

# Measuring provider adherence to tobacco treatment guidelines: A comparison of electronic medical record review, patient survey, and provider survey

Molly B. Conroy, Nicola E. Majchrzak, Caroline B. Silverman, Yuchiao Chang, Susan Regan, Louise I. Schneider, Nancy A. Rigotti

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**An accurate method of measuring primary care providers' tobacco counseling actions is needed for monitoring adherence to clinical practice guidelines. We compared three methods of measuring providers' tobacco counseling practices: electronic medical record (EMR) review, patient survey, and provider survey. We mailed a survey to 1,613 smokers seen by 114 Boston-area primary care providers during a 2-month period to assess what tobacco counseling actions had occurred at the visit ( $N=766$ ; 47% response rate). Smokers' reports were compared with the EMR and with their providers' self-reported usual tobacco counseling practices, derived from a provider survey ( $N=110$ ; 96% response rate). Patients reported receiving each counseling action more frequently than providers documented it in the EMR. Agreement between the patient survey and the EMR was poor for all 5A steps (kappa statistic=0.01–0.22). Providers reported that they often or always performed each 5A action at a higher rate than indicated by EMR or patient report. However, providers who said they often or always performed individual 5A steps did not have consistently higher mean rates of EMR documentation or patient report than those who said they performed the 5A's less frequently. Little agreement was found among the three methods of measuring primary care providers' tobacco counseling actions. Implementing an EMR does not necessarily improve providers' documentation of tobacco interventions, but EMR adaptations that would standardize provider documentation of tobacco counseling might make the EMR a more reliable tool for monitoring providers' delivery of tobacco treatment services.**

## Introduction

Tobacco use is a major cause of morbidity and mortality in the United States (Centers for Disease Control and Prevention, 1999). A brief smoking cessation intervention by clinicians is effective in helping smokers to quit, but many smokers do not

receive such intervention (Lancaster, Stead, Silagy, & Sowden, 2000; Thorndike, Rigotti, Stafford, & Singer, 1998). The U.S. Public Health Service (USPHS) has produced a clinical practice guideline recommending that health care providers routinely counsel patients using a five-step algorithm commonly known as the 5A's: (a) ask patients about smoking status at every visit, (b) advise all tobacco users to quit, (c) assess a patient's willingness to quit, (d) assist the patient's quitting efforts (provide smoking cessation treatments or referrals), and (e) arrange follow-up (Fiore, 2000).

Accurate measures of providers' delivery of tobacco cessation efforts during office practice are needed to monitor providers' adherence to this guideline and to assess the impact of interventions (Pbert et al., 1999). Existing methods for monitoring provider practice patterns include providers' own reports of their behavior, patients' reports of

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Molly B. Conroy, M.D., M.P.H., Division of General Internal Medicine, University of Pittsburgh, PA; Nicola E. Majchrzak, M.S.W., M.P.H., Caroline B. Silverman, M.Sc., Susan Regan, Ph.D., Nancy A. Rigotti, M.D., Tobacco Research and Treatment Center and General Medicine Division, Massachusetts General Hospital, Harvard Medical School, Boston, MA; Louise I. Schneider, M.D., Division of General Internal Medicine and Primary Care, Brigham and Women's Hospital, Harvard Medical School, Boston, MA; Yuchiao Chang, Ph.D., General Medicine Division, Massachusetts General Hospital, Harvard Medical School, Boston, MA.

