice data with or without comparative data derived from other physicians; and (7) local consensus statements regarding patient management recommendations or guidelines that are based on criteria that the physicians themselves personally helped develop.^{10,16,23-28}

In recognition of the potential effect of the origin of information,²⁸ several source and venue variations were provided under each intervention strategy. For example, dissemination of information was described variously as literature from peer-reviewed journals, non-peer-reviewed journals, pamphlets and updates, public agencies (eg, the Centers for Disease Control and Prevention and the Food and Drug Administration), national or specialty medical associations, continuing medical education (CME)-accredited sources, insurance companies and managed care organizations, and pharmaceutical companies.

Thus, in the first section, the resulting set of survey questions included 27 individual interventions intended to influence physician behavior. In this section, ratings of effectiveness were recorded on a 5-point Likert scale similar to that used previously by Tunis et al²⁹ in a survey of physicians' attitudes regarding clinical practice guidelines, with scores ranging from 1 (none) to 5 (very high). Responses of

DK (don't know) and NA (not applicable) were also included. Ratings of exposure were recorded similarly for each item.

The second section of the questionnaire asked physicians to evaluate the effectiveness of 5 general approaches for promoting the adoption of medical evidence into clinical practice in improving patient outcomes, reducing practice variation, and reducing the cost of care. The 5 approaches were disease management, clinical practice guidelines, provider education, point-of-care decision support, and administrative interventions. In this section, ratings of effectiveness were recorded on a 5-point Likert scale, with scores ranging from 1 (not effective) to 5 (extremely effective).

The last section of the questionnaire captured relevant respondent characteristics shown to influence the effectiveness of preventive practices in previous studies. These respondent characteristics include sex, practice setting and geographic location, years in practice, patient volume, and the predominant form of reimbursement for services.³⁰⁻³³

The survey was initially pilot tested with 6 local practicing physicians with varied experience with managed care and fee-for-service reimbursement, ages, and years in practice. Feedback from these physicians was used to refine the questionnaire.

Participants and Data Source

A random sample of 1100 actively practicing internists and general and family practitioners who were members of the American Medical Association in 2000 were surveyed. Surveying was principally conducted using self-administered mailed questionnaires. The initial mailing included a \$10 incentive and was preceded by an introductory postcard. An accompanying cover letter offered survey recipients the alternative options of returning the questionnaire in an enclosed prepaid return envelope or via fax, completing an online version of the questionnaire, or using a toll-free telephone number to record answers verbally. A second questionnaire was sent to those who did not respond to the initial mailing. Finally, at least 2 attempts were made to reach nonresponders directly by telephone. Physicians who were successfully contacted were offered the opportunity to answer the survey questions immediately or at a scheduled time of their choosing, to complete the online version, or to receive another mailed copy. Demographic data, including age, sex, type of practice, type of board certification, and geographic location of practice, for all 1100 physicians were obtained from the

American Medical Association's Physician Master File in August 2000.

Statistical Analysis

Comparisons of demographic characteristics of respondents and nonrespondents were performed using *t* tests for continuous variables and χ^2 tests for categorical variables. Mean \pm SD scores were calculated for characteristics of respondents, frequency of exposure, and ratings of effectiveness for each intervention, strategy, and theoretical effectiveness group. The mean for each strategy or effectiveness group was the average of respondents' means for interventions listed under that strategy or effectiveness group. Responses of NA and DK were excluded. Previous studies that evaluated the effectiveness of the 7 intervention strategies described in the first survey section were used to define 3 theoretical effectiveness groups: the ineffective group (dissemination of published and unpublished information and didactic educational interventions), the variable group (patient-mediated interventions, audit and feedback, and local consensus), and the generally effective group (academic detailing and educational outreach and physician reminders). Repeated-measures analysis of variance (ANOVA) was used to test the hypothesis that means of a same variable were equal.

A scatterplot of means of effectiveness of 27 interventions in the first survey section was used to preliminarily detect whether the impact of frequency of exposure on rating of effectiveness varied across interventions. Regression analysis was then used to further examine whether, in addition to frequency of exposure, demographic variables also affected the perceived effectiveness. For each of the 27 regression analyses performed, the only consistently significant predictor of effectiveness was exposure. As a result, a second regression analysis was performed using only frequency of exposure as the independent variable. Scatterplot and regression analyses were based on data from the sample in which all interventions were rated 1 to 5 (ie, missing data and responses of NA and DK were excluded). *T* tests were used to examine the significance of differences between mean scores of ratings based on data from responders who completed the whole survey and those based on data from responders who only completed the partial survey. All analyses were performed using SAS statistical software (SAS Institute Inc, Cary, NC). The scatterplot and graphs were completed using a spreadsheet program (Microsoft Excel; Microsoft Corp, Redmond, Wash).

