ORIGINAL ARTICLES

Effectiveness of the 5-As Tobacco Cessation Treatments in Nine HMOs

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BACKGROUND: Smoking remains the leading cause of preventable mortality in the US. The national clinical guideline recommends an intervention for tobacco use known as the 5-As (Ask, Advise, Assess, Assist, and Arrange). Little is known about the model's effectiveness outside the research setting.

OBJECTIVE: To assess the effectiveness of tobacco treatments in HMOs.

PARTICIPANTS: Smokers identified from primary care visits in nine nonprofit health plans.

DESIGN/METHODS: Smokers were surveyed at baseline and at 12-month follow-up to assess smoking status and tobacco treatments offered by clinicians and used by smokers.

RESULTS: Analyses include the 80% of respondents who reported having had a visit in the previous year with their clinician when they were smoking (n=2,325). Smokers were more often offered Advice (77%) than the more effective Assist treatments—classes/counseling (41%) and pharmacotherapy (33%). One third of smokers reported using pharmacotherapy, but only 16% used classes or counseling. At follow-up, 8.9% were abstinent for >30 days. Smokers who reported being offered pharmacotherapy were more likely to quit than those who did not (adjusted OR=1.73, CI=1.22–2.45). Compared with smokers who didn't use classes/counseling or pharmacotherapy, those who did use these services were more likely to quit (adjusted OR=1.82, CI=1.16–2.86 and OR=2.23, CI=1.56–3.20, respectively).

CONCLUSIONS: Smokers were more likely to report quitting if they were offered cessation medications or if they used either medications or counseling. Results are similar to findings from clinical trials and highlight the need for clinicians and health plans to provide more than just advice to quit.

KEY WORDS: smoking; HMOs; 5-As tobacco cessation treatment.

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INTRODUCTION

Tobacco use remains the leading cause of preventable morbidity and mortality in the nation and is a major contributor to excess medical care costs. Despite the ever growing list of harmful health effects associated with smoking,¹ approximately 45 million US adults continue to smoke, and 1,200 die prematurely each day from tobacco-related diseases.² Annual smoking-attributable expenditures are estimated to be \$96 billion in direct medical costs and \$97 billion in lost productivity.³ Results of recent national surveys raise concern that the 7-year decline in smoking prevalence among US adults has come to an end.²

It is encouraging that the majority of smokers want to quit,² report wanting help from their physician, and are more satisfied with their health care when they are offered cessation services.^{4,5} Most smokers see a physician at least once a year,⁶ and efficacious tobacco treatments have been developed specifically for the primary care setting. In 2000, the US Public Health Service released an updated clinical practice guideline that called on physicians and health-care organizations to implement a treatment model described by the "5-As": (1) ask patients about smoking at every visit, (2) advise all tobacco users to quit, (3) assess smokers' willingness to try to quit, (4) assist smokers' efforts with treatment and referrals, and (5) arrange follow-up contacts to support cessation efforts.⁷ The strength of the guideline is its strong evidence base. The 2008 update of the guideline confirmed the benefits of the 5-A treatments and the importance of the health-care system in the success of tobacco treatment strategies.⁸ To date, however, little is known about the effectiveness of the 5-A model outside the research setting under conditions of usual care.

Considerable efforts have been made to persuade physicians to deliver the 5-As cessation services to smokers, especially in managed care health plans.^{9,10} Health Maintenance Organizations (HMOs) have powerful incentives beyond their commitment to prevention to promote tobacco control efforts, including published accounts of health plan performance on quality measures like the Healthcare Effectiveness Data and Information Set.^{11–13} Although the implementation of tobacco-related guidelines has been less than optimal, the majority of smokers are identified and report receiving advice during visits to their managed care clinician.^{12,13} In contrast, fewer smokers report offers of classes or individual counseling and pharmacotherapy — the Assist tobacco treatments that were shown to be most efficacious in clinical trials.^{7,8,14}

The goal of the HMOs Investigating Tobacco (HIT) study was to examine the relationship between tobacco control policies

and the delivery of smoking cessation services to smokers enrolled in nine geographically dispersed health plans distinguished by their long-standing commitment to tobacco control.^{15,16} This analysis examines the effectiveness of the 5-A treatment model in typical primary care practice.

