Predicting Physician Guideline Compliance: An Assessment of Motivators and Perceived Barriers

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Background: Although clinical practice guidelines are widely accepted as "best practices," provider compliance remains low.

Objectives: To examine the relationship between providers' behavioral intentions and their compliance with practice guidelines; to assess the impact of perceived barriers that were most inhibiting to compliance; and to examine the ability of factors in the Physician Guideline Compliance Model to predict intention to comply and compliance with guidelines implemented at specific practice sites.

Methods: Survey research methods were used to assess effects of antecedents (attitudes, subjective norms, past behavior, and perceived behavioral control) on providers' intentions to comply and compliance with clinical practice guidelines. Provider survey I was conducted at the time of guideline introduction and survey II 4 months after implementation.

Results: Scores for the antecedents to behavior and behavioral intention reflected favorable responses toward the use of guidelines. The mean self-reported compliance behavior was 65%, whereas compliance as assessed by chart review was 54%. Approximately 68% of the variance in the physicians' behavioral intentions was accounted for by variables included in the Physician Guideline Compliance Model. A significant negative correlation was found between perceived barriers and self-reported behavior but not between perceived barriers and chart-review-assessed behavior.

Conclusions: Some variables, particularly perceived barriers to guideline implementation, predicted a provider's practice intentions and self-reported behavior. Future guideline intervention efforts should identify and reduce these barriers to guideline compliance prior to implementation.

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The demand is ever increasing from patients, patient advocate groups, government regulatory agencies, and employer groups for cost-effective, high-quality patient care. Because quality is largely determined by the daily clinical decisions of practitioners, interest has grown in finding ways to influence providers' decision-making processes. One way of influencing clinical decision making is through the development and implementation of evidence-based clinical practice guidelines. Although numerous healthcare organizations, health plans, and individual researchers promote the development and utilization of guidelines,[1-4] research findings demonstrate that even with educational programs and incentives for compliance, practitioners often fail to use guidelines in daily practice.[5-16] Studies have attempted to identify reasons for practitioners' general failure to follow evidence-based guidelines. However, research using a theoretical foundation for understanding and predicting physician behavior has been limited.

A review of literature on barriers to guideline adherence identified a lack of knowledge on the part of physicians as the most frequently investigated barrier.[17] Other barriers examined in empirical work were found to include low self-efficacy and negative outcome expectancy beliefs on the part of physicians, as well as patient barriers and environmental barriers such as lack of time and insufficient staff support.[17] Other studies have indicated that failure to adhere to guidelines is sometimes a conscious decision based on disagreement with what is the best practice for a particular patient or situation,[18] which may be a particularly relevant scenario when guidelines lag behind "cutting-edge" practice.[19]

While much of the research that has evaluated efforts to improve utilization of practice guidelines has been empirical, several investigators have described a conceptual framework for examining implementation of guidelines. Kitson and associates[20] developed a framework for conceptualizing implementation of evidence-based practices. The factors included in their model were (a) the nature of the evidence supporting the guideline; (b) the context, including the work culture and leadership in the organization; and (c) the support from others in the environment. Although valuable in examining the implementation process, their framework is not based specifically on an established theory of behavior change and, as acknowledged by the authors, requires validation through empirical testing. In addition to this work, Pathman and colleagues[21] proposed a stage model of awareness, agreement, adoption, and adherence as the invariant steps physicians go

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through in incorporating specific guidelines into their practice behavior. The stage theory is descriptive rather than explanatory, although the authors did provide evidence that the prescribing behavior in implementing guidelines did follow the stages described.[21]

The purpose of this study was to investigate antecedents to practitioners' guideline utilization using a social psychological model. Specifically, the primary goals were to (1) examine the relationship between providers' stated behavioral intentions and their behavior in complying with specific recommendations of clinical practice guidelines, (2) identify and assess the impact of barriers (both internal and external) perceived by providers to be most inhibiting to compliance, and (3) examine the ability of factors in the Physician Guideline Compliance Model (PGCM) to predict provider intention to comply and compliance with treatment guidelines.