RESULTS

Survey Response and Demographics

Of 1100 surveys mailed, 63 (5.7%) were excluded for the following reasons: incorrect address ($n = 23$), death ($n = 5$), or retirement ($n = 35$). A total of 431 completed surveys were received (response rate = 41.6%) by mail ($n = 404$), fax ($n = 10$), Web site ($n = 10$), and telephone ($n = 7$). The characteristics of the survey respondents are presented in **Table 1**. Most respondents were men, were working in solo or group practices, and were most likely to be reimbursed for patient care through a fee-for-service arrangement. Respondents were almost evenly distributed across rural, urban, and suburban settings.

Based on demographic data provided by the American Medical Association, compared with non-respondents ($n = 606$), physicians answering the questionnaire ($n = 431$) were slightly younger (53.2

vs 55.5 years; $P < .021$) and less likely to practice in an office-based setting (88.4% vs 91.6%; $P < .016$). There were no statistically significant differences between the groups with respect to sex or geographic location in the United States (East, South, Central, and West).

Effectiveness Ratings for Interventions

Table 2 summarizes the responses to 27 interventions in the first survey section. The single intervention with the highest mean effectiveness rating on the 5-point Likert scale was “one-on-one communication with a respected colleague” (mean \pm SD effectiveness rating = 4.2 ± 0.8). Other interventions with a score ≥ 4 were “literature from CME-accredited sources” and “educational activities such as conferences and lectures” (mean \pm SD effectiveness ratings = 4.0 ± 0.9 for both). The single intervention with the lowest mean effectiveness score was “literature from insurance companies or managed care organizations” (mean \pm SD effectiveness rating = 2.0 ± 0.9). Effectiveness scores and their 95% confidence intervals for the 7 intervention strategies are shown in **Figure 1**.

The results of ANOVA rejected the hypothesis that the mean scores of effectiveness of the 27 interventions are equal ($P < .001$). Similar results of ANOVA were found for the 7 intervention strategies and the 3 theoretical effectiveness groups ($P < .001$ for both). Among respondents, no statistically significant differences in mean scores among those who completed the survey ($n = 150$) and partial responders were found.

Exposure Ratings for Interventions

Respondents ranked “one-on-one communication with a respected colleague” (mean \pm SD exposure rating = 3.7 ± 1.0) as the single intervention to which they were most frequently exposed, followed closely by literature from pharmaceutical companies, peer-reviewed journals, and CME-accredited sources (mean \pm SD exposure ratings = 3.73 ± 1.1 , 3.71 ± 1.0 , and 3.69 ± 0.9 , respectively). The single intervention with the lowest mean exposure score was “reports of personal practice data without comparative information” (mean \pm SD exposure rating = 1.9 ± 0.9). Exposure scores and their 95% confidence intervals for the 7 intervention strategies are presented in **Figure 2**. Results of ANOVA rejected the hypothesis of equal means of exposure for the 27 interventions, the 7 intervention strategies, or the 3 theoretical effectiveness groups ($P < .001$ for all).

Table 1. Characteristics of 431 Respondents to a Survey of Physician Perceptions of the Effectiveness of Strategies for Promoting the Adoption of Medical Evidence Into Clinical Practice

Characteristic	Values
Age, mean \pm SD, y	53 \pm 12
Time since graduation, mean \pm SD, y	25 \pm 12
Men, %	88
Practice setting, %	
Solo practitioner	36
Group practice	44
Multispecialty group	8
Staff-model HMO	1
Other	11
Geographic setting, %	
Urban	32
Suburban	31
Rural	37
Average patient care per week, h	47.6
Average patients per week, No.	111.4
Reimbursement, %	
Fee for service	41.3
Discounted fee for service	38.1
Capitation	9.4
Other	11.1