METHODS

The HIT study was conducted within the National Cancer Institute-funded Cancer Research Network, a consortium of research organizations in nonprofit health plans that provided medical care to more than 8 million Americans, including a minority enrollment of 30%.¹⁷ These analyses include data from nine of the ten HMOs participating in the CRN at the time the HIT study was conducted. The Institutional Review Board at each HMO approved the study protocol.

DESIGN

To identify current smokers enrolled in the nine health plans participating in the HIT study, each month between September 1999 and August 2000 a questionnaire was sent to random samples of health plan members who were between 25 and 75 years of age, had at least 1 year of plan enrollment, and had made a primary care visit in the previous 12 months. The survey methodology has been described in detail elsewhere.¹⁸ Briefly, we used the method proposed by Dillman that includes an initial mailing followed in turn by a reminder postcard, a second mailing, and telephone calls to non-responders.¹⁹ Smokers were resurveyed 1 year from receipt of their completed baseline questionnaire.

Measures

The baseline survey collected demographics (sex, age, race/ethnicity, education) health status, and smoking-related information. Smokers were asked the number of cigarettes they smoked each day, the number of minutes after waking they smoked their first cigarette, and whether they planned to quit smoking in the next 6 months. The 12-month follow-up survey asked respondents whether they had a visit with their doctor in the previous year while they were a smoker and assessed their current smoking status. If a respondent reported they had quit smoking, they were asked for the date they quit. The follow-up survey asked smokers whether their providers advised them to quit smoking; assessed their willingness to quit; offered assistance—self-help materials, referral to classes or phone-based/in-person counseling, pharmacotherapy (nicotine replacement or bupropion); or arranged a follow-up visit or phone call about cessation. Finally, smokers were asked whether they used these cessation services in the previous year to help them quit. Although smoking cessation is often defined by several common measures, e.g., 24-h or 7-day point prevalence,²⁰ we chose the more conservative outcome of abstinence for 30 days or longer at the time of the 12-month follow-up.

Data Analysis

Smokers' characteristics and reports of offers and use of tobacco cessation services were obtained from unadjusted

frequencies of responses to the baseline and follow-up surveys. Bivariate associations between offers and use of tobacco services and abstinence were examined using chi-square tests of significance. We fit multivariable logistic regression models to calculate the odds ratio (OR) and 95% confidence interval (CI) estimating the effect of offers and use of tobacco treatments on cessation. Previous analyses among sites found only modest differences in the delivery of tobacco services, which were mostly accounted for by patient characteristics.⁴ To control for potential confounding in our multivariable models and to avoid redundancy, we chose to include those same patient characteristics and not site in these analyses. Consequently, we included sex, age (categorized as <40 vs 40–54 and 55+), race/ethnicity (white, non-Hispanic vs other), education (high school or less vs some college or more), health status (excellent/very good vs good/fair/poor), cigarettes smoked per day (1–19 vs 20+), number of minutes to first cigarette of the day (<30 vs 30+), and plans for quitting (yes vs no) as covariates in the models. In addition, the multivariate model examining offers of cessation services included offers of all the cessation treatments (yes/no). The multivariate model examining the effect of use of cessation services included use of the Assist and Arrange treatments (yes/no) and whether smokers were advised or assessed for their willingness to quit. When responses about offers or use were missing, responses were coded as not offered or not used. Missing data for minutes to first cigarette of the day ($n=45$) were imputed with heavy smokers coded as smoking within 30 min of waking. Equivalent results were found for analyses including complete and imputed cases for minutes to first cigarette smoked. Analyses were conducted using SAS version 8.2 (SAS Institute Inc., Cary, NC, 2002).

