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Cancer Prevention in Primary Care: Predictors of Patient Counseling Across Four Risk Behaviors over 24 Months

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Abstract

Objective—Rates of preventive counseling remain below national guidelines. We explored physician and patient predictors of preventive counseling across multiple cancer risk behaviors in at-risk primary care patients.

Methods—We surveyed 3557 patients, with at least one of four cancer risk behaviors: smoking, diet, sun exposure, &/or mammography screening, at baseline and 24 months. Patients reported receipt of 4A's (Ask, Advise, Assist, Arrange follow-up); responses were weighted and combined to reflect more thorough counseling (Ask=1, Advise=2, Assist=3, Arrange=4, score range 0–10) for each target behavior. A series of linear regression models, controlling for office clustering, examined patient, physician and other situational predictors at 24 months.

Results—Risk behavior topics were brought up more often for mammography (90%) and smoking (79%) than diet (56%) and sun protection (30%). Assisting and Arranging follow-up were reported at low frequencies across all behaviors. More thorough counseling for all behaviors was associated with multiple visits and higher satisfaction with care. Prior counseling predicted further counseling on all behaviors except smoking, which was already at high levels. Other predictors varied by risk behavior.

Conclusions—More thorough risk behavior counseling can be delivered opportunistically across multiple visits; doing so is associated with more satisfaction with care.

Keywords

Primary Care; physician counseling; cancer prevention

Précis At risk patients (n=3557) who receive more thorough counseling—more of the 4As—also report more satisfaction with their care. Yet counseling rates are still low across cancer risk behaviors.

Introduction

Health risk behaviors account for approximately 40% of known causes of death (Mokdad et al, 2000). Visits to primary care physicians account for 63% of all visits, with most patients making multiple visits per year (Woodell & Cherry, 2004). Still, rates of preventive counseling remain well below national guidelines (Pronk et al, 2004). Preventive counseling has been characterized by the 4A approach (Ask, Advise, Assist, Arrange follow-up), first developed to guide smoking cessation counseling in primary care (Fiore et al, 1996). Variations of this approach have been applied to other risk behaviors, including physical activity (Pinto et al, 2001), diet (Ockene et al, 1996) and sun protection Mikkilineni et al, 2002). A more recent expansion to the 5A's added Assess readiness to change and was applied to smoking (Fiore et al, 2000) and multiple risk behaviors (Dosh et al, 2005). The 5A model was modified further by incorporating Ask into the Assess step and adding Agree, and this model was recommended as a unifying approach for brief primary care interventions across multiple risk behaviors and as a framework for examining findings across studies (Whitlock et al, 2002). While our study was designed when the earlier 4-A model was in use, both the 4A and 5A approaches incorporate common behavior change theories, each "A" strategy has been validated in the literature (Whitlock et al, 2002), and primary care intervention research suggests that delivery of the A's combination is more effective than advice alone (Whitlock et al, 2002; Goldstein et al, 2004). For example, in smoking cessation studies, increased counseling intensity (dose response effect from < 3 minutes to > 20 minutes) is associated with higher abstinence rates (Fiore et al, 2000).

Few studies have examined the implementation of A's across multiple risk behaviors. Dosh and colleagues (2005) described delivery of 5A's, as assessed from chart reviews on tobacco, diet, physical activity and alcohol interventions, and found limited penetration of the construct; documentation was more common for Ask, while Assist and Arrange were infrequently recorded. Knowledge of factors that influence delivery of counseling across multiple behaviors will inform strategies to improve effectiveness of risk behavior interventions. Previous efforts to identify predictors of preventive care delivery have typically focused on just the first 2 A's, Asking about or Advising on behavioral risks. Patient demographic factors associated with receipt of physician advice have included higher income for diet and exercise (Tiara et al, 1997); higher education for diet and exercise (Honda, 2004); middle age for diet and exercise (Honda, 2004); or older age for smoking (Denny et al, 2003) and for multiple risks behaviors (i.e, smoking, overweight and physical inactivity) (Friedman et al, 1994); women for smoking (Denny et al, 2003) and multiple risks (Friedman et al, 1994); and poorer perceived health for diet (Honda, 2004). Asking about or screening for risk factors among persons reporting one or more behavioral risk factors (i.e., overweight, physical inactivity, smoking, risky drinking) was associated with higher income, higher education, being male, less than age 65, having four or more healthcare visits in the past year, and having a regular source of preventive care (Coup et al, 2004).