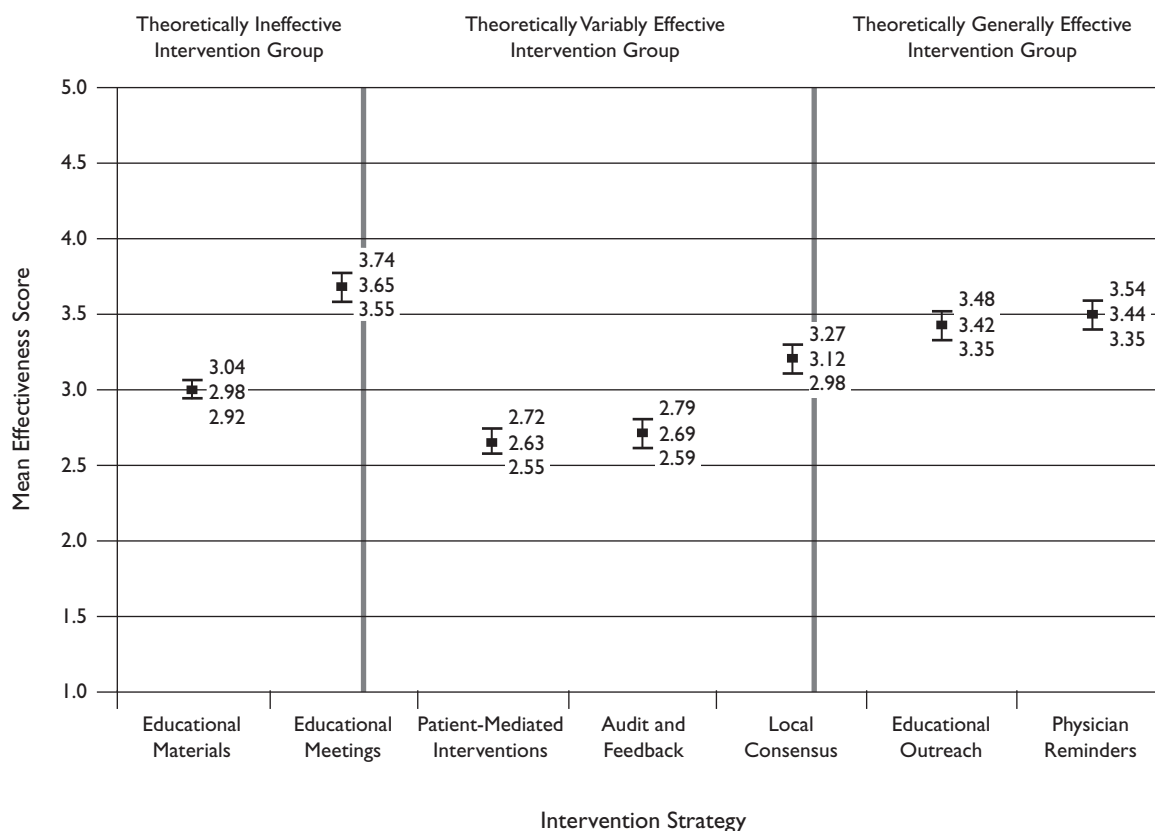
Table 2. Frequency of Exposure and Effectiveness Ratings of Specific Interventions for Changing Provider Behavior*