Results

Sixty-five percent of the 4,466 smokers identified in the baseline survey returned a valid 12-month follow-up survey ($n=2,892$). Analyses include the 80 percent of respondents ($n=2,325$) who reported they had a visit with their clinician when they were smoking in the previous year. Table 1 displays smokers' characteristics at the time of the baseline survey. The majority of the sample was female; younger than 55 years of age; white, non-Hispanic; had more than a high school education; and reported to be in good, fair, or poor health. Forty-one percent reported smoking a pack (20 cigarettes) or more a day, and almost 60% smoked their first cigarette of the day within 30 min of waking. Yet, at the time of the baseline survey, over two-thirds reported they were planning to quit in the next 6 months.

Table 1 also shows smokers' reports of offers of tobacco treatments from clinicians in the year preceding the follow-up survey. Offers varied by type of cessation service. Overall, about three-fourths of smokers reported they were advised to quit, almost two-thirds reported they were assessed for their interest in quitting, about a third were offered self-help materials, 41% were offered or referred to classes or counseling, a third were offered pharmacotherapy, and only 13% were offered a follow-up contact. Table 2 displays smokers' reported use of the Assist and Arrange 5-A tobacco services. With the exception of pharmacotherapy, reports of using tobacco treatments were lower than reports of offers. About a quarter of smokers reported they used self-help materials, 16% attended

Table 1. Smokers' Characteristics and Offers of 5-A Tobacco Treatments in Nine Non-Profit HMOs (n=2,325)

Baseline Characteristics	N	%	% Offered cessation services					
			Advice	Assess	Self-help*	Classes/ Counseling*	Meds*	Follow-up†
Sex								
Male	784	33.7	78.6	64.2	38.4	43.6	36.5	14.7
Female	1,541	66.3	75.6	62.5	33.3	39.1	30.8	11.8
Age								
<40	559	24.0	73.0	60.1	30.6	37.2	30.8	10.9
40-54	1,106	47.6	77.9	64.3	38.3	42.8	33.4	14.3
55+	660	28.4	77.6	63.5	33.2	39.9	33.3	11.8
Race/ethnicity								
White, non- Hispanic	1,620	69.7	77.2	65.6	35.7	40.5	34.9	12.6
Other	705	30.3	75.3	57.3	33.5	40.9	27.8	13.2
Education								
≤High school	887	38.2	79.4	63.4	35.6	40.7	31.6	13.9
Some college +	1438	61.9	74.9	62.9	34.6	40.5	33.4	12.1
Health status								
Excellent/very good	854	36.7	73.3	61.6	36.0	37.5	30.6	10.4
Good/fair/poor	1,471	63.3	78.5	63.9	33.4	42.4	34.0	14.1
Cigarettes/day								
≤19	1,374	59.1	73.7	58.7	31.4	38.3	27.7	11.6
20+	951	40.9	80.9	69.3	40.3	44.0	40.0	14.4
Smoking after waking								
<30 min	1,365	58.7	79.3	66.9	37.4	43.2	37.7	14.5
30+ min	960	41.3	72.7	57.6	31.6	37.0	25.7	10.3
Considering quitting								
Yes	1,597	68.7	77.9	64.9	38.0	43.9	36.9	14.6
No	728	31.3	73.8	59.1	28.4	33.4	23.5	8.8
Total	2,325		76.6	63.1	35.0	40.6	32.7	12.8

*Assist tobacco treatment

†Arrange tobacco treatment

classes or counseling sessions, 34% used medications, and 5% had follow-up contact.

Small to modest differences were observed for offers and use of cessation treatments by smokers' baseline characteristics. Of note, however, almost twice as many heavier smokers compared with lighter smokers were offered and used pharmacotherapy. Similarly, compared to smokers without plans to quit, those with plans more often reported offers and use of pharmacotherapies to help with their cessation efforts.