This study is different from prior studies reported in the literature as it examines predictors of provider counseling for more than Ask and Advice. We focus on the combination of 4A's, with Ask, Advise, Assist and Arrange follow-up, examining predictors over a two-year time frame. While many studies focus on behavioral risk for heart disease, we focused on persons at risk for one or more of four cancer risk behaviors: smoking, high fat diet, unprotected sun exposure, and/ risk of missed mammography screening. We chose to investigate potential predictors previously studied, including patient age, gender, education, marital status, employment, income, race and ethnicity, perceived health, perceived cancer risk, number of healthcare visits in past year. Since we are examining counseling for multiple risks, we investigated whether being at risk in other risk behaviors was associated with counseling in a target behavior, and whether the degree of risk, as measured on a validated behavior score, was associated with

counseling in that behavior. We also examined some less studied practice related factors, including physician specialty, satisfaction with care at last visit, prior advice on the target behavior. Finally, while some intervention study outcomes are reported elsewhere (Prochaska et al, 2005), we investigated the whether random assignment into one of two treatment groups, expert-system mailed or office-based intervention, was associated with delivery of 4A counseling. The project received approval by human subjects review boards of participating institutions.

Methods

Participants

Subjects were recruited into an intervention study where practices were randomly assigned to either an office-based intervention versus standard-care, and patients were randomly assigned within practices to either a tailored expert-system intervention versus assessment-only. The design of the larger study fully crossed the office-based intervention with the home-based expert system intervention, resulting in a two-by-two design. Practices were eligible if at least one physician was enrolled with the collaborating health insurer; identified specialty as Family Medicine, Internal Medicine or Obstetrics/Gynecology; reported that at least 25% of their patients were seen for continuity care; not hospital-based; and not planning to retire or relocate in the 4-year study period. Recruitment targeted 361 physicians within 274 practices. The study goal, to enroll 80 practices, was reached after contacting 172 practices (40 offices were ineligible, 52 refused). One practice dropped out soon after enrollment, resulting in 79 practices randomized.

Following physician recruitment, health plan subscribers listing a study physician as their doctor were identified. The health plan mailed letters to these patients, describing the project, their doctor's participation, and the option to refuse a recruitment telephone call. A total of 12,384 patients were contacted by phone: 3,820 patients (30.8%) refused (declined to accept call), giving a 69.2% recruitment rate. Eligibility criteria included age 18–75 and being at-risk in one more of targeted behaviors (smoking, diet, sun exposure, and mammography screening). Of 8,564 patients agreeing to participate, 3,157 (36.9%) were ineligible because they had none of the four behavioral risks, leaving a baseline sample of 5,407 (see Prochaska et al, 2005 for recruitment and retention details).

For exploration of provider counseling behaviors reported here, the analyses used a sub-sample of 3,557 patients reporting at least one medical visit in the prior year at the 24-month follow-up.

Interventions

The two experimental interventions utilized the Transtheoretical Model of Change (TTM) (Prochaska et al, 1992) to conceptualize individual behavior change. The TTM incorporates stages of readiness to change (precontemplation, contemplation, preparation, action, maintenance), pros and cons of changing, self efficacy, and processes of change to transition between stages. Medical providers in the office intervention condition were trained to use TTM to provide patients with stage-matched counseling and stage-appropriate resources, incorporating TTM components. Providers were given suggested scripts to use with patients who were ready versus not ready to change in each targeted risk behavior; each script applied the 4A approach. Intervention practices also received training on office systems to support cancer prevention activities (e.g. staff involvement, reminders, flowsheets); the standard office condition received only a copy of *Guide to Clinical Preventive Services*, published by U.S. Preventive Services Task Force (USPSTF, 2003). The office intervention was based on a combination of explanatory models for the adoption of new medical practice patterns. Offices

received eight educational visits by project staff over two years. Participants in the expert-system intervention received three tailored reports (at 0, 6, & 12 months) plus self-help manuals to facilitate adoption of cancer prevention behaviors; control condition individuals received assessment only (Prochaska et al, 2005).

Measures

A telephone survey was conducted at baseline, 12-, and 24-months for all participants, while expert-system intervention participants received an additional assessment at 6-months to generate a tailored report. Surveyors were blind to group assignment. Demographic items consisted of gender, age, marital status, education level, income, race, and ethnicity. General perceived health was assessed using an adapted item of the Medical Outcome Survey (Ware, 1976) ("Would you say that your health in general is 'poor', 'fair', 'good', 'very good' or 'excellent'?"), and perceived-risk for cancer ("Compared to others your same age and sex, how would you rate your risk of getting cancer within the next 10 years?" with 5-point response scale, 1=much lower than average to 5=much higher than average).