Strategy	Responses, No.	Frequency of Exposure, mean ± SD	Intervention Effectiveness, mean ± SD	Coefficient (95% CI)
1. Dissemination of Published and Unpublished Information				
<i>Literature from...</i>				
Peer-reviewed journals	421	3.7 ± 1.0	3.7 ± 0.9	0.55 (0.48-0.63)
Non-peer-reviewed journals, pamphlets, and updates	414	3.3 ± 1.1	2.7 ± 0.9	0.35 (0.27-0.42)
CME-accredited sources	424	3.6 ± 0.9	4.0 ± 0.9	0.46 (0.37-0.55)
National or specialty medical associations	410	3.0 ± 1.1	3.4 ± 1.1	0.65 (0.57-0.73)
Pharmaceutical companies	426	3.7 ± 1.1	2.9 ± 1.0	0.25 (0.16-0.33)
Public agencies (eg, CDC, FDA)	410	2.5 ± 1.0	3.0 ± 1.1	0.66 (0.57-0.76)
Insurance companies and managed care organizations	412	2.6 ± 1.2	2.0 ± 0.9	0.26 (0.19-0.33)
<i>Health information...</i>				
Published primarily for distribution on the Internet	367	2.1 ± 1.1	2.3 ± 1.1	0.73 (0.65-0.81)
Brought directly to physicians by patients	414	2.2 ± 0.8	2.2 ± 0.9	0.58 (0.48-0.67)
2. Didactic Educational Sessions				
<i>Educational activities such as...</i>				
Conferences or lectures	428	3.5 ± 1.0	4.0 ± 0.9	0.45 (0.37-0.52)
Interactive workshops	405	2.5 ± 1.1	3.1 ± 1.3	0.72 (0.64-0.81)
3. Patient-Mediated Interventions				
<i>Clinical data collected from patients and given directly to physicians from...</i>				
Work site health screenings	392	2.1 ± 0.9	2.5 ± 1.0	0.74 (0.65-0.83)
Community health fairs	388	2.0 ± 0.9	2.3 ± 1.0	0.77 (0.68-0.86)
Insurance companies and managed care organizations	400	2.1 ± 1.0	2.1 ± 0.9	0.56 (0.48-0.65)
4. Academic Detailing and Educational Outreach				
<i>One-on-one communication with...</i>				
Respected colleagues	428	3.7 ± 1.0	4.2 ± 0.8	0.46 (0.39-0.52)
Local opinion leaders (eg, chief of staff)	416	2.7 ± 1.0	3.1 ± 1.1	0.77 (0.70-0.85)
Recognized experts	421	3.1 ± 1.1	3.9 ± 0.9	0.40 (0.33-0.48)
Other health professionals (eg, pharmacists and nurses)	420	2.8 ± 0.9	3.0 ± 0.9	0.59 (0.50-0.67)
Pharmaceutical company representatives	424	3.5 ± 1.2	2.8 ± 0.9	0.29 (0.21-0.36)
5. Physician Reminders				
<i>That prompt you to perform a specific test, examination, or procedure...</i>				
Before a patient visit	396	2.8 ± 1.1	3.3 ± 1.1	0.64 (0.56-0.73)
During a patient visit	401	3.1 ± 1.2	3.6 ± 1.1	0.63 (0.56-0.70)
After a patient visit (eg, as part of follow-up)	393	3.0 ± 1.0	3.3 ± 1.0	0.70 (0.62-0.78)
6. Audit and Feedback				
<i>A report of your personal practice data...</i>				
Compared with other physicians in your group or local area	383	2.7 ± 1.1	3.0 ± 1.1	0.54 (0.44-0.65)
Compared with national data	379	2.4 ± 1.0	2.7 ± 1.1	0.56 (0.46-0.66)
Without comparative information	333	1.9 ± 0.9	2.1 ± 1.0	0.68 (0.57-0.79)
<i>A summary report of patient management data from your physician organization...</i>				
For your practice group or physicians in your local area	343	2.4 ± 1.1	2.6 ± 1.1	0.67 (0.58-0.75)
7. Local Consensus				
<i>Patient management recommendations (guidelines) based on...</i>				
Criteria that you personally helped develop	335	2.5 ± 1.2	3.1 ± 1.3	0.73 (0.64-0.82)

*P < .001 for all regression models.

CI indicates confidence interval; CME, continuing medical education; CDC, Centers for Disease Control and Prevention; and FDA, Food and Drug Administration.

Figure 1. Mean Effectiveness Scores for 7 Intervention Strategies for Promoting the Adoption of Medical Evidence into Clinical Practice From a National Physician Survey, Grouped by a Literature-based Categorization of Theoretical Effectiveness



Error bars represent 95% confidence intervals.

Factors Affecting Perceived Effectiveness

The scatterplot in **Figure 3** depicts the correlation of effectiveness and exposure across the 27 interventions. These findings matched the results of regression analyses. For each of the 27 interventions, the outcome from the initial multivariate regression analysis showed that only exposure was a significant predictor of effectiveness; consequently, univariate regression analyses were performed. The resulting coefficients of exposure in all regressions were also statistically significant (Table 2). Results were similar whether data from all questionnaires (n = 431) or only those fully completed (n = 150) were analyzed.

