Background: Health professionals have a proven, positive impact on patients’ ability to quit smoking, yet few integrate cessation counseling into routine practice. The aim of this study was to evaluate the impact of continuing education training on physicians’ and pharmacists’ cessation counseling.

Methods: A group-randomized trial of health care providers (87 physicians and 83 pharmacists) from 16 Texas communities compared smoking cessation training (intervention group) with skin cancer prevention training (control group). Pretraining, posttraining, and extended follow-up surveys were collected from providers. Perceived ability, confidence, and intention (ACI) to address smoking with patients were assessed with a composite ACI index. Patient exit interviews (at baseline, 1452 patients completed interviews; after 12 months, 1303 completed interviews) assessed counseling practices.

Results: There was a significant increase in the percentage of physicians with a high ACI index in the intervention group from pretraining to posttraining (27% to 73%; P < .001) vs the control group (27% to 34%; P = .42) and for pharmacists (4% to 60%; P < .001) vs the control group (10% to 14%; P = .99). Similar results were seen from pretraining to extended follow-up. At baseline, fewer pharmacy patients reported being asked about smoking compared with patients seen by physicians (7% vs 33%; P = .001). There was an increase in assisting patients to quit (6% to 36%; P = .002) by physicians (baseline vs 12 months) in the intervention group, but not in the control group.

Conclusions: Training led to significant and lasting improvement in counseling among physicians. Low levels of counseling were seen among pharmacists.

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Health care providers are well positioned to identify and address tobacco use among patients. Studies have shown that even brief counseling by health care providers increases smoking cessation rates; yet fewer than 50% of patients who smoke receive cessation counseling and treatment during physician office visits. The Treating Tobacco Use and Dependence, 2008 Update: Clinical Practice Guideline provides evidence-based recommendations for tobacco cessation treatment. The Clinical Practice Guideline states that clinicians should ask about tobacco use at every patient visit, advise those who use tobacco to quit, assess readiness to quit, assist with quitting, and arrange follow-up. These activities represent the “5 A’s” model: ask, advise, assess, assist, and arrange (follow-up).

The effects of tobacco-counseling training on the counseling practices of nonphysician health care providers (eg, pharmacists) are understudied and not well understood. Yet, even more so than other clinicians, pharmacists have an ability to interface with all segments of the public.

See Invited Commentary at end of article

Advice from a pharmacist does not require an appointment or medical insurance; as such, pharmacists are capable of reaching and assisting underserved populations, which often exhibit a higher prevalence of tobacco use and incur a disproportionately higher incidence of tobacco-related disease. Because medications for smoking cessation are available primarily through pharmacies, pharmacists have a unique opportunity to become an active and recognized resource for assistance with quitting. Pharmacists report interest in embracing this role, but few have received training.

Continuing education (CE) programs have been designed to improve clinicians’ confidence and skills in cessation counseling, and such training programs have been shown to be effective in increasing levels of counseling activities.
ever, there is substantial room for improvement. We estimated the impact of 2 CE programs for physicians and pharmacists on smoking cessation counseling practices through a randomized controlled trial in 16 Texas communities. Herein, we report outcomes of the trial, including health care provider self-reported counseling activities and results from patient exit interviews conducted in medical offices and clinics and community pharmacies.

METHODS

STUDY DESIGN

The design was a nested, group-randomized trial with the community serving as the unit of randomization. Outcome assessments include (1) counseling and treatment practices reported by health care providers and (2) cross-sectional, patient-reported assessments of health care provider counseling and treatment practices through exit interviews. Sixteen communities within a 200-mile radius of Houston, Texas, were selected to encompass both urban and rural ethnically diverse patients, pair-matched on ethnic composition, urban or rural location, and population size. The communities were randomized to receive a 2-hour CE program on either smoking cessation counseling (treatment group) or sun-protection counseling (control group). The study protocol (BS01-129) was approved by The University of Texas M. D. Anderson Cancer Center institutional review board on June 20, 2001, and the study was conducted from February 2004 through May 2007.