CONCEPTUAL FOUNDATION

The PGCM was developed as the first step of this study (A schematic of this model is available directly from the authors.) The constructs and conceptual framework used in the study are adapted from the Theory of Reasoned Action[22] and the Theory of Planned Behavior.[23] The Theory of Reasoned Action postulates that behavioral intention is predictive of actual behavior within a specified timeframe and situation. Predictors of behavioral intention are an individual's attitude toward performing the behavior and the subjective norms set by significant others in the individual's environment.[22] We used Fishbein and Ajzen's[22] definition of *attitude* as a person's positive or negative evaluation of personally performing the target behavior. We also adopted Fishbein and Ajzen's[22] definition for *subjective norm,* defined as an assessment of the social pressures put on an individual to perform or not to perform the behavior of interest. In addition to these constructs, Bentler and Speckart's[24] construct of past behavior was added to examine the influence of past efforts to implement guidelines on behavioral intention. The purpose of including this domain was to explore the effect of practitioners' previous experiences in using guidelines and to assess their overall evaluation of these past experiences.

In concordance with the Theory of Planned Behavior, which is a modification of the Theory of Reasoned Action, the construct of *perceived behavioral control* was also examined. Ajzen[23] defined this construct as a person's belief as to how easy or difficult performance of a specific behavior would be. However, for this particular study, this definition alone was considered inadequate, because healthcare providers' practices do not depend solely on the level of difficulty associated with isolated practice recommendations. Providers' practices are subject to external factors such as patients' desires/demands, time constraints, administrative policies, etc. Therefore, an individual's perception of personal control was added. This component was aimed at determining the level of control providers believe they have over practice decisions (eg, is administration perceived to completely govern the practitioners' practices or are they free to establish practices as desired?).

In addition, a component that assessed practitioners' perceptions of specific barriers to guideline use was added. This component included a list of potential barriers, both internal and external, believed to influence providers' practices. Internal barriers were defined as those barriers that are internal to the provider such as confidence, understanding, and practice habits. External barriers were those barriers that are primarily viewed as being outside of the provider's control, such as patient demands, time constraints, and delays in receiving laboratory results. Through assessing practitioners' perceptions related to these barriers, identifying and targeting specific areas for future interventions may be possible.

HYPOTHESES

Consistent with the primary aims of the study, the study hypotheses focused primarily on the relationships involving behavioral intention and barriers to guideline use. The overall ability of the factors within the PGCM to predict provider behavior was also examined as part of the exploratory component of the study.

Hypothesis 1: Practitioners' overall score on the perceived barriers subscale (Likert scale from "not a barrier" to "a major barrier") will be negatively correlated with practitioners' intentions to use guidelines.

Hypothesis 2: Practitioners' overall score on the perceived barriers subscale will be negatively correlated with practitioners' self-reported behavior.

Hypothesis 3: Practitioners' overall score on the perceived barriers subscale will be negatively correlated with practition-

ers' actual behavior (guideline adherence as measured through chart review).

Hypothesis 4: External barriers will be perceived as more inhibiting to guideline compliance than internal barriers.

In addition to testing these hypotheses, several research questions related to exploratory work directed at developing and testing the PGCM were examined. These questions asked how well the independent variables in the model (attitude, past behavior, subjective norms, and perceived behavioral control) correlated with behavioral intention and behavior (both self-reported and "actual"). The final research question was: How well does the Physician Guideline Compliance Model predict behavioral intention and behavior?

METHODS

Research Design

We used survey research methods to assess healthcare provider attitudes, subjective norms, intentions, and perceived barriers toward clinical practice guideline utilization and compliance with guidelines. Surveys were administered immediately preceding guideline introduction to measure predictors of guideline compliance. Guideline implementation at each site involved dissemination to all practitioners and endorsement by medical directors, administrators, and lead physicians. One site, the group model health maintenance organization (HMO) described below, used a more aggressive strategy for implementation by training the in-house pharmacy staff to detect patients whose medication regimen was not consistent with the guidelines and to relay this information to providers.

A second survey was administered 4 months after implementation of guidelines to measure self-reported use of guideline recommendations. In addition, chart audits were conducted at the end of the 4-month postimplementation period to assess provider compliance with guideline recommendations. For consistency across analyses, only those charts for practitioners who completed survey II were included in these analyses. Subjects consisted of attending/staff physicians, physician residents, interns, advanced registered nurse practitioners, and physician assistants from 5 practice sites. The practice sites were large provider groups selected from Central and North Central Florida based on intended implementation of specific clinical practice guidelines. The sites included a group model HMO with 24 providers implementing dyspepsia guidelines, a large teaching hospital oncology and hematology service with 35 providers implementing guidelines for fever and neutropenia, a Veterans' Administration hospital with 15 providers implementing chronic obstructive pulmonary disease guidelines, and 2 family practice residency groups with 54 and 44 providers implementing asthma guidelines.