Effectiveness Ratings of General Approaches

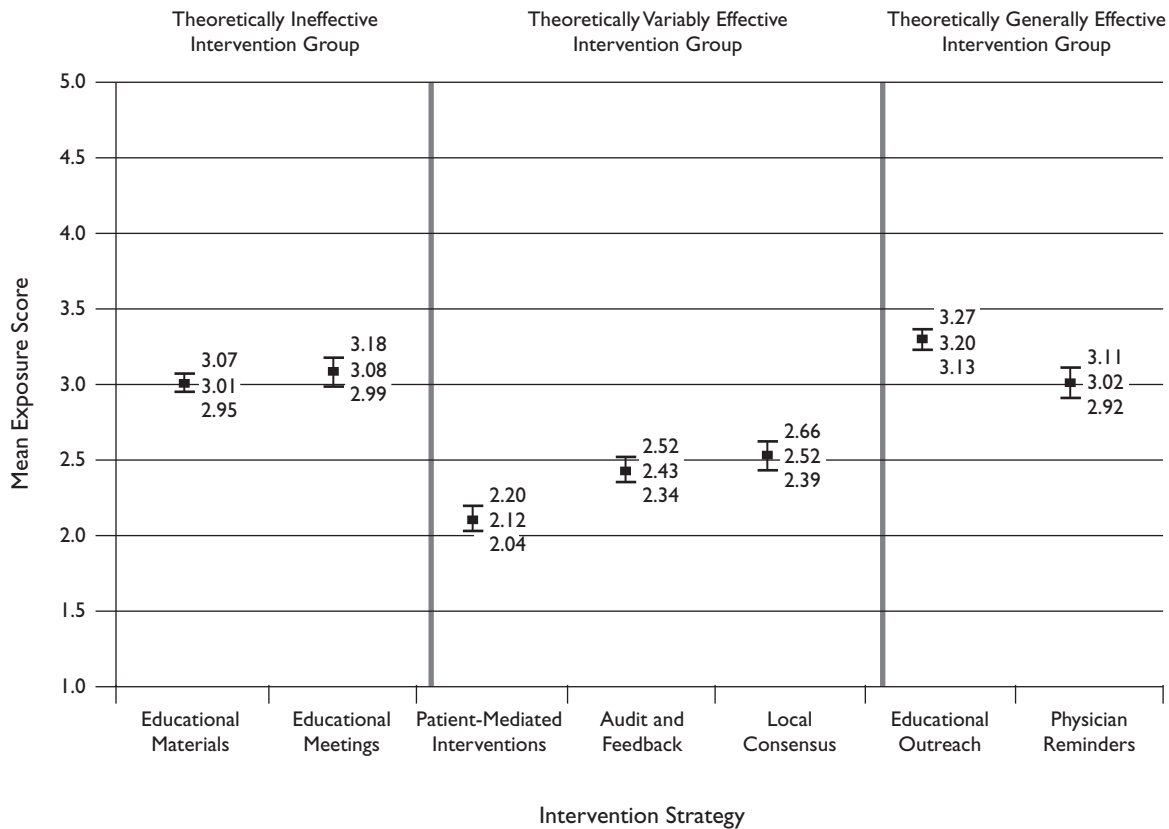
The results of ratings of effectiveness are given in **Table 3**. The provider education approach had the

highest mean ± SD overall (3.3 ± 0.8) and in each individual rating (improving patient outcomes, reducing practice variation, and reducing the cost of care). Similarly, administrative interventions had the lowest mean ± SD overall (1.98 ± 0.9) and for each individual rating. Results of ANOVA demonstrated that the difference in mean scores across the 5 approaches was significant whether the comparison was based on the overall rating or the 3 individual ratings (P < .001).

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COMMENT

A key finding of this national physician survey is the association of exposure and perceived effectiveness for different interventions. In this study, primary care physicians were asked to describe the

Figure 2. Mean Exposure Scores for 7 Intervention Strategies for Promoting the Adoption of Medical Evidence into Clinical Practice From a National Physician Survey, Grouped by a Literature-based Categorization of Theoretical Effectiveness