RECRUITMENT AND SAMPLE CHARACTERISTICS

In each of 16 communities, 6 physicians and 6 community pharmacists (hereinafter, “providers”) were targeted for recruitment. Patients were recruited for exit interviews by trained, bilingual research staff in the practice environments of the participating providers. All patients were at least 18 years old and able to speak and write in English or Spanish. Because the Clinical Practice Guideline encourages asking every patient about his or her tobacco use at every visit, patients were recruited regardless of their smoking status.

INTERVENTION AND CONTROL CONDITIONS

Four 2-hour training curricula were developed for this study: (1) smoking cessation counseling for physicians, (2) smoking cessation counseling for pharmacists, (3) sun-protection counseling for physicians, and (4) sun-protection counseling for pharmacists. The content of the tobacco and sun-protection training for physicians and pharmacists was similar, with differences specific to their professional activities. For the smoking cessation training, physicians were trained using a slide presentation format that included vignettes illustrating various physician-patient dialogue scenarios. Training sessions were conducted in a standardized manner by 5 individuals: 2 faculty members (A.V.P. and K.S.H.), 2 postdoctoral fellows (1 of whom was K.H.F.), and 1 specialist with extensive experience in training of health care professionals (F.V.). All nonfaculty trainers received extensive coaching from the principal investigator in providing consistent, high-quality educational events. The curriculum for physicians included information on tobacco-attributable morbidity and mortality, and social aspects and neurophysiologic mechanisms of nicotine dependence. In addition, physicians received a guided practice session with reinforcement through role-playing and rehearsal of counseling skills. The training for pharmacists was similar in content, with greater emphasis on counseling for proper medication use and with a hands-on demonstration of various medications for cessation. Participants practiced through role-playing, and videos were used to demonstrate appropriate counseling interactions. All sessions were conducted by experienced public health professionals with pharmacy and/or cessation counseling backgrounds.

For both physicians and pharmacists, a variety of patient handouts were provided in English and Spanish. In addition, bilingual print materials (ie, posters and leaflets) for raising patient awareness of the provider’s specialized training in tobacco cessation were provided for posting in waiting areas, and these materials encouraged patients to talk with their providers about quitting.

Providers randomized to the control condition received a comparable duration of continuing medical education– or CE-accredited skin cancer prevention training. Training was provided for the control group to establish balance between the 2 study arms, in terms of providers’ dedication and interest in being trained in cancer prevention.

DATA COLLECTION

Brief surveys were administered to providers before and immediately following the training, and follow-up assessments were conducted at 6 and 12 months after training (posttraining). Owing to logistical issues, not all the providers could be surveyed at both follow-up time points; therefore, we consolidated the data obtained at 6 and 12 months into 1 (extended) follow-up data pool. Using handheld computers, cross-sectional (unlinked) exit interviews were conducted with convenience samples of patients on completion of their medical appointments or pharmacy visits at baseline (pretreatment) and 12 months posttraining. No identifying information for patients was collected, and therefore it is unlikely but unknown whether an individual might have been accounted for at more than 1 assessment time point. A small compensation ($5) was provided to patients for their time.

MEASURES

Providers were characterized based on age, sex, race, years of licensed practice, tobacco use status, and patient populations served. Perceived ability, confidence, and intention (ACI) to address tobacco use with their patients was assessed with 3 items with 4-point response scales (0, none; 1, low; 2, moderate; and 3, high).

To assess providers’ perceived ability to address patient tobacco use in their practices, the following item was used: “Please rate your overall ability to address (1) skin cancer prevention and treatment, (2) tobacco use and dependence, (3) diet and nutrition, and (4) physical activity.” Similar items were developed for overall confidence and intention and all were rated using a 4-point scale (0, none; 1, low; 2, moderate; and 3, high).

To reduce the potential measurement effect of exit interviews on tobacco counseling by providers, the instrument included a proportionate number of items on counseling regarding skin cancer prevention, nutrition, and physical activity. Patient exit interviews estimated providers’ counseling activities for each of the 5 A’s.