Participant behavioral risk for cancer was assessed for 1) smoking: self report of current daily smoking; 2) high-fat diet: estimated fat intake ≥ 30% calories and total score on the 22-item Dietary Behavior Questionnaire, consisting of items on substituting low- for high-fat foods, modifying food preparation, avoiding high-fat foods, and increasing fruits, vegetables and grains (Greene et al, 1996); 3) sun exposure: reporting sun exposure more than 15 minutes per day or inconsistently using SPF-15 or higher sunscreen, and total Sun Protection Behavior Scale score, with items on sunscreen use and sun avoidance (Rossi et al, 1995); 4) while all women over age 50 were considered "at risk" and eligible for mammography screening, we further defined relapse risk as having no screening in the past year, using standardized questions (Clark et al, 2002). Patients were asked to self-report height and weight for body mass index (BMI).

At baseline, patients reported recall of prior behavior change advice, "Have you ever been advised by your doctor or your doctor's assistants to do any of the following?: 1) give up smoking, 2) reduce amount of fat in your diet, 3) increase amount of fiber in your diet, 4) avoid harmful effects of the sun". At follow-up surveys, patients were asked about number of medical visits in the past 12 months. Satisfaction with care was asked at follow-up (Rubin et al, 1993). "Think about your last visit to your doctor's office and rate your satisfaction with this visit overall", rating 1=poor to 5=excellent. Physician specialty was obtained from participating physicians.

Also at follow-up, patients who reported having a medical visit in the past year were asked receipt of 4A's (Ask, Advise, Assist, Arrange follow-up) for each target behavior, from anyone in the medical office. Ask was worded as, "In the past 12 months, did any of the following topics come up, either through talking with a health care provider, and/or filling out a form", followed by the list of four target behaviors. Patients having any one of the target risk behaviors were then asked, "In the past 12 months, did your doctor or anyone in a medical office advise you", followed by the four target behaviors: to make diet changes, to protect your skin from sun exposure, to quit smoking, and for women over age 50 only, to get a mammogram. Assist was defined as, "In the past 12 months, did your doctor or anyone in a medical office *help you*, for example by setting goals, providing written material, or referring you for help, in any of the following areas?" Lastly, patients were asked if follow-up was arranged on any of the behaviors, as described above for Advise. Response options were "yes" or "no". Our dependent measure was a composite score for receipt of 4A's in each target behavior. "Yes" responses were weighted and combined to reflect thorough counseling (Ask=1, Advise=2, Assist=3, Arrange=4, score range 0–10) for each target behavior. The rationale for weighting is based on the Public Health Service *Smoking Cessation Guideline* (Fiore et al, 2000), where meta-

analysis showed a dose-response relationship for increased counseling intensity, as a function of encounter time. Use of specific components, such as problem-solving assistance, providing support, and arranging follow-up, were also found to have larger effect sizes (Fiore et al, 2000), suggestive of a higher weighting for these components.

Statistical analyses

The 4A weighted scores for each of the target behaviors were used as dependent measures in a series of linear-regression models to examine predictors at the 24-month follow-up. The sample (n=3,557) was divided into analysis models based on risk status, i.e., models on smoking counseling included only smokers, models on diet counseling included only persons at diet risk, etc.

There were three exploratory models for each behavior. The first model included demographic items as independent variables (Table 1). The second model focused on physician/practice variable (Table 2). The third modal focused on other patient variables (Table 3). A fourth final comprehensive model for each behavior was then constructed including all significant (p< .10) variables from each of the three earlier models. The analysis also included intervention group assignments for practices and patients. These assignments were explored as possible influences of counseling delivery in the context of other variables. We used hierarchical linear models with SAS Proc MIXED procedures for all analyses, to address nesting of patients within practices, and with office clustering effects controlled.

Results

The sample were mostly women (72%), well educated (65% > high school), married/living with a partner (73%), White (97%), and employed (70%)(Table 1). Patients' physicians specialized in Internal Medicine (43%), Family Practice (33%), and Obstetrics/Gynecology (24%)(Table 2). While only 19% were smokers, 68% reported having a high-fat diet, 72% reported low use of sun protection behaviors; and, among women over age 50, 7% were off-schedule for mammography (Table 3).