Correspondence: Nancy A. Rigotti, M.D., Massachusetts General Hospital, 50 Staniford Street, 9th floor, Boston, MA 02114, USA. Tel: +1 (617) 724-4709; Fax: +1 (617) 724-3544; E-mail: nrigotti@partners.org

providers' actions, review of medical records, and direct observation of the physician-patient encounter. Each method has limitations. Direct observation or audiotaping of clinical encounters is the gold standard but is cumbersome and expensive to implement, even in research settings (Stange et al., 1998). Providers generally overestimate how often they counsel patients about health-related behaviors, including smoking (Montano & Phillips, 1995; Thorndike et al., 1998). Patients' reports may either underestimate (Thorndike et al., 1998) or overestimate (Pbert et al., 1999; Wilson & McDonald, 1994) their receipt of counseling services, including smoking counseling, compared with direct observation (Ellerbe, Ahluwalia, Jolicoeur, Gladden, & Mosier, 2001; Pbert et al., 1999; Stange et al., 1998; Wilson & McDonald, 1994). No published data compare these methods for assessing the full spectrum of USPHS-recommended 5A tobacco intervention activities.

Medical record documentation of health-behavior counseling, including smoking cessation counseling, has been shown repeatedly to underestimate actual practice (Nicholson, Hennrikus, Lando, McCarty, & Vessey, 2000; Pbert et al., 1999; Stange et al., 1998; Wilson & McDonald, 1994). Electronic medical records (EMRs) are being adopted at a rapid pace by health care institutions and physician practices (Schneider, Riehl, Courte-Wienecke, Eddy, & Sennett, 1999; Tang, LaRosa, & Gorden, 1999). EMRs are easier to review than paper records and often use templates to record standard information, a feature that might improve providers' documentation of tobacco counseling activities (Soto, Kleinman, & Simon, 2002; Spenser, Swanson, Hueston, & Edberg, 1999). To our knowledge, no study has compared EMR review with other methods of assessing providers' delivery of tobacco cessation counseling in office practice. If agreement between methods is high, it would suggest that EMR systems can provide a valid index of tobacco intervention by clinicians. By contrast, low rates of agreement would suggest that an EMR does not, by itself, ensure accurate recording of tobacco intervention in the medical encounter and that further adaptations may be needed to enhance the utility of the EMR.

The present study compared three methods of measuring how often primary care physicians and nurse practitioners delivered the 5A smoking intervention in office practice: provider survey, patient survey, and EMR review. The study extends past work by comparing the EMR with other methods for measuring smoking counseling and by providing a systematic examination of each of the five actions recommended in the USPHS tobacco treatment clinical guideline. We hypothesized that providers who reported higher levels of performing 5A tobacco

counseling would be more likely to document such counseling in the EMR and would have a higher percentage of patients who reported receiving each of the 5A's.

## Method

The present analysis used baseline data from an ongoing study evaluating the effect of feedback and reimbursement on primary care providers' rates of addressing their patients' tobacco use. The study is being conducted at eight Boston-area primary care practices that use an EMR and are affiliated with Partners HealthCare, Inc., an integrated health care delivery system in eastern Massachusetts. Physicians and nurse practitioners in the participating practices were recruited for the study, and 114 (88%) of the 129 eligible providers consented (106 physicians and 8 nurse practitioners).

At baseline, we measured providers' adherence to the national tobacco treatment guideline by assessing what occurred when a smoker made an office visit to a participating provider during a 2-month observation period. The assessment consisted of a patient survey mailed after the visit, review of the patient's EMR from that visit, and a concurrently administered survey asking the provider to report his or her usual practice regarding tobacco treatment. The data collection forms for these assessments measured a common set of actions based on the USPHS tobacco treatment guideline, using the structure of the 5A algorithm. In this way, the analysis could compare, for a common set of items, agreement between the patient survey, medical record, and provider survey. The study was approved by the institutional review board of Partners HealthCare, Inc. Providers and patients were informed that the surveys were part of a research study designed to assess how physicians addressed patients' tobacco use.