STATISTICAL ANALYSIS

Providers were characterized using descriptive statistics. For perceived ACI to address tobacco use with their patients, a composite ACI index was created combining all 3 measures. Inter-item correlation coefficients, Cronbach α, and principal axis factor analysis were used to evaluate the validity of the index.
Correlations between the 3 contributing items were significant for both physicians and pharmacists, with interitem correlations of 0.42 or higher, and Cronbach α estimates of internal consistency were 0.78 and 0.82 for physicians and pharmacists, respectively. The factor analysis resulted in a theoretically plausible 1-factor, simple structure solution that accounted for 59% of the variance. All item loadings on the extracted factor were at least 0.40. Providers were classified on the ACI index with 2 well-defined groups: those with higher scores on ACI (3 on all measures) and those with lower scores on ACI (<3 on at least 1 measure). As such, the index was coded as a binary variable (0, low competence; 1, high competence) and compared over time from pretraining to immediate posttraining and extended (6-12 months posttraining) between the intervention and control groups.

The primary method of analysis was mixed model regression for binary outcomes, with intervention condition and time of assessment modeled as fixed effects and intervention condition times assessment period as an interaction effect. Community (the unit of randomization) was modeled as a random effect nested within intervention condition. Adjustments were made for covariates to correct for remaining baseline imbalances. These included age, sex, and race/ethnicity. The final model eliminated covariates found to be nonsignificant. The results were summarized using type III tests of fixed effects, F statistics, and P values. The time × condition interaction was used as the target of inference. Where significant time × condition interactions were detected, Bonferroni-adjusted posthoc comparisons were summarized with t statistic and P values.

The patient-reported effect of the provider training on the 5 A's–based counseling practices from baseline to 12-month follow-up between intervention and control conditions was computed using the exit-interview data. We applied mixed model regression for binary outcomes similar to those described herein for the provider analyses.

RESULTS

HEALTH CARE PROVIDER RECRUITMENT AND RETENTION

Provider recruitment and retention by condition are presented in Figure 1. A total of 87 physicians completed the pretraining survey, 85 (98%) completed the immediate posttraining survey, and 83 (95%) completed the extended follow-up assessment. A total of 83 community pharmacists (95%) completed the pretraining and posttraining surveys, and 75 (90%) completed the extended follow-up assessment.

Initially, we had planned to enroll the same number of family practitioners, obstetricians and gynecologists (OB/GYNs), and pediatricians across target communities. However, in a “real world” study it turned out to be impossible to achieve a perfect combination of physician practitioners. As a result, clinicians included the following types: family practitioner (n = 73); nurse practitioner (n = 3); OB/GYNs (n = 2); pediatrician (n = 6); and physician’s assistant (n = 3). Because most of clinicians in our study (93%) had a medical degree and all non-physician clinicians saw patients on a regular basis and had prescription privileges, in this article we decided to group them into 1 category of “physicians.”

PHYSICIAN CHARACTERISTICS

The work settings varied from relatively large community clinics with multiple providers to small 1- or 2-provider clinics. Some of the health care facilities, located in the Houston area, catered to predominantly low socioeconomic status, ethnic minority patients.

The mean (SD) age of physicians was 44 (11) years; over half (57%) were male, and most (69%) were white (6% were African American; 21%, Asian; and 4%, other). Eleven percent of respondents identified themselves as having Hispanic/Latino ethnic background. The mean (SD) number of years in practice was 15 (11), the mean number of patients seen per week was 103 (45), the mean time spent per patient visit was 16 (10) minutes, and most participating physicians (85%) had never used tobacco. There were no baseline differences between participants assigned to the 2 study conditions.

PHARMACIST CHARACTERISTICS

The mean (SD) age of pharmacists was 44 (13) years, 47% were male, and most (67%) were white (17% were African American; 13%, Asian; and 3%, other). Six percent of
respondents identified themselves as having Hispanic/Latino ethnic background. The mean (SD) number of years in practice was 18 (13); the mean (SD) number of prescriptions filled per week by the pharmacy was 2104 (1495); and 82% had never used tobacco. There were no significant differences in the aforementioned characteristics between participants assigned to the 2 study conditions.

**PROVIDER PERCEPTIONS**

A slightly higher percentage of physicians completed the extended follow-up survey than pharmacists (95% vs 90%). For both physicians and pharmacists, there were no baseline differences in the ACI index between intervention and control conditions.