Patients' recall was higher for Asking and Advising than for Assisting and Arranging follow-up (Table 4). Rates for all smoking and mammography-related counseling steps were higher than for diet or sun protection. Except for counseling on Mammography screening, Assist and Arrange rates were underutilized across all risk behaviors.

Table 5 shows predictors for both exploratory and final multivariate models. All statistically significant variables from the exploratory models were included in one final model for each of the four risk behaviors. While not significantly associated with counseling in exploratory models where it was included, the physician treatment group was included in the final models, since risk behavior counseling was a focus of the office intervention.

Patient factors most often varied by risk behavior. Overall statistical results for final multivariate models are described as follows. For smoking, significant factors were higher age (≥35)(F(5, 541)=4.51, p<.001) and less education (≤12 years)(F(3, 541)=2.71, p<.05). Predictors for diet were poorer perceived general health (fair or good) (F (4, 1953)=7.12, p<.0001) higher BMI (≥25) (F 2, 1953) =40.47, p<.0001), and higher total dietary score (poorer behavior)(F(1, 1953)=14.90, p<.0001). Predictors for sun protection were higher age (F (5, 2221)=3.64, p<.01), higher total sun protection score (more protective behavior)(F(1, 2221) =19.37, p<.0001), and not being assigned to expert-system condition (F(1, 2221)=39.33, p<.0001). Significant predictors for mammography counseling were being off-schedule for mammography at baseline (F(1, 582)=4.27, p<.05) and being at-risk for high-fat diet (F(1, 582) =9.64, p<.01).

Some predictors were found to have an influence on multiple health behaviors. Prior advice was a significant predictor for diet (F(1, 1953)=28.63, p<.0001), sun (F(1, 2185)=55.01, p<.0001), and mammography counseling (F(1, 582)=5.16, p<.05). More frequent health care visits was a significant predictor of counseling for all health behaviors: smoking (≥5 visits)(F(3, 541) = 3.53, p < .01); diet (≥5) (F(3, 1953) = 14.98, p< .0001), sun protection (≥5) (F (4, 2221) =4.39, p<01); and mammography (3–4 visits) (F(3, 582) = 7.27, p<.0001). Patient satisfaction with care was associated with higher counseling scores at follow-up for all behaviors— smoking (F (1, 541) =6.74, p<.01), diet (F(1, 1953)=12.93, p<001), sun (F(1, 2221)=14.84, p<.0001), and mammography counseling (F(1, 582)=10.49, p<.01). Family or Internal Medicine physicians were more likely to provide thorough counseling for diet than ObGyn physicians (F(2, 1953)=3.77, p< 05).

Discussion

This study provided a unique perspective on multiple risk behaviors and provider 4A's counseling across cancer risk behaviors in a large sample of insured primary care patients. This is the first study to investigate predictors of the combination of A's in counseling, with at risk patients, using a composite weighted score to reflect more intensive counseling, from anyone in the primary care practice. Patients' recall of 4A's counseling showed more activity for smoking (mean combined 4A scores = 4.18) and mammography screening (6.39) than for diet (2.30) and sun protection (1.25). Smoking and mammography have received more attention in the past decade, with consistent evidence to support primary care intervention (USPTF, 2003). Encouragingly, provider counseling across all 4A's increased compared to an early 1990's random-digit-dial study of Rhode Islanders with a past-year medical visit, which showed 51% of smokers asked about smoking, 45.5% were advised, 14.9% assisted, and 3% had follow-up arranged (Goldstein et al, 1997). Counseling about mammography screening showed highest rates across the A's (90% Asked, 86% Advised, 71% Assisted, 41% Arranged), suggesting this has become routine in primary care. Lower counseling rates for diet may reflect more complex messages needed to support dietary change. Sun protection received lowest rates, which may reflect the limited attention skin cancer prevention has received compared to other targets for health behavior counseling (Mikkilineni, et al, 2001).

It is also not surprising that Ask and Advise steps were more often reported by patients. Assist and Arrange require more time, skills, resources, and active orientation towards preventive counseling. Assist strategies address motivation, barriers to change, self-help skills, and/or help to access referral resources. Arrange strategies include arranging follow-up counseling at the next visit regardless of the patient's motivational stage (Whitlock et al, 2001). Assisting and Arranging for mammography may be easier than for other behaviors since this may be addressed, at least in the patient's view, by simply writing an order and developing a plan to provide results. These tasks are also more closely aligned with traditional clinician roles.