### *Patient survey*

All adults who made an outpatient visit to the 114 participating primary care physicians or nurse practitioners during the 2-month observation period (January 15–March 15, 2002) were identified from administrative records ( $N=21,344$ ). We reviewed the EMRs of these patients by early April 2002 to identify likely current smokers, defined as any patient who was identified as a smoker in a chart note in the past 3 years and who had not subsequently been noted to have quit. The goal was to maximize our chance of identifying all current smokers. This process identified 2,030 probable current smokers (10% of the patients seen). As required by the institutional review board, we asked

each patient's physician for permission to contact the patient. By May 2002, we obtained permission to contact 1,613 patients (80%). When permission was denied, providers usually indicated a legitimate reason. Most often the patient was a nonsmoker or had poor mental status.

Contacted patients received a mailed survey in May–June 2002. The subsequent survey protocol included a postcard reminder, a second mailing, and up to 10 attempts to administer the survey by telephone. Surveys were completed by 766 patients (47% response rate). A total of 686 (90%) of the respondents recalled their visit during the observation period, but 164 (24%) of those recalling the visit either claimed they were not smoking at the time of the index visit ( $n=162$ ) or failed to answer this question ( $n=2$ ). The remaining 522 respondents were smokers at the time of the index visit for this analysis. Respondents did not differ from nonrespondents by gender (65% vs. 63% female,  $p=.62$ ), but respondents were somewhat older than nonrespondents (47.5 vs. 45.3 years,  $p<.001$ ).

The survey asked patients about the actions their provider had taken to address tobacco use during a specific office visit (the index visit). Actions were categorized using the 5A model, as shown in Table 1. Response options were “yes”, “no,” or “don't recall.” Patients who indicated “don't recall” were considered not to have received that step.

### Electronic medical record

The EMR system used in the present study contained a health maintenance grid in which providers or other office staff could note or update a patient's smoking status and indicate that counseling had occurred on a specific date. All other tobacco counseling was noted in the free text section of the note. The system contained no mandatory response fields, and no mechanism prompted the provider to perform or document 5A counseling after indicating in the health maintenance grid that a patient was a smoker.

We reviewed the EMRs of the 522 patients who completed the patient survey, recalled having made a visit to the primary care practice during the study period, and reported having been a smoker at the time of the visit. The EMR contained a visit note from the study period for 479 (92%) of these patients. A single trained research analyst reviewed these medical records for documentation of the 5A's. The review encompassed all visit notes from the study period and the year preceding the index visit, along with entries made during this time frame in the health maintenance grid, problem list, and medication list.

Medical record review forms were developed to assess the provision of the USPHS clinical practice guideline, using the 5A model, and to match questions asked on the patient survey (Table 1). Response options were “yes” or “not noted.” The 43

**Table 1.** Questions from patient and provider surveys.

	Patient survey	Provider survey
5A	Question	Question
Ask	At your last visit in January, February, or March; did anyone ask if you use tobacco?  <i>At your visit in January, February, or March, did the doctor or nurse practitioner do any of the following?</i>	How often do you ask about or otherwise identify a patient's smoking status at a typical visit (including new patient, problem, and health maintenance visits)?  <i>If your patient is a smoker, how often do you do each of the following on a typical visit (including new patient, problem, and health maintenance visits)?</i>
Advise	Advise you to stop smoking	Advise patients to quit smoking
Assess	Ask you about your interest in quitting smoking Ask if you were willing to set a quit date	Ask smokers about their interest in quitting smoking
Assist: <i>Counsel</i>	Talk with you about how to quit smoking	Provide brief counseling about how to quit smoking
Assist: <i>Materials</i>	Give you reading material to help you stop smoking	Give out written stop-smoking materials
Assist: <i>Medication</i>	Recommend using nicotine patch or gum to stop smoking Recommend using nicotine inhaler or nasal spray to stop smoking Recommend using Zyban (Wellbutrin, bupropion) to stop smoking	Discuss use of medications (nicotine replacement or Zyban) to stop smoking
Assist: <i>Refer</i>	Refer you to a nurse or someone else in the office for more information about quitting smoking Give you a telephone number to call for help quitting  Give you information about counseling classes or programs to help you quit smoking Refer you to the Quit Smoking Program at BWH or MGH	Refer to a nurse or someone else in the office for more information about quitting smoking Refer for telephone counseling (e.g., Massachusetts Quitline, 1-800-TRY-TO-STOP) Refer to a smoking cessation class or program such as the MGH or BWH Quit Smoking Service
Arrange	Suggest a follow-up visit or phone call about quitting smoking	Suggest a follow-up visit or phone call about quitting smoking