Twelve months after the initial assessment of smoking status, 8.9% of baseline smokers reported they had been abstinent for 30 days or longer. Table 3 shows the unadjusted percents and adjusted odds ratios and confidence intervals describing the associations between offers of tobacco treatments and abstinence. Bivariate comparisons found significant associations between cessation and offers of most tobacco treatments (self-help materials, classes/counseling, pharmacotherapy, and follow-up contact), but not advice. In contrast, in the multivariate model including demographics and smoking characteristics, as well as the offers of all the tobacco treatments, pharmacotherapy was the only 5-A service that remained significant (OR=1.73, CI=1.22-2.45).

The associations between use of tobacco treatments and smoking cessation at 1-year follow-up are detailed in Table 4. Unadjusted comparisons found significantly higher cessation among smokers who used self-help materials, classes or counseling, and pharmacotherapy. Results of the multivariate model, including demographic and smoking characteristics and use of the Assist and Arrange tobacco treatments, as well as advice and assessment, found smokers were nearly twice as likely to report cessation if they used classes or counseling

(OR=1.82, CI=1.16-2.86) and more than twice as likely if they used pharmacotherapy (OR=2.23, CI=1.56-3.20). Use of self-help materials and follow-up contacts were not associated with abstinence in the multivariable models.

No significant differences in reports of abstinence were found across health plans. As expected, in the multivariate models examining the effect of offers and use of tobacco treatments on quitting, older smokers were more likely to report abstinence, while those smoking 20 or more cigarettes/day or smoking their first cigarette within 20 min of waking were less likely to quit. Smokers' sex, race/ethnicity, education, health status, and plans for quitting at baseline were not associated with abstinence (data not shown).

DISCUSSION

Reports of tobacco services received by smokers in nine large HMOs from across the nation found that clinician compliance with the national tobacco control guideline varied across the 5-A treatment model. While the majority of smokers were offered Advice, most were not offered the most effective Assist treatments. Only 41% were offered cessation classes or counseling, and only a third was offered pharmacotherapy. At the time of the surveys, the published HEDIS quality measure for health plan performance on tobacco control was the percentage of smokers receiving advice from their physician in the previous year. This may help explain the higher frequency of clinicians advising their patients about smoking compared with offering other cessation treatments. Yet, more recent HEDIS quality reports that include measurement of physicians' discussion of smoking cessation medications and cessation strategies have

Table 2. Smokers' Characteristics and Use of 5-A Tobacco Treatments in Nine Non-Profit HMOs (n=2,325)

Baseline characteristics	N	%	% Used cessation services			
			Self-help*	Classes/ counseling*	Meds*	Follow-up†
Sex						
Male	784	33.7	25.3	18.1	36.5	7.3
Female	1,541	66.3	23.5	15.4	32.3	4.5
Age						
<40	559	24.0	23.3	12.2	31.0	4.6
40-54	1,106	47.6	25.3	16.9	34.8	6.2
55+	660	28.4	22.7	18.8	34.2	4.7
Race/ethnicity						
White, non-Hispanic	1,620	69.7	23.9	16.6	35.7	5.3
Other	705	30.3	24.5	15.6	29.2	5.7
Education						
High school or less	887	38.2	21.8	14.7	32.7	5.6
Some college +	1,438	61.9	25.5	17.3	34.4	5.3
Health status						
Excellent/very good	854	36.7	23.8	16.2	32.1	5.9
Good/fair/poor	1,471	63.3	24.3	16.4	34.7	4.6
Cigarettes/day						
≤19	1,374	59.1	21.9	14.3	29.0	4.9
20+	951	40.9	27.2	19.2	40.6	6.2
Smoking after waking						
<30 min	1,365	58.7	26.2	18.3	38.2	6.0
30+ min	960	41.3	21.0	13.4	27.4	4.6
Considering quitting						
Yes	1,597	68.7	28.0	18.8	39.6	6.3
No	728	31.3	15.5	10.9	20.9	3.6
Total	2,325		24.1	16.3	33.7	5.4