Procedures

The pre-implementation questionnaire (survey I) was developed based on (1) the PGCM (see Figure), (2) a review of the clinical guideline and social psychological literature, (3) discussions with experts in the area of guideline development, and (4) discussions with physicians who used guidelines. The constructs examined include physicians' past behavior (which incorporated 2 distinct components: past guideline use and perceived degree of change required to implement new guidelines relative to a provider's customary practice), attitudes, subjective norms, perceived behavioral control over guideline use, and behavioral intention. Each construct is defined in **Table 1.** Because the specific guidelines introduced varied by site, several survey items were individualized to refer to the specific disease states targeted at each site. Prior to survey use, an expert panel reviewed all questions for content validity. Three weeks after the initial mailing, reminder postcards were mailed to providers who had not yet returned the survey.

The postimplementation survey (survey II) was developed for the purpose of measuring practitioner guideline compliance through self-reports of behavior. Providers were asked to report the percentage of their patients who met the guideline's inclusion criteria for each key recommendation that they treated according to the guidelines. This survey was also reviewed by an expert panel for content validity. The practitioners were asked to return the survey within 2 weeks of receipt. Those who did not respond received a reminder 3 weeks after dissemination of this survey.

In addition to self-reported compliance data collected in survey II, medical record audits were conducted 4 months after the guidelines were implemented. The chart audit forms were customized for each site based on the guideline recommendations. Both the participating organization and the expert panel approved these forms prior to use. Charts for any patient seen by a participating provider (ie, those who completed both surveys) for the condition of interest during the 4-month period were examined. These patients were identified through claims data and pharmacy data.

Study Variables and Instrumentation

Past Behavior. The 2 components of past behavior

Table 1. Physician Guideline Compliance Model Constructs

Constructs	Definition
Past behavior	
Degree of change	Perceived similarity between the provider's current practices and the recommendations made within the guideline.
Past experiences	Practitioner's evaluation of past guideline use experiences.
Attitude	A person's attitude toward using clinical practice guidelines is his/her positive or negative evaluation of carrying out that behavior.
Subjective norm	An assessment of the perceived social pressures placed on an individual by specified referents to carry out a specific behavior (to use or not use clinical practice guidelines). Referents included patients, colleagues, other healthcare personnel, and the overall organization.
Perceived behavioral control	The practitioners' belief as to how easy or difficult using the guideline recommendations will be. The level of control the physician feels he or she has concerning the use or failure to use the specific guidelines. Perceptions of existent barriers that act as obstacles to guideline use.
Behavioral intention	The assessment of an individual's intent and desire to use the practice guidelines.
Behavior	The behavior of interest is practitioner's compliance with clinical practice guidelines, measured through self-reports and chart audits.

were degree of change perceived necessary to implement new guidelines and past guideline use. To assess the degree of change, practitioners were asked to specify how similar their most recent practices for the disease-state of interest were to the practice recommendations found within the guideline being implemented. Past guideline use focused specifically on past experience in using any clinical practice guidelines and subjective evaluations of that experience.

Attitude. The providers' positive or negative evaluations of the use of clinical practice guidelines were measured through assessment of providers' behavioral beliefs and outcome evaluations. Using the method described by Fishbein and Ajzen,[22] scores were obtained by taking the products of the belief strength and outcome evaluation of each specified belief and summing the resulting products of each of the items making up the scale. In addition to this indirect measure, 2 direct measures of attitude toward guidelines were added that focused on the providers' agreement with the guideline recommendations being implemented at their institutions and their evaluation of guideline use in general. Investigations of direct and indirect measures indicated a high level of internal consistency when all items were combined, which they were for analysis purposes.

Subjective Norm. An assessment of the social pressures put on a clinician to perform or not to perform the target behavior was made by asking the practitioners to provide their normative beliefs relative to specific referents and motivation to comply with these referents. The following referents were included for all sites: patients, fellow colleagues, other healthcare personnel, and the overall organizational norms at the work setting. Using the method described by Fishbein and Ajzen,[22] the total score for subjective norm was determined through the sum of the products of normative beliefs and the corresponding motivations to comply.