patients for whom no EMR note was created for the index visit were counted as having none of the 5A's documented for this visit. Providers who documented that they "discussed" smoking or "counseled" about smoking without providing additional details about the content of the discussion or counseling were considered to have fulfilled the criteria for Advise but not for Assist. The Assist variable included several items, including providing brief counseling about how to quit, giving out written materials, recommending pharmacotherapy, or referring to counseling services.

Chart review data collection forms were developed and piloted in an iterative manner by two researchers, who developed comprehensive coding instructions used to train the single chart reviewer. The reviewer's intrarater reliability was assessed by having her repeat the review of a random sample of 30 charts. Intrarater agreement for 5A items ranged from 87% to 100%.

#### *Provider survey*

In February 2002 we mailed a 2-page survey to all 114 participating providers, along with a US\$1 financial incentive for completion. Nonrespondents received the survey again 2 weeks later, followed by distribution of the survey twice by electronic mail, each 2 weeks apart. Clinicians who still had not completed the survey were contacted by telephone to urge them to do so. We obtained 110 completed surveys (96% response rate).

The survey included five items that asked providers to report their typical practice regarding tobacco use during an office visit. Actions were categorized using the 5A model, as shown in Table 1. Providers also were asked how often they documented counseling. Responses were made on a 5-point modified Likert scale (never, rarely, sometimes, often, and always). So that we could compare provider rates of 5A's to those in the patient surveys and EMRs, we collapsed the responses into "often" or "always" vs. other responses.

#### *Data analysis*

Separate analyses were conducted for each 5A activity.

*Agreement between patient survey and medical record.* Because the patient survey and the record review focused on the index visit, data from these sources could be compared directly to assess agreement. The proportion of the 522 patients who reported having received each 5A intervention at the index visit was compared with the proportion of patients whose records contained documentation of

the same 5A's during the study period. Of the 522 patients, 129 (25%) made more than one visit during the study period. These patients received credit for having a 5A step documented if any chart entry made during the 2-month study period contained this information. The percentage agreement was calculated as the number of concordant patient survey–medical record pairs divided by the total number of pairs. The kappa statistic assessed agreement between the patient survey and the EMR. We considered any kappa below 0.21 to indicate poor agreement between the patient survey and the EMR (Dawson & Trapp, 2001).

*Comparison of the provider survey and the patient survey.* A direct comparison of the provider survey with either the patient survey or the medical record was not possible because providers were asked how often they performed an activity in general rather than whether it was done on a particular visit. Instead, we assessed whether the patients of providers who reported always or often performing a 5A step were more likely to report having received that activity, compared with patients of providers who reported taking that action sometimes, rarely, or never. For each provider, we calculated the percentage of patients reporting receipt of each 5A. Providers were grouped according to the frequency with which they reported each activity (always, often, sometimes, rarely, never). To assess the relationship between patient and provider reports, we used logistic regression models to predict patients' reports of a 5A activity according to the frequency of provider reports. The generalized estimating equations (GEE) techniques were used to handle the repeated-measures structure of the data. These analyses accounted for the clustering of patients within providers.

*Comparison of provider survey and medical record.* We assessed whether providers who reported that they often or always completed a 5A step were more likely to have documented that activity in the medical record, compared with providers who reported completing the activity less frequently. For this analysis, providers were counted as having documented the activity if it appeared in a patient's record at least once during the 12-month period ending with the index visit. We also assessed whether providers who reported that they often or always documented counseling in the EMR were more likely to have documented any 5A activity, compared with providers who reported documenting less frequently.