*Assist tobacco treatment

†Arrange tobacco treatment

shown only modest improvements.¹³ In addition, while all the study health plans provided comprehensive coverage for classes/counseling and pharmacotherapy for smoking cessation,¹⁵ physicians' lack of understanding of their health plan's

coverage for tobacco treatment may have contributed to under-provision of these benefits to patients who smoked.²¹

In contrast to the other 5-A treatments, only an offer of pharmacotherapy was independently associated with increased cessation at the time of the 12-month follow-up. Yet, when smokers attended classes or participated in counseling they were almost twice as likely to report quitting. The effect

Table 3. Offers of 5-A Tobacco Treatments and Smokers' Abstinence at 12-Month Follow-up*

Tobacco treatment	Abstinent at follow-up†			
	Unadjusted		Adjusted‡	
	%	p	OR	CI
Advice				
Yes	9.04	0.68	0.84	0.56-1.25
No	8.46			
Assessment				
Yes	9.89	<0.05	1.16	0.78-1.74
No	7.22			
Self-help materials				
Yes	11.30	<0.01	1.28	0.88-1.85
No	7.61			
Classes/counseling				
Yes	10.49	<0.05	0.99	0.69-1.42
No	7.82			
Pharmacotherapy				
Yes	12.48	<0.0001	1.73	1.22-2.45
No	7.16			
Follow-up contact				
Yes	13.13	<0.01	1.28	0.84-1.94
No	8.28			

*Smokers' reports of offers of tobacco treatments from health-care providers during 12 months of outpatient visits

†Smokers' reports of abstinence ≥30 days at 12-month follow-up

‡Adjusted for sex, age, race/ethnicity, education, health status, number of cigarettes smoked/day, minutes to smoking after waking, plans for quitting, and offers of each of the 5-As cessation services

Table 4. Smokers' Use of 5-A Tobacco Treatments and Abstinence at 12-Month Follow-up*

Tobacco treatment	Abstinent at follow-up†			
	Unadjusted		Adjusted‡	
	%	p	OR	95% CI
Self-help materials				
Yes	11.61	0.01	0.71	0.47-1.08
No	8.05			
Classes/counseling				
Yes	16.09	<0.0001	1.82	1.16-2.86
No	7.50			
Pharmacotherapy				
Yes	13.78	<0.0001	2.23	1.56-3.20
No	6.42			
Follow-up contact				
Yes	13.49	0.06	1.17	0.66-2.05
No	8.64			

*Smokers' reported use of tobacco treatment over 12-months of follow-up

†Smokers' reports of abstinence ≥30 days at 12-month follow-up

‡Adjusted for sex, age, race/ethnicity, education, health status, number of cigarettes smoked/day, minutes to smoking after waking, plans for quitting, use of the assist and arrange cessation services, and advice and assessment

sizes we found for the Assist treatments are similar to those published from reviews of efficacy trials. For classes/counseling, the OR of 1.8 compares with the ORs reported in the USPHS tobacco clinical guideline review⁷ (ORs ranging from 1.2 to 2.3) and reviews from The Cochrane Collaboration²²⁻²⁴ (ORs ranging from 1.6-2.1). For pharmacotherapy consisting of the transdermal nicotine patch and bupropion, our OR of 2.2 compares with the range of 1.9 to 2.0 from the national tobacco guideline⁷ and 1.8 to 2.7 from Cochrane reviews.^{25,26}

The US Surgeon General's report, *Reducing Tobacco Use*, concluded the lack of progress in tobacco control is attributable more to the failure to implement proven strategies than it is about what to do.²⁷ Increasing smokers' participation in existing cessation treatments should be a tobacco control priority. The National Institutes of Health's recent conference on tobacco identified effective strategies for health plans to create a sustained demand for cessation services, including media campaigns using brief, recurring messages to inform and motivate smokers to quit; outreach to smokers such as proactive counseling; informing smokers about their covered benefits for tobacco treatments; and incentives to clinicians.²⁸