Perceived Behavioral Control. The perceived behavioral control subscale comprised 3 components: level of difficulty, level of control, and perceived barriers. The level of difficulty was the perceived difficulty in implementing proposed guidelines. Items were scored on a 5-point Likert scale and were summed and averaged. The second component was the level of control providers felt they had when making a decision to comply with a specific guideline. For the perceived barriers component, a variety of potential barriers were included in the questionnaire; for each, the subjects were asked to score each barrier on a 5-point Likert scale, from 1 = "not a barrier" to 5 = "a major barrier." The barriers included in the instruments were selected based on the investigators' examination of the guideline use process, from reviewing the literature,[15,25,26] and from discussions with physicians who were familiar with guidelines and barriers to utilization. A panel of experts classified each barrier as either internal or external for later analysis. Barriers classified as "external" were accessibility of guideline, time for visit, patient flow, computer support, patient education requirements, patient resistance to trying a new type of care, lack of continuity due to patients seeing multiple physicians, side effects associated with use of a medica-

tion, time to receive labs, x-rays, etc, and the amount of paperwork required. "Internal" barriers were considered to be practice habits, ethical concerns, legal concerns, concerns about professional autonomy, resistance to concept of using guidelines, understanding of the guideline, and confidence that the physician can use the guideline. Final scores were calculated for each classification (internal and external) by summing all item scores in the particular category and taking an average.

Behavioral Intention. Behavioral intention was measured through an assessment of an individual's intent relative to the behavior in question. Questions included in this subsection were focused on the desire to follow, as well as the intent to follow, the specific recommendations within the guidelines.

Self-Reported Utilization of Guidelines. Compliance with guideline implementation was measured in the survey sent out 4 months after the initiation of guidelines at each institution. For the self-reported measures, practitioners were asked to respond to questions such as: "Over the past 4 months, what percentage of patients who met the guideline's inclusion criteria for [target disease] did you treat according to the guidelines?" This answer was reported as a percentage from 0 to 100. Individual questions were included for each key recommendation within the guidelines.

Compliance With Guidelines. Practitioner guideline compliance was assessed by medical record audits. The score for compliance behavior was based on a proportion. The numerator was the number of times the practitioner complied with guideline recommendations and the denominator was the number of opportunities the practitioner had to use the guideline recommendations during the previous 4 months.

Analytical Plan

Reliability. The internal consistency of the instrument was calculated through the use of Cronbach's coefficient alpha statistic. An item analysis was also performed to determine the final set of items for inclusion in the analyses. The decision to include an item within its respective subscale was based on the following information: (a) a corrected item to total correlation coefficient, (b) the coefficient alpha estimate if the item was deleted from the scale, and (c) theoretical significance.

Hypothesis Testing. The first 3 hypotheses involved tests of bivariate correlations between independent and dependent variables. Spearman's rho correlation coefficients were examined to determine if significant relationships existed between specified variables. An alpha level of .05 was set for each.

For the fourth hypothesis, to determine if external barriers were perceived to be significantly more inhibiting to guideline adherence than internal barriers, the difference between external and internal barriers scores was first calculated. Then a paired *t* test was performed to determine if the providers' scores for external barriers were significantly larger than their internal barrier scores.

The exploratory research questions also involved tests of bivariate correlations between independent and dependent variables. Correlation coefficients were examined to determine if significant relationships existed between specified variables. An alpha level of .05 was set for each.

The final research question required that each of the dependent variables be modeled as a function of the independent variables. Multiple regression analysis was used for this assessment.

RESULTS

The response rate for survey I was 63% (106 of 167 eligible providers). Forty-eight subjects responded to survey II. However, when considering only those individuals who had both responded to survey I and were still practicing at their respective organizations at the time of survey II administration, 36 of 71 persons (51%) had usable data for both surveys. Because of the large turnover of providers from some of the study sites, the number of eligible providers was lower than anticipated.

Coefficient alpha results for each summated scale exceeded the .60 criterion set for internal consistency. In addition, each item within a scale correlated at a level of .30 or greater with the corrected total score of the scale and, if deleted, would not have resulted in an increase in coefficient alpha. As such, all items were retained.