For each provider, we calculated the percentage of medical records documenting receipt of each 5A. Repeated-measures logistic regression models (GEE) were used to determine whether providers'

self-reported frequency of performing an activity (often/always vs. sometimes/rarely/never) predicted documentation of the activity in the patient chart, while accounting for clustering of medical records within provider. We used SAS v. 8.2 for all analyses and considered two-sided *p* values less than .05 to be significant.

**Results**

Table 2 shows the characteristics of the 522 respondents who reported smoking at the time of their visit during the study period. Table 3 shows the characteristics of their providers, including the frequency with which they reported performing each of the 5A actions at a typical patient visit. Over 90% of providers said they often or always ask, advise, and assess readiness to quit, and 79% reported that they routinely provide some form of cessation assistance, but only 15% said that they often or always arrange follow-up. Providers also reported documenting their tobacco counseling efforts in the medical record at a high rate; nearly two-thirds of providers stated that they always or often did so.

Figure 1 contrasts the frequency at which each 5A activity was reported by providers, patients, and the medical record. More physicians reported that their typical practice was to always or often perform each 5A step than the chart review documented or the patient surveys reported. The exception was the Arrange follow-up step, which was reported more frequently by patients than providers. The estimates from physicians, patients, and the chart were most similar for the Ask variable, the only action documented in the chart at a substantial rate.

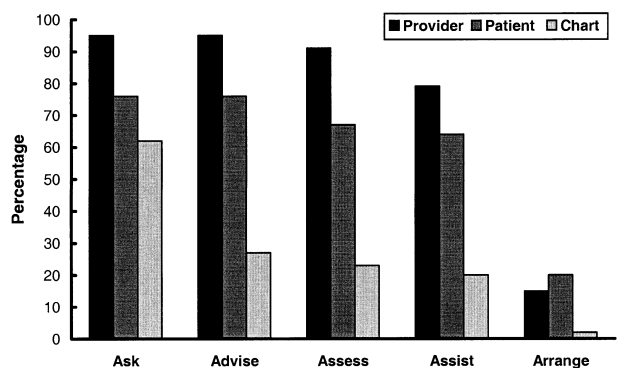
**Table 2.** Characteristics of smokers who recalled seeing their primary care provider during the study period, January 15–March 15, 2002 (N=522).

Characteristic	n (percent)	Mean (SD)
Age (years)		47.5 ± 14.1
Sex		
Female	344 (66)	
Male	178 (34)	
Race		
White	381 (74)	
Black	74 (14)	
Other	57 (12)	
Hispanic ethnicity	14 (3)	
Education (>high school)	328 (65)	
Health status		
Excellent or very good	201 (39)	
Good	202 (39)	
Fair or poor	105 (22)	
Length of relationship with physician		
<1 year	100 (19)	
1–5 years	228 (44)	
>5 years	194 (37)	
Cigarettes/day		14.7 ± 12.3

**Table 3.** Primary care providers' characteristics and tobacco intervention practices (N=110).

Characteristic or practice	n (percent)	Mean (SD)
Baseline characteristic		
Age (years)		45.0 ± 9.3
Sex		
Female	59 (54)	
Male	51 (46)	
Year completed training		
1961–1980	28 (25)	
1981–1990	31 (28)	
1991–2001	50 (45)	
Clinical workload (number of half-day patient care sessions per week) <sup>a</sup>		
1–2	35 (32)	
3–6	45 (42)	
≥7	30 (26)	
Self-reported frequency of tobacco intervention		
Frequency of doing 5A tobacco intervention (always or often)		
Ask about tobacco use	104 (95)	
Advise tobacco cessation	105 (95)	
Assess readiness to quit	100 (91)	
Assist smokers with cessation (any action)	87 (79)	
Provide brief counseling	70 (64)	
Discuss use of medications	57 (52)	
Give out written stop-smoking materials	14 (13)	
Refer to smoking cessation class or program	32 (33)	
Refer to nurse or other office staff	8 (6)	
Refer for telephone counseling	4 (4)	
Arrange follow-up	17 (15)	
Frequency of documenting tobacco counseling in record		
Often/always	71 (65)	
Sometimes	30 (27)	
Never/rarely	9 (8)	

Note. <sup>a</sup>Eight patient care sessions per week is full-time clinical practice.