For physicians, we observed a significant time × condition effect ($F=3.2; P=.04$), with an increase in the percentage of those with a high ACI index in the intervention group from pretraining to posttraining (from 27% to 73%; $t=-4.2; P<.001$) compared with the control group, in which no significant increase was seen (from 27% to 34%; $t=-0.7; P=.99$). At the extended follow-up, there was a significant increase in the percentage of physicians with a high ACI index in the intervention group from the pretraining survey (from 27% to 59%; $t=-3.0; P=.04$) compared with the control group, in which no significant increase was seen (from 27% to 46%; $t=-1.8; P=.99$).

For pharmacists, we observed a significant time × condition effect ($F=6.1; P=.003$), with an increase in the percentage of those with a high ACI index in the intervention group from pretraining to posttraining (from 4% to 60%; $t=-4.5; P<.001$) compared with the control group, in which no significant increase was detected (from 10% to 14%; $t=0.4; P=.99$). In assessing the longitudinal impact of the training, there was a significant increase in the percentage of pharmacists with a high ACI index in the intervention group from pretraining to extended follow-up (from 4% to 21%; $t=-2.1; P=.04$) compared with the control group, in which no significant increase was seen (from 10% to 19%; $t=-1.1; P=.99$). Covariates, including age, sex, and race/ethnicity, were not significantly related to the outcome for physicians or pharmacists. The results are depicted in **Figure 2**.

**PATIENT RECRUITMENT AND RETENTION**

Patient recruitment and retention at the intervention and control sites are presented in **Figure 3**. At baseline, a total of 1571 patients were originally approached, and 119 refused to participate; 1452 completed baseline exit interviews. We cannot report the exact number of patients approached at 12 months owing to incomplete field records. However, because 12-month follow-up data collection occurred in the same clinics and pharmacies located in the same communities as baseline, there is reason to believe the refusal rate was similar to baseline.

**PATIENT CHARACTERISTICS**

Baseline exit interviews were completed by patients in medical offices and pharmacies (n=1452). The mean (SD) age was 45 (15) years; 70% were female; 81% were white; 15%, African American; and 4%, other. Thirty-four percent were of Hispanic/Latino origin, 52% had completed high school or less, 27% had some college education, and 22% were college graduates. Nineteen percent reported current smoking (mean duration, 19 years). Most smokers (70%) said they were thinking about quitting within the next 6 months, and 60% reported at least 1 attempt to quit in the past 12 months.

Twelve-month exit interviews were completed by 1303 patients. The mean (SD) age was 45 (15) years; 72% were female; 81% were white; 16%, African American; and 3%, other. Thirty-four percent of patients were of Hispanic/Latino origin, 52% had completed high school or less, 26% had some college education, and 22% were college graduates. Twenty percent reported current smoking (mean du-
TABLE 1. Baseline Patient Exit Interviews

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>At Baseline (n=374)</th>
<th>At 12 Mo (n=357)</th>
<th>At Baseline (n=321)</th>
<th>At 12 Mo (n=309)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Five “A’s” of counseling</td>
<td>Seen by physician</td>
<td>118 (31.6)</td>
<td>189 (52.9)</td>
<td>109 (33.4)</td>
<td>.001b</td>
</tr>
<tr>
<td>Smokers (n=280)</td>
<td>Baseline (n=66)</td>
<td>12 mo (n=62)</td>
<td>Baseline (n=58)</td>
<td>12 mo (n=57)</td>
<td></td>
</tr>
<tr>
<td>Asked about smoking</td>
<td>32 (48.5)</td>
<td>29 (59.6)</td>
<td>29 (50.0)</td>
<td>25 (43.9)</td>
<td>.05b</td>
</tr>
<tr>
<td>Advised</td>
<td>20 (30.3)</td>
<td>35 (56.5)</td>
<td>19 (32.8)</td>
<td>25 (43.9)</td>
<td>.006b</td>
</tr>
<tr>
<td>Assessed</td>
<td>4 (6.1)</td>
<td>22 (35.5)</td>
<td>11 (19.0)</td>
<td>11 (19.3)</td>
<td>.005c</td>
</tr>
<tr>
<td>Assisted</td>
<td>2 (3.0)</td>
<td>10 (16.1)</td>
<td>6 (10.3)</td>
<td>6 (10.5)</td>
<td>.04b</td>
</tr>
<tr>
<td>Arranged follow-up</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Unless otherwise specified, data are given as number (percentage) of patients.