Model Component Scores

Scores for the antecedents to behavior and behavioral intention reflected generally favorable responses toward the use of guidelines (**Table 2**). For each antecedent, the lower the score, the more positive the attitude, intention, subjective norm, etc. More than half (n = 60; 57%) of the 106 respondents had an attitudinal score between 2.0 and 4.0, indicating positive attitudes toward the use of guidelines. Likewise, for subjective norms, >80% of the subjects scored between 1.0 and 8.0, reflecting motivation to comply with the referents' desires. The lowest scores, which indicated the referents most likely to influence practitioners' compliance with guidelines, were for "fellow colleagues" and "the practice site."

The mean for perceived behavioral control reflected less positive scores on this construct (mean = 2.59). Fifty-six (53%) of the 106 responding practitioners scored at or below the 2.5 midpoint of the scale. Paired *t* test results

indicated a significant difference (t = 9.46, P < .0001, n = 105) between provider perceptions of internal and external barriers to compliance. Results showed that providers perceived external barriers to be more inhibiting (mean score of 3.07 vs 2.36, range 1-5).

As indicated previously, past behavior consisted of 2 domains: perceived degree of change from routine practice and past experience with guideline utilization along with an evaluation of that experience. This score indicated that complying with the guidelines required only slight changes in the providers' practice patterns (ie, the providers' practices at the time of guideline implementation were somewhat similar to the guideline recommendations). More than 92% of the subjects had a score of 2.5 or less.

Relatively few practitioners reported past experience with practice guidelines. For this reason, this domain was broken down into 3 categories. A score of 1 indicated no reported past guideline use, 2 indicated a less than positive experience, and 3 indicated a good experience. For the overall sample, 44 practitioners indicated they had less than positive experiences with guidelines, 23 indicated they had had good experiences, and the remaining 36 providers did not report past experiences with use of guidelines.

The scores for behavioral intentions reflected strong intentions to utilize the guidelines in practice. Thirty-two practitioners reported a strong intention (score of 1) to use the guideline. Eighty-six practitioners (83%) reported a score of <2.5.

For the mean self-reported behavior of compliance with guidelines, half of the practitioners indicated that, when given the opportunity, they complied with the guidelines at least 77% of the time. Additionally, 10% of the practitioners indicated that they complied with the guidelines 100% of the time. Only 2% of the providers admitted to never complying with the guidelines. Thirty (63%) of the 48 practitioners who responded to survey II estimated that they used the guideline at least 62% of the time when given the opportunity during the 4-month study period.

When compliance was assessed through chart audit, the scores were lower than those from the self-reports. The mean compliance rate was 54% ± 25%. Twenty-nine (64%) of the providers used the guideline at least 50% when given an opportunity during the 4-month period.

Results of Hypothesis Testing

In examining the bivariate correlation of perceived barriers and practitioners' intentions to use guidelines (Hypothesis 1), we found a significant negative correlation (r = –0.68, P < .0001). For the second hypothesis examining the correlation of perceived barriers and practitioners' self-reported behavior, we again found a significant negative correlation (r = –0.47, P < .006). For the third hypothesis examining the correlation of perceived barriers and practitioners' actual behavior as determined by chart review, no statistically significant difference was found (r = –0.11, P = .50, n = 42). For the final hypothesis, which stated that external barriers are perceived as more inhibiting to guideline compliance than internal barriers, the results showed a significant mean difference of .621 (P = .001). The individual scores for specific barriers are further described in the next section.

Exploratory Research Questions

In examining bivariate correlations of other predictor variables and behavioral intention, we found significant correlations with attitude toward clinical practice guidelines (r = 0.67, P < .0001), subjective norms (average r = 0.55 for all referents, P < .0001 for each referent), overall perceived behavioral control (r = 0.32, P < .002), internal barriers (r = –0.72, P < .0001), and external barriers (r = –0.28, P < .004). In addition, perceived degree of change was correlated with intention (r = 0.20, P < .05). The relationship between behavioral intention to use clinical practice guidelines and self-reported behavior was not significant (r = 0.13). This analysis was based only on the 33 subjects who had provided complete responses to both survey instruments. However, as described in hypothesis 2, there was a significant negative correlation (r = –0.470, P < .006) between the perceived barriers scale and practitioners' self-reported behavior even with the reduced sample size. In examining internal and external barriers separately, we found a significant negative relationship between self-reported compliance and both perceived internal barriers (r = –0.50, P = .0029) and external barriers (r = –0.39, P = .0255).