**Figure 1.** Frequencies of 5A's in provider survey, patient survey, and electronic medical record. Provider survey frequencies represent the percentage who stated that they often or always took the action.

Table 4 shows the frequencies with which an action at a specific visit was reported by the patient or documented in the chart. Patients consistently reported receiving each 5A step more frequently than physicians documented it. The rate of 5A

**Table 4.** Agreement between 5A's in patient survey and in electronic medical record (N=522).

	Patient survey (percent)	Electronic medical record (percent)	Percentage agreement <sup>a</sup>		Kappa statistic
			+	-	
Ask about smoking status	76	62	55	10	0.22 <sup>b</sup>
Advise cessation	76	27	26	17	0.13
Assess readiness to quit	67	23	19	29	0.12
Assist cessation (any action)	64	20	18	34	0.18
Do brief counseling	51	4 <sup>c</sup>	4	39	0.05
Discuss medications	44	11	9	54	0.19
Provide written material	20	<1	<1	72	0.01
Refer to office staff	20	<1	<1	73	0.07
Refer to Quitline	22	<1	<1	71	0.01
Refer to formal program	37	8	7	62	0.22 <sup>b</sup>
Arrange follow-up	20	2	2	72	0.11

*Note.* <sup>a</sup>Positive (+) percentage agreement is the percentage of patients who reported receiving a 5A step who also had the step documented in their medical record. Negative (-) percentage agreement is the percentage of patients who reported not receiving a 5A step who did not have this step documented in the medical record. <sup>b</sup>Kappa indicates slight agreement. All other kappas represent poor agreement. <sup>c</sup>If documentation criteria are relaxed to include a reference to "discussed smoking" or "counseled about smoking" without additional details, the rate increases to 12%, but the kappa statistic increases only to 0.10.

documentation in the EMR was particularly low for the Assist and Arrange steps. Among the various Assist categories, offering pharmacotherapy was the only action documented in more than 10% of records. We then reanalyzed the data using a less stringent criterion for "Assist: counsel" that included providers who documented in the record that they "discussed" smoking or "counseled" about smoking but provided no other details. This approach increased the documentation rate of "Assist: counsel" from 4% to 12%, making it comparable with the rate of documenting an offer of pharmacotherapy.

Agreement between the patient survey and the EMR, as measured by the kappa statistic, was poor for all of the 5A's, except Ask (kappa=.22) and "Assist: formal program" (kappa=.22); for these steps, we found a slight level of agreement. We repeated the analysis, limiting it to patients who made a single visit to a provider during the study period, to ensure that including patients with multiple visits did not change the kappa statistics. The kappas did not vary substantially with this reanalysis (data not shown).

We calculated the mean proportion of patients who reported having received each 5A across the categories of provider response. For most actions, no statistically significant difference was found in patient reports by provider survey response (data not shown).

We also calculated mean EMR documentation of each 5A across the categories of provider response. For Advise and Assess, documentation of the activity did not vary with provider report (all *p* values >.05). Statistically significant differences (all *p*<.05) were found for Ask, Arrange follow-up, and two Assist activities (brief counseling and referring to cessation programs). Providers reporting they always or often perform these steps documented them more

frequently in the EMR. However, apart from Ask, these activities were noted rarely in the EMR, and it is difficult to conclude that the differences noted were clinically meaningful. Providers who reported often or always documenting counseling were not more likely to have documented any 5A activity than were those providers who reported documenting less frequently (data not shown).