The low frequency of smokers who reported receiving an offer of a follow-up contact and, consequently, the few smokers who used this service make it difficult to evaluate the effectiveness of the Arrange component of the 5-A model. However, the absence of follow-up contacts may indicate the need for better systems to support clinicians in their tobacco control efforts. The National Cancer Institute's initiative to promote systems thinking about tobacco control acknowledges the complexity of the problem.²⁹ It seeks an integrated systems-based approach that includes multiple stakeholders and environmental factors with the goal of having administrators, clinicians, and staff working together to develop effective strategies to provide smokers with cessation interventions they will use. Most recently, the updated national clinical guideline for treating tobacco use and dependence emphasized the increasing evidence that health-care systems significantly affect the likelihood that smokers receive effective tobacco-dependence treatment.⁸ Finally, these results also point to the need for more efficacious treatments to help smokers quit. Even when smokers used the more effective tobacco cessation services, less than a fifth reported 30-day abstinence at follow-up. Culturally tailored, gender-specific, and language-appropriate programs may improve outcomes, as well as interventions that target populations with co-occurring comorbidities.²⁸ In addition, the potential of combined pharmacotherapies and behavioral treatments, including interventions to improve medication compliance, has yet to be fully explored.

Strengths of this study include the prospective assessment of respondents' smoking-related characteristics, the geographic diversity of the health plans, and large size of the sample. In addition, these results are responsive to the recent call for assessment of the 5-A treatment model in real world settings.^{8,30} Our findings are subject to the limitations of observational studies, which make it difficult to prove the causality of relationships. To minimize these limitations, we assessed smokers' characteristics at baseline, followed smoking status for 12 months, and adjusted results for important potential confounders.

Other limitations include potential biases if respondents were more interested in quitting and, thus, more likely to respond, recall, and report receipt and use of services. However, smokers who were offered services, but did not use

them, may be less likely to report receipt of offers. The percentage of baseline survey respondents who reported current smoking was lower than the prevalence of smokers in the health plans; thus, under-reporting did occur. Respondents to the baseline survey under-represented men and probably younger and minority smokers.¹⁸ Only 65% of the smokers identified in the baseline survey returned a follow-up survey, and this may help explain the higher overall cessation rates found in this study compared with national annual estimates (8.9% vs 2.5%, respectively).³¹

Further, these results are based on reports from patients and do not reflect the perspective of clinicians or notations from the medical record. Of note, however, Patrick and colleagues found the overall validity of smoking self-reports is high, with sensitivity and specificity estimates of close to 90%, especially in observational studies.³² Separate analyses conducted in the HIT study health plans found notations of offers of the 5-As treatments in the medical record were substantially lower than reports from patients.³³ Analyses do not include unmeasured factors such as provider^{34,35} and visit^{36,37} characteristics. Finally, these results may not apply in other health-care settings, especially where cessation treatments are not covered benefits.

CONCLUSION

The results of this study highlight the need for quality reports, health plans, and clinicians to go beyond providing smokers with simple advice. Reports from smokers in nine geographically diverse health plans showed wide variation in the types of 5-As tobacco treatments offered to smokers. Advice to quit was common, but less than half of smokers reported being offered the most effective Assist treatments. When smokers used the Assist tobacco treatments under usual care conditions, their effectiveness was similar to results from meta-analyses of clinical trials. Cessation was twice as likely when smokers attended classes/received counseling, or used pharmacotherapies. Results call for increased tobacco-control efforts by health-care systems and providers, and new cessation interventions for patients who smoke.

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Conflict of Interest: In the past 3 years Dr. Quinn served as a co-investigator on studies funded by Pfizer and Sanofi-Aventis and Dr. Rigotti served as a consultant to Pfizer and Sanofi-Aventis and received research grants from Pfizer, Sanofi-Aventis, and Nabi Biopharmaceuticals.

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