Across all groups, with the exception of the teaching hospital implementing the fever and neutropenia guideline, the strongest barrier to guideline compliance was "time allowed for the patient's visit." For the teaching hospital, the attending physicians and fellows reported that the greatest barrier was the "time necessary to receive lab results, x-rays, etc," whereas the residents and interns reported that the greatest barrier to their complying with guidelines was "concern over professional autonomy," an internal barrier.

The correlation between behavioral intention and compliance as measured by chart audit was 0.29 (P = .07, n = 40). The bivariate correlation between perceived barriers and compliance as measured by chart audit was also not significant (r = 0.11, P = .50, n = 42).

In addition to bivariate relationships, how well the independent variables of attitude, past behavior, subjective norms, and perceived behavioral control together

Table 2. Means and Standard Deviations of PGCM Variables

Variable	N	Mean	SD	Range	Median	Minimum	Maximum
Attitude	106	5.05	2.40	2-30	4.53	2.00	15.63
Subjective norm	105	6.15	2.93	1-25	5.75	1.00	16.00
PBC	106	2.59	0.53	1-5	2.53	1.51	4.00
Degree of change	97	1.92	0.58	1-5	2.00	1.00	4.00
Past experience	103	—	—	1-3	2.00	1.00	3.00
Behavioral intent	104	1.87	0.87	1-5	1.80	1.00	5.00
Self-reported compliance (%)	48	0.65	0.29	0-1	0.75	0.00	1.00
Chart audit compliance (%)	45	0.54	0.25	0-1	0.55	0.00	1.00

PBC indicates perceived behavioral control; PGCM, the Physician Guideline Compliance Model.

predicted behavioral intention and compliance behavior, both self-reported and as assessed by chart audit, was examined. **Table 3** presents the results of the regression analysis that was conducted for the purpose of predicting behavioral intention. The adjusted R^2 for this model was 0.6770, indicating that approximately 68% of the variance in the physicians' behavioral intentions to use the guidelines was accounted for by the variables included in the model. Both perceived behavioral control and attitudes were significant variables in this model (P = .0001 for each). This finding indicated that practitioners' intentions to use guidelines were predicted by their attitudes and by the perceived behavioral control construct. It is important to note that perceived behavioral control accounted for a much greater amount of variance than did attitudes as indicated by their parameter estimates (.73 vs .13, respectively). To determine which of the domains within perceived behavioral control were most significant in this model, a multiple regression analysis was conducted with the 3 perceived behavioral control domains individually included. Additionally, the internal and external barriers were entered as separate predictor variables in the model (see Table 3).

Based on the analysis with separated perceived behavioral control scale scores, the internal barriers variable was most significant. For every 1-unit change in this variable, there was an associated change of .40 in intention. While mean scores (see Table 2) indicated that providers perceived external barriers to be more inhibiting, internal barriers predicted more of the variance in intention controlling for the other variables in the model. Neither of the other domains of perceived behavioral control was significant.

Table 4 provides the results of the multiple regression analysis that was conducted to determine if the antecedents included in the PGCM were able to predict self-reported compliance. Based on the model P value of .5962, this model was not statistically significant. However, the sample size for this model was only 33 complete surveys and the power was .32. Therefore, a larger sample size would have been necessary in order to obtain reliable results.

Table 4 also displays the results of the multiple regression analysis that was conducted for determining if the antecedents found in the PGCM were able to predict compliance with guidelines as determined by chart audit. This model was not statistically significant (P = .4093). The sample size was only 42 and the associated power was .43. Once again, a larger sample size would be needed to adequately test this model.

DISCUSSION

This study assessed the relationship between practitioners' behavioral intentions to comply with specific recommendations made within clinical practice guidelines and their actual guideline compliance. One would expect a strong positive correlation between these variables since research in social psychology supports the claim that behavior is strongly influenced by the intention to engage in the behavior of interest.[24] However, only small correlations were found. In short, intentions alone were found to be relatively poor predictors of guideline compliance. Instead, as indicated by the significant correlations between perceived barriers prior to implementation of guidelines and subsequent self-reported behavior in implementing guidelines, behavioral intentions should be accompanied by measures of perceived barriers when predicting guideline compliance.