## Discussion

This comparison of alternative methods for measuring how frequently providers offer the 5A tobacco intervention during an office visit demonstrated little agreement between what patients reported and what the EMR of that same visit documented. The EMR review revealed low rates of documentation for all 5A steps except for the identification of smoking status (i.e., Ask). Patients reported that their physicians conducted the 5A steps at a much higher rate than the record indicated, suggesting that physicians failed to document all of their actions in the EMR. Although most providers felt they were often or always providing the 5A's, this translated into modest rates of patient report of 5A activity and relatively low per-visit rates of documentation.

Because the present study included no direct observation of the physician-patient encounter, the true rate at which the tobacco intervention steps occurred is unclear. Audiotapes or videotapes of patient encounters could have provided a gold standard, but these methods were neither financially nor logistically feasible in this large-scale study. However, the pattern of our results was consistent with previous studies using direct observation. Such studies have shown that providers overestimate in surveys how often they counsel smokers (Thorndike et al., 1998; Wilson & McDonald, 1994)

but underdocument in paper records their counseling about health behaviors (Nicholson et al., 2000; Pbert et al., 1999; Stange et al., 1998; Wilson & McDonald, 1994). The present study suggests that the use of an EMR in place of a paper record did not correct the underdocumentation problem.

Patients' reports of what occurred at a visit fell between the lower estimates from the EMR and what one might expect based on provider self-report. Previous studies comparing patients' reports with the gold standard of direct observation have shown that patients' reports can be imprecise and may overestimate actual practice (Montano & Phillips, 1995; Thorndike et al., 1998). One could argue that what the patient recalls from a medical visit is probably the most meaningful measure when the goal is to change a patient's behavior. This was the conclusion of a study of hospital patients, in whom behavior change (quit attempts) was predicted by patients' reports but not by physicians' documentation of cessation counseling (Nicholson et al., 2000). However, the time elapsed between a visit and a patient survey can introduce error into a mailed survey. If the goal is to identify accurately what transpired during a patient visit, a patient exit interview may be most appropriate, but this method cannot capture the impact of a visit on a patient's subsequent smoking status.

The only action documented in more than one-third of EMRs and at a rate comparable with what patients or providers reported was the identification of patient smoking status (i.e., Ask). A likely explanation is that in our EMR, the Ask variable is the only one documented using a template (i.e., checking a box marked "smoking status" in the health maintenance grid). Data for the template can be recorded by providers or other staff. The other 5A steps must be entered in a free text note, which is usually done only by providers. Implementing a format in the EMR that facilitates provider documentation of 5A activities, such as a standardized pop-up 5A form, might increase documentation rates of the 5A tobacco intervention steps. Such a system also might remind providers to counsel smokers (Soto et al., 2002; Spenser et al., 1999). Future EMR systems could be designed that would not only remind providers to counsel by giving them a set of boxes to check off but also enhance counseling by providing tips, creating tailored materials for smokers, or facilitating referral of smokers to additional cessation services such as telephone quitlines. One also might imagine that if the patients were allowed to interface with the EMR, they could input and update health information (e.g., smoking status) and receive counseling materials directly. EMR systems that emphasize "documentation for the sake of documentation"

(Grant, 1999) are probably less likely to improve patient outcomes.

Another potential explanation for physicians' high rates of identifying smoking status is that national efforts focused on making smoking status identification into a routinely documented vital sign may be succeeding. This step is seen by many observers as key to increasing physicians' tobacco counseling efforts. Although no specific system-level intervention to increase smoking status documentation occurred in the study practices, the high rate of documentation may reflect general changes in documentation patterns. If that is the case, our results are consistent with a recent study demonstrating that routine documentation of smoking status did not generate comparable increases in other 5A tobacco intervention steps (Boyle & Solberg, 2004).