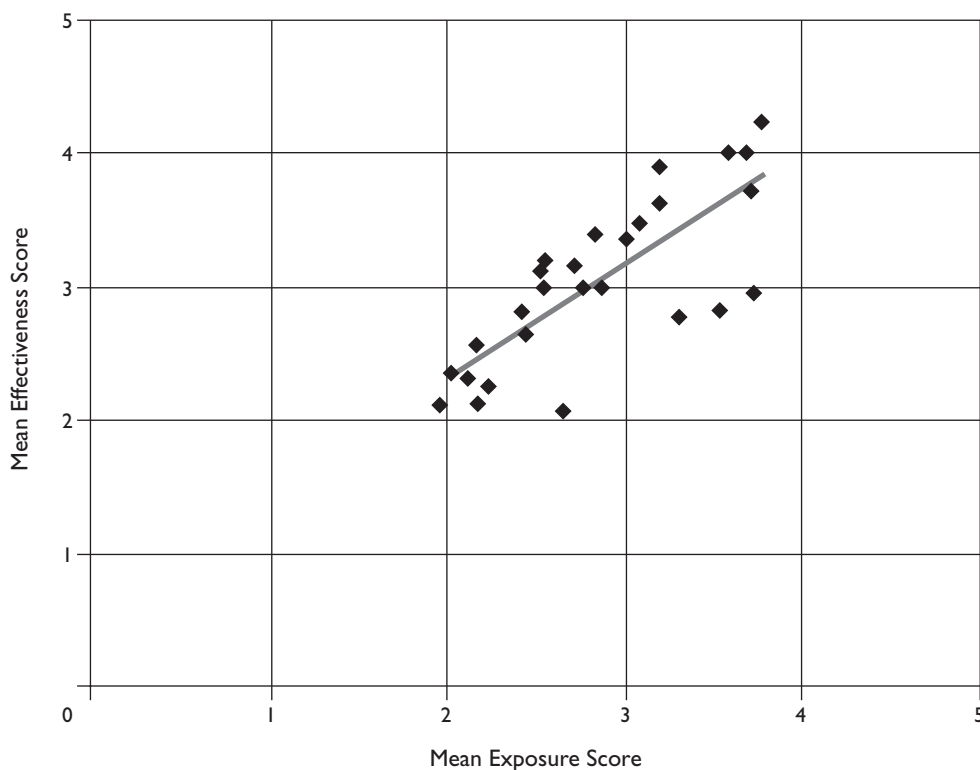
Error bars represent 95% confidence intervals.

frequency with which they were “exposed to” or encountered different types of interventions intended to change or inform their behavior as well as their perceptions of the effectiveness of these efforts. These data offer a perspective on the implementation of different interventions in real-world settings and an overall estimation of their value from their intended audience. These results suggest that strategies that lend themselves to frequent repetition may, all other things being equal, turn out to be the most effective. Future research should address why repeated exposure is required to achieve effective change in behavior, whether there are additional factors that may influence effectiveness, and how the credibility of the source of information influences physicians’ ratings of the effectiveness. At the very least, these data suggest that considering physicians’ exposure to interventions and programs may

be an important factor for interpreting their responses to inquiries of perceived effectiveness, such as the recent study³⁴ that found that primary care physician experiences with disease management programs were generally positive.

Insight afforded by the results of this study may be derived from a comparison of physician perceptions with published reviews on this topic. In this questionnaire, one-on-one communications with respected colleagues and recognized experts were considered highly effective, as were articles published in peer-reviewed journals, materials from CME-accredited sources, and efforts to educate physicians in general. Clearly, physicians value and are accustomed to information provided by other physicians and efforts to further their education. In fact, physician education was ranked as the most effective intervention for improving patient out-

Figure 3. Mean Exposure Scores vs Mean Effectiveness Scores of 27 Specific Interventions for Changing Provider Behavior



comes, reducing both practice variation and costs of care. Most study¹¹⁻¹³ findings concur that didactic training and simple dissemination of information (eg, medical journals received in the mail) are generally ineffective. The reason for this discrepancy may relate to differences between physician actions and intentions, as has been described for use of preventive screening measures.³⁵ Although physicians may desire to accumulate as much relevant knowledge as possible to provide effective, high-quality patient care, their ability to retain and apply such knowledge at the bedside could be a limiting factor.