*Effect of time.

*Time-by-condition effect.

This study used the most rigorous design to estimate the impact of a tobacco cessation counseling program in a

PATIENT-REPORTED ASSESSMENTS OF PROVIDER COUNSELING BEHAVIOR

Table 1 describes baseline patient reports of clinician counseling for cessation. Approximately one-third of patients seen by physicians and fewer than 10% of patients seen by pharmacists reported being asked whether they smoked. There were no significant baseline differences in the 5 A’s model of counseling between intervention and control groups for physicians or pharmacists.

For patients counseled by physicians, a significant increase was observed for asking about smoking in the 5 A’s model of counseling between intervention and control groups from baseline to 12 months (F=52.5; P < .001). In addition, there was a significant increase in assessing readiness to quit in both groups (F=7.7; P=.006), as well as in arranging follow-up (F=4.2; P=.04). No significant time × condition interactions were seen from baseline to 12 months between intervention and control groups with respect to asking, advising, assessing, or arranging follow-up; however, a significant interaction (F=8.2; P=.005) was observed for assisting patients with quitting, with the tobacco-training group showing a larger increase from baseline to 12 months (t=3.7; P=.002) compared with the control group, in which a significant increase was not observed (t=0.1; P=.99). Exit interviews also indicated that older patients were less likely to be asked about tobacco use than were younger patients (F=17.3; P < .001). Covariates, such as education, sex, and ethnicity, were not associated with these outcomes and were not included in the final model. For physicians, we detected a significant overall time effect for asking, assessing, and arranging follow-up (P < .05) and a significant trend for advising (P=.05). Post hoc comparisons revealed that intervention physicians had a higher increase in asking (t=5.8; P < .001) compared with control physicians (t=4.1; P < .001). In addition, intervention physicians had more significant increases in assessing (t=−2.9; P=.03) and in arranging follow-up (t=−2.6; P=.04) compared with control physicians, for whom no significant increases were seen.

Results for patients counseled by physicians are presented in Table 2. For patients counseled by pharmacists, there were no significant differences between the intervention and control groups from baseline to 12 months for the 5 A’s (Table 3).

COMMENT

This study used the most rigorous design to estimate the impact of a tobacco cessation counseling program in a...
group-randomized trial among physicians and community pharmacists. The important difference between the present study and previously published reports is that it (1) includes 2 types of providers and (2) evaluates the training outcomes from 2 perspectives (ie, providers and patients). While the study examines the impact of the training on counseling behavior, it is important to note that it does not examine the impact of the training on patient outcomes (eg, quit rates among patients). However, considerable evidence from the Clinical Practice Guideline indicates that the use of the 5 A’s model by clinicians leads to increased tobacco cessation among their patients.

Although training programs for tobacco cessation exist, little progress in the extent to which physicians address patients’ tobacco use during office visits was reported over the past decade. Furthermore, little research has been conducted among licensed pharmacists to determine the extent to which training increases their tobacco cessation counseling behavior. Community pharmacists are the only clinicians who have regular interactions with a large range of patients and who know a great deal about medications to aid smoking cessation. However, pharmacists have identified a number of barriers that can inhibit smoking cessation counseling, including competing dispensing duties, practice site considerations, lack of cessation counseling skills, and financial concerns.

Despite the pharmacists’ accessibility to the public, coupled with their substantial interest in receiving training in tobacco cessation counseling observed in this and other studies, the cessation counseling practices by pharmacists were not affected by CE training. Even though the mean ACI index was higher at the extended follow-up, it did not lead to improved tobacco counseling practices. The low numbers of patients being asked about tobacco use is a barrier that likely could be circumvented by training pharmacy staff to screen for tobacco use at the point of prescription intake.