Family and Internal medicine doctors were more likely than Ob/Gyn doctors to provide dietary counseling. Ob/Gyn doctors may be less likely to view such counseling as part of their role. Prior advice on all behaviors except smoking was a significant predictor of counseling for the same behavior. This finding suggests that providers who do this counseling do it consistently. Prior advice was reported by 92% of smokers at baseline, which probably explains the lack of a relationship between prior smoking advice and smoking counseling.

There were more differences than similarities across the four risk behaviors on patient predictors. Older patients reported more counseling on smoking, consistent with Denny et al (2003) and sun protection, perhaps because these health effects appear more often with older patients, providing counseling cues. More counseling among smokers with lower education levels (high school or less) is consistent with the demographics of current smokers. Dietary

counseling was more likely among patients with lower perceived health, consistent with Coup et al (2004), with a higher total diet behavior score (higher risk), and with higher BMI, which may have served as a cue to counseling. Conversely, patients who reported more sun-protection counseling also reported a higher baseline behavior score (lower risk), and prior sun-protection advice. Being off-schedule for mammography at baseline appeared to have a negative effect on counseling for mammography screening, but it is unclear if this reflects actual advice delivery or recall bias for these women. Interestingly, the presence of other risk behaviors (i.e. multiple risk factors within patients) did not generally predict counseling on a specific target behavior. The one exception was that having a high-fat diet as a risk factor was predictive of mammography screening counseling.

The number of medical visits was a predictor across all behaviors. This is consistent with the report by Coup et al (2004) on risk factor screening for persons with one or more risks. More frequent visits provide more opportunity for providers to intervene (Flocke & Stange, 2004). Moreover, the delivery of more thorough counseling may be spread over multiple visits, a distinct advantage when delivering counseling in the primary care setting. Flocke and colleagues (1998) found evidence for "opportunistic" preventive care, as counseling more likely occurred with higher-risk patients, while delivery of acute care and drug prescription during the visit decreased preventive services delivery.

Other studies have also reported an association between patient satisfaction and preventive care services delivery (Weingarten et al, 1995; Solberg et al, 2001; Stange et al, 1998). Recently, a primary care-based study of smoking cessation counseling showed that increased patient satisfaction was associated with receipt of each element of the 5As, independent of readiness to quit smoking; moreover, satisfaction with care increased as counseling intensity increased (Conroy et al, 2005). Our results do not indicate whether the delivery of counseling leads to greater satisfaction, or whether more satisfied patients elicit and/or report more counseling.

An unexpected finding for sun protection counseling was that those patients who received assessment only versus those receiving the expert-system report intervention were more likely to report physician counseling on sun protection. Perhaps completing assessments in the absence of an intervention, increased awareness and interest in sun protection, such that participants elicited more sun protection counseling from their doctors. Separate analyses on the expert-system intervention showed significant improvements across all risk behaviors (Prochaska et al, 2005). There was no evidence that the expert system intervention, delivered outside the context of primary care practice, increased demand for or otherwise stimulated clinicians to deliver preventive counseling.

The practice-based intervention did not have measurable impact on providers' behavioral counseling, as reported by patients. To accommodate the complexity of intervening on multiple behavioral risks, we used a menu-driven intervention approach, where providers and their staff were given the choice of starting with one target behavior and one office system, based on perceived need and interest, and progressing to other risk factors and/or other systems, with guidance from our consultants. This flexible, practice-centered approach was meant to parallel a patient-centered approach to multiple risk factor counseling (Goldstein et al, 2004; Ockene et al, 1996). However, this menu-driven approach may have diluted the intervention impact on counseling delivery across risk behaviors. For example, we observed during our intervention visits that 25% of intervention practices chose to focus only on a single health behavior for their improvement efforts over two years, although we measured study outcomes across all counseling behaviors across all practices. Additionally, the intervention intensity was probably insufficient in the setting of competing office demands, limited office leadership buy-in, and minimal incentives for preventive counseling delivery. To address the possibility that we

missed an early, but not sustained intervention effect, we applied the same analysis models at the end of the first intervention year, but findings were similar to those reported here. The lack of an office-based intervention effect on clinician counseling behaviors reflects the challenges reported by others on delivering interventions to independent community-based practices, with high variability in resources, motivation, and external influences (Solberg et al, 2000; Cohen et al, 2005).