Previous studies^{6,11,17,22,36} demonstrating that the use of physician reminders is a generally effective strategy for changing physician behavior seem to be consonant with the views of practicing physicians, as evaluated in this study. The additional finding of a strong, positive association of exposure and effectiveness supports the potential value of developing and implementing automated reminder systems that facilitate the frequent repetition of key information, such as preventive measures associated with improved health outcomes. Automated

reminder systems also offer the theoretical advantage of standardization and potential use on a widespread basis and could therefore help broaden the reach of any quality improvement effort. Such systems may also present a vehicle for incorporating new information and shortening the lag between the development of evidence and its adoption in practice. Note, however, that respondents to this survey did not rank clinical decision support systems highly. Whether this result represents a contradiction to the higher mean scores for physician reminders (which may be considered a form of clinical decision support) or a lack of respondent familiarity with the terms used is unclear.

This study has several limitations, including a response rate < 42%. Although the difference in age of approximately 2 years between respondents and nonrespondents was statistically significant, it is unclear whether this selection bias had a significant impact on these results. Practical considerations limited the list of potential interventions and the methods of implementation (eg, there was only one choice given for consensus development). Furthermore, respondents may have rated the effectiveness of an intervention based on personal opinion of the intervention in general rather than based on the effectiveness of the intervention in their day-to-day practice. Moreover, the estimates of perceived effectiveness reported herein may or may not be correlated to actual effectiveness. Finally, in reporting physician perceptions, the results described herein may have more to do with physician preferences than actual estimations of effectiveness. Interpretation of the effect of frequency on

Table 3. Average Effectiveness Scores of 5 General Approaches to Promoting the Adoption of Medical Evidence Into Clinical Practice and Their Perceived Impact on Improving Patient Outcomes and Reducing Practice Variation and Cost of Care

Item*	Effectiveness Score, mean ± SD
Effectiveness of disease management programs for...	3.0 ± 0.7[†]
Improving patient outcomes (n = 376)	3.2 ± 0.9
Reducing practice variation (n = 377)	3.2 ± 0.9
Reducing cost of care (n = 359)	2.8 ± 1.0
Effectiveness of clinical practice guidelines for...	3.1 ± 0.8[†]
Improving patient outcomes (n = 387)	3.2 ± 0.9
Reducing practice variation (n = 397)	3.3 ± 0.9
Reducing cost of care (n = 371)	2.8 ± 1.0
Effectiveness of provider education for...	3.3 ± 0.8[†]
Improving patient outcomes (n = 409)	3.7 ± 0.9
Reducing practice variation (n = 395)	3.3 ± 0.9
Reducing cost of care (n = 375)	3.0 ± 0.9
Effectiveness of point-of-care decision support for...	2.7 ± 1.0[†]
Improving patient outcomes (n = 230)	2.7 ± 1.1
Reducing practice variation (n = 233)	2.7 ± 1.1
Reducing cost of care (n = 223)	2.5 ± 1.1
Effectiveness of administrative interventions for...	1.9 ± 0.9[†]
Improving patient outcomes (n = 372)	1.6 ± 0.9
Reducing practice variation (n = 366)	2.0 ± 1.1
Reducing cost of care (n = 358)	2.2 ± 1.3

*The numbers in parentheses denote the number of respondents with complete answers (ie, no missing data, "not applicable" or "don't know" responses).

[†]Overall effectiveness scores for each of the 5 approaches to care were calculated based on data from 205 respondents who rated each of the questions in the second section from 1 to 5.

perceived effectiveness is somewhat limited in that the questionnaire did not allow respondents to distinguish between absolute and relative frequency. In terms of future efforts to address this point, researchers would have to study changes in physician perceptions of the effectiveness of specific interventions over a period during which exposure varied or to compare groups of physicians matched in all respects except levels of exposure to different interventions. As we progress in our efforts to work toward improving the quality of healthcare in the United States, we believe that understanding and

incorporating the perspective of practicing physicians will be one critical factor for success. Last, in relating measures of effectiveness and exposure, we have not accounted for the possibility that the observed association between exposure and effectiveness could be caused by the tendency of physicians to limit their exposure to interventions that they believe will be effective. Only further studies can serve to clarify this latter question.

Overall, the findings of this study highlight the strong, positive association of frequency of exposure and the perceived effectiveness of interventions to influence physician behavior. Physician perception of the effectiveness of any given intervention is undoubtedly shaped by a variety of considerations. Subsequent research in this area needs to address other factors and their potential for evoking behavioral changes. Ultimately, understanding physician opinions of different intervention strategies, and the factors that affect them, should help inform our future decisions about the most effective strategies to use as we strive to close the quality gap, bridging the differences between evidence-based and actual physician practices.

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