The results presented in this study suggest that perceived barriers to guideline utilization may influence

Table 3. Prediction of Behavioral Intention with Summated and Separated PBC Construct Measures

		With Summated PBC		With Separated PBC	
Variable	*df*	Parameter Estimate	Prob > |T|	Parameter Estimate	Prob > |T|
Intercept	1	–1.077008	0.0004	–0.142953	0.6981
Degree of change	1	0.159557	0.0625	0.087006	0.3490
Positive experience	1	–0.172126	0.1225	–0.176324	0.1179
Negative experience	1	–0.064527	0.6520	–0.052621	0.7433
Level of difficulty	1	0.732571	0.0001	0.008639	0.9257
PBC	1	0.732571	0.0001		
Control	1			0.077085	0.3412
Internal barriers	1			0.409112	0.0001
External barriers	1			–0.034655	0.7405
Subjective norms	1	0.021239	0.3215	0.035913	0.1025
Attitude	1	0.131009	0.0001	0.114599	0.0001
		Adjusted R^2 = 0.6770		Adjusted R^2 = 0.6172	

PBC indicates perceived behavioral control.

practitioner guideline compliance. Although subjective norm was not revealed as a significant predictor of behavioral intention in the regression model, the correlations between subjective norm and behavioral intention show a strong positive relationship between these 2 variables, particularly in regards to colleagues and the practice site as referents. This finding, which is supported by previously published studies,[27,28] suggests that implementation strategies that utilize well-respected physician champions in the practice sites may improve guideline compliance.

Additionally, since the perceived degree of change required by new guidelines was significantly correlated with behavioral intentions, organizations may consider gradual implementation if feasible. Reducing the degree of abrupt change necessary may serve to improve behavioral intention and ultimately compliance. This concept is supported by the work of Gates,[29] who demonstrated that focusing initially on specific areas for improvement one at a time may be more effective for improving multiple aspects affecting the processes of care.

Physician attitude in relation to guideline use was strongly correlated with self-reported guideline compliance and was a significant predictor of behavioral intentions to utilize guidelines. Thus, attitudes toward guideline use should be assessed during future implementation programs. Identifying those practitioners with negative attitudes and working to improve their attitudes will help to improve guideline compliance.

While this study did not strongly support the hypothesis that intentions to utilize guidelines predict guideline compliance, it did demonstrate that numerous variables are related to a provider's practice decisions. Thus, future research as well as future implementation strategies should consider the myriad influences. It is hoped that results generated by this research will lead to a better understanding of physicians' behavior and will provide needed information that can be utilized for developing future guideline implementation programs.

Limitations inherent in the methodology were mainly related to the nature of the variables collected in this study. Self-reports of behavior and other psychological constructs examined in this study may be biased by response sets such as social desirability, acquiescence, and extremity, which would obscure the measurement of interest. Precautions against this source of bias, such as assuring the physicians of confidentiality, were taken.

Additionally, these study results may not be generalizable to other organizations or practitioners, because the participating providers did not constitute a random sample of practitioners. Furthermore, the study did not control for the differences between the sites and type of guideline included.

The sample size in itself was a limitation of the study, particularly for the multiple regression analyses and those analyses that included compliance as measured in survey II and in chart audits. To allow for more robust

Table 4. Predicting Guideline Self-Reported Compliance and Compliance Measured by Chart Audit

		Self-Reported		Chart Audit	
Variable	***df***	**Parameter Estimate**	***P***	**Parameter Estimate**	***P***
Intercept	1	1.110930	.0029	0.519020	.0772
Degree of Change	1	0.030407	.7577	0.026009	.7362
Positive Experience	1	–0.027276	.8296	–0.020903	.8291
Negative Experience	1	0.013323	.9348	0.083066	.5031
PBC	1	–0.231662	.1402	0.035608	.7696
Attitude	1	0.031291	.4110	–0.048495	.0448
Behavioral Intent	1	–0.089322	.5578	0.065378	.5485
		Adjusted R^2 = 0.0439		Adjusted R^2 = 0.0076	

PBC indicates perceived behavioral control.

findings, future research should be conducted to test the PGCM that ensures adequate power through increased sample size. Additionally, other measures of compliance may be considered such as claims analyses to accompany chart reviews or videotaped patient/practitioner interactions.

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