In conclusion, tobacco cessation training of physicians has led to substantial and, importantly, lasting improvements in patient counseling; thus, this type of training seems to be appropriate and should be broadly disseminated. The discouraging results among pharmacists were not affected by CE training. Even though the mean ACI index was higher at the extended follow-up, it did not lead to improved tobacco counseling practices. The low numbers of patients being asked about tobacco use is a barrier that likely could be circumvented by training pharmacy staff to screen for tobacco use at the point of prescription intake.

Table 3. Patients Receiving 5 A’s Model-Based Counseling From Pharmacists

<table>
<thead>
<tr>
<th>All Patients (n=1394)</th>
<th>Intervention Group</th>
<th>Control Group</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responding “Yes” to question</td>
<td>Baseline (n=405)</td>
<td>Baseline (n=65)</td>
<td>12 mo (n=300)</td>
</tr>
<tr>
<td>Asked about smoking</td>
<td>24 (5.9)</td>
<td>25 (7.1)</td>
<td>29 (9.7)</td>
</tr>
<tr>
<td>Smokers (n=243)</td>
<td>Baseline (n=61)</td>
<td>Baseline (n=65)</td>
<td>12 mo (n=66)</td>
</tr>
<tr>
<td>Advised</td>
<td>7 (8.6)</td>
<td>4 (6.2)</td>
<td>5 (7.6)</td>
</tr>
<tr>
<td>Assessed</td>
<td>3 (3.7)</td>
<td>2 (3.1)</td>
<td>7 (10.6)</td>
</tr>
<tr>
<td>Assisted</td>
<td>3 (3.7)</td>
<td>0</td>
<td>7 (10.6)</td>
</tr>
<tr>
<td>Arranged follow-up</td>
<td>0</td>
<td>1 (1.2)</td>
<td>0</td>
</tr>
</tbody>
</table>

*bUnless otherwise specified, data are given as number (percentage) of patients.

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Author Contributions: Dr Prokhorov had access to all data in the study and takes responsibility for the integrity of the data and accuracy of the data analysis. Study concept and design: Prokhorov, Hudmon, Foxhall, Wetter, Cantor, Vitale, and Gritz. Acquisition of data: Prokhorov, Ford, and Stancic Luca. Analysis and interpretation of data: Prokhorov, Hudmon, Marani, Wetter, Cantor, and Gritz. Drafting of the manuscript: Prokhorov, Hudmon, Marani, Foxhall, and Ford. Critical revision of the manuscript for important intellectual content: Prokhorov, Hudmon, Marani, Stancic Luca, Wetter, Cantor, Vitale, and Gritz. Statistical analysis: Prokhorov, Hudmon, Marani, and Cantor. Obtained funding: Prokhorov, Hudmon.
A Prescription for Improved Chronic Disease Management

Have Community Pharmacists Function at the Top of Their Training

In a recent commentary, Grumbach suggested a Baumbusch Delivery Systems Principles approach to the redesign of the health care delivery system: all health care workers should function at the top of their level of training and skill with genuine teamwork. For doctorate-level trained pharmacists, this would mean that they “would not count pills” but instead “would counsel patients about complex polypharmacy regimens and spearhead interventions to eliminate medication errors, with pharmacy technicians and automated devices handling medication dispensing in retail pharmacies. See also page 1634

In many respects, this vision has been achieved in the hospital setting. Clinical pharmacy services have been associated with decreased mortality among hospitalized patients; pharmacist-provided anticoagulation treatment in hospitalized Medicare patients has been shown to result in fewer bleeding complications, deaths, and lower hospital charges when compared with those institutions not receiving pharmacist-provided anticoagulation treatment; pharmacist patient rounding and pharmacist-provided drug protocol management has been associated with reduced hospital mortality; and rounding and consultation with an intensive care unit pharmacist has been associated with a significant reduction in preventable adverse drug events.

Although not as well established, a growing body of research demonstrates the valuable role of pharmacists in chronic disease management in outpatient clinic settings. For example, in this issue of the Archives, Weber et al assess the impact of including pharmacists in the treatment of patients with hypertension. Using a prospective, cluster-randomized controlled trial, the investigators demonstrate a significantly greater reduction in systolic blood pressure in those patients receiving pharmacist-physician collaborative treatment as measured by 24-hour ambulatory blood pressures compared with those treated only by their phy-

REFERENCES