The most frequently documented of the nine possible actions in the Assist category was the provision of medication advice, perhaps because providers routinely document new or changed prescriptions. Only 4% of charts documented that the physician had provided tobacco cessation counseling, although this rate increased to 12% when we relaxed the documentation criteria for delivering brief counseling. Nevertheless, these rates are low, considering that providers can offer counseling to smokers at all stages of readiness to quit. An electronic template in the EMR could be designed to facilitate more complete 5A documentation and should be explored.

Our findings should be interpreted in the context of the study's limitations. The relatively low response rate to the patient survey could have introduced a response bias. We were able to compare respondents and nonrespondents on age and gender and found little difference. Survey respondents might be more likely than nonrespondents to recall counseling. If so, the patient survey would produce an overestimate of true patient-reported counseling rates. This might explain the observed high rates of three of the 5A steps (Ask, Advise, and Assess) compared with other surveys that use patient reports (McBride, Plane, Underbakke, Brown, & Solberg, 1997; Milch, Edmundson, Beshansky, Griffith, & Selker, 2003; Piper et al., 2003). However, there is no a priori reason to believe that providers' medical record documentation of smoking counseling would differ between patients who did and did not return the patient survey. Hence, the low response rate to the patient survey should not alter our assessment of the comparability of patient report with chart review or physician report.

Another limitation is that the survey asked patients to recall a visit that had occurred several months earlier. We sent the patient survey as rapidly as possible after the visit, but a delay of several

months was unavoidable for administrative reasons and human subjects requirements for protection of health information. Because of the delay, patients' recollections of the details of that visit may have been imprecise, which may have contributed to the low agreement between patient survey and record review. A patient exit interview would provide a more immediate and likely more valid measure of patient report (Pbert et al., 1999). We were unable to use this method due to financial and logistical constraints, which also prevented us from including a gold standard measure such as an audio or video transcript of the patient encounter.

We also acknowledge that the EMR itself may contain some inaccurate data. Because 24% of the respondents who recalled a visit said they were not smoking at the time of the visit, the EMR data indicating they were smokers could be inaccurate or outdated. We observed a 10% smoking rate in the study practices, which is likely an underestimate because the current adult smoking prevalence in Massachusetts is 20% (Massachusetts Department of Public Health, 2002). The cause of the underestimate of prevalence is likely a combination of providers' insufficient documentation in the EMR and patients' underreporting of their smoking status.

Another limitation is that some patients made more than one visit during the study period. Patients may have merged more than one visit in their recall, which may have contributed to the discrepancy between the patient survey and the chart review results. Also, the provider survey asked providers to summarize their typical actions over the past year, rather than report on what they did at a single visit. This prevented a direct comparison of the provider survey to the patient survey or the EMR, although an indirect comparison was possible. Finally, the present study was conducted among patients of 114 providers in eight primary care practices affiliated with academic medical centers in one city. As stated above, the documented smoking rate in these practices is below the Massachusetts average. Therefore, we cannot be certain that our findings are generalizable to other institutions or provider groups. However, many of our findings confirm what others have reported about the accuracy of these methods of assessing physician practice.

In summary, the present study found little agreement among three methods for assessing primary care providers' delivery of the 5A tobacco intervention in office practice. An accurate and practical way of measuring physicians' actions addressing tobacco use in medical practice is needed. Such a method is needed by health care organizations and regulatory bodies that use providers' rates of tobacco counseling to measure quality of care and, in some cases, determine financial incentives. Health services

researchers need an accurate way to measure changes in providers' behavior in response to system-level interventions designed to improve rates of tobacco counseling. A patient exit interview is an option for research purposes but is not practical for monitoring the quality of care. One approach worth testing is to design more sophisticated EMRs to facilitate provider documentation and patient outcomes. This could potentially allow monitoring of EMRs as a more accurate and practical method of measuring providers' provision of tobacco treatment services in office practice.

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