Strengths and Limitations

Data on provider behaviors are based on patient reports, which may be inaccurate or subject to recall bias. Patients with multiple visits during the reporting period may be more likely to report that counseling occurred due to more accurate recall than because counseling occurred more often. Because our subjects all had health insurance and were predominately White and highly educated, these results may not generalize to practice settings with less insurance coverage and/or greater diversity. However, this sample of insured patients represents the majority of patients seen in primary practices and profile is consistent with other insured populations (Stevens et al, 2003). The emphasis on at-risk patients increases focus on predictors of counseling for patients who most need interventions and who are the target of national preventive care guidelines (USPTF, 2003). Since we designed our study and began initial assessments prior to the newer 5A model, we are unable to assess delivery of the expanded model, which was intended to provide a better fit across multiple behaviors. However, both the 4A and 5A models represent the value of the combination of A's, as a more thorough approach to counseling. Therefore we believe this analysis adds to the literature examining delivery of brief interventions.

Conclusions

This study provided a unique description of the variation of primary care provider counseling across four cancer risk behaviors. Participating patients provided data about naturally occurring visits in which providers often opportunistically addressed preventive care. More frequent counseling for smoking and mammography screening, than for diet and sun protection, was not surprising, considering greater recent attention to these behaviors. Also, providers can more easily assess smoking and mammography screening status than dietary or sun exposure risk, which may require more extensive assessment. Higher rates of Asking and Advising than Assisting and Arranging follow-up may be explained by the greater time, skill, and resources needed for the latter. Prior counseling was predictive of further counseling on all behaviors expect smoking, which was already at high levels. Clearly, broad gaps remain between preventive care guidelines and recommendations for health behavior counseling in primary care (US Preventive Services Task Force, 2003; Whitlock et al., 2002) and actual rates of counseling in real world clinical practice settings. Increasing preventive counseling rates is a daunting task, as reflected by the lack of a practice-based intervention effect on clinician counseling behavior in this study. On the other hand, our results provide some guidance for future researchers and others interested in promoting primary care-based multiple risk factor counseling. More thorough counseling for all behaviors was reported when patients made more frequent visits and this counseling was associated with greater patient satisfaction with care, suggesting thorough counseling can be achieved with opportunistic interventions over time and also that patients appear to appreciate this effort. Our findings regarding the impact of prior receipt of counseling as well as cues for counseling (e.g., high BMI for diet; older age for sun protection counseling) suggest that strategies that remind or cue clinicians to intervene are likely to have considerable value. Results from this study and other efforts to promote health behavior counseling in primary care reflect a need for a systematic integrated approach to multiple health risk behavior interventions (Pronk et al, 2004; Glasgow et al, 2004; Curry, 2004; Cifuentes et al, 2005). Such an approach would include helping providers to learn the principles of 5A counseling, but also include system-based interventions (such as information

technology systems to prompt and document , team-based approaches for delivering 5A counseling, and incentives to reward and reinforce counseling behavior) that support the delivery of planned, proactive preventive care (Pronket al, 2004; Glasgow et al, 2004; Curry, 2004; Cifuentes et al, 2005).

Acknowledgements

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Table 1

Demographic Profile of Analysis Sample[a]

Baseline Variables	N	Percent
Female	3557	72.0
Age	3556	4.1
≤ 24		
25–34		16.4
35–44		27.9
45–54		26.6
55–64		16.5
65+		8.4
Education	3490	
< 12		4.7
12		30.3
13–15		24.8
16+		40.2
Marital Status	3501	
Married/Living with a partner		73.2
Other		26.8
Race	3501	
White		97.0
African American		0.9
Asian or Pacific Islander		0.4
Other		1.7
Hispanic	3500	1.2
Employment	3501	
Employed for wages Salaried/Hrly		69.9
Self-employed		8.4
Out of work for > 1 year		1.7
Out of work for < 1 year		2.1
Homemaker		6.0
Student		2.3
Retired		9.6
Income	3500	
< 15,000		3.9
15,000–29,999		15.8
30,000–39,999		18.8
40,000–59,999		31.7
60,000–79,999		16.3
> 80,000		13.5

[a]Patients who reported one or more medical visits in past 12 months at 24-month Follow-up.

Table 2

Physician practice variables in analysis sample[a]

Variables	N	Percent
Physician specialty	3557	
Internal medicine		43.2
Family practice		32.6
Ob/Gyn		24.2
Number of visits in past 12 months to anyone in medical office	3557	
1–2		28.5
3–4		27.6
5–6		15.2
7+		28.7
Physician treatment group assignment	3557	
Office intervention		47.5
Control		52.5
Reported ever receiving doctor advice[b]		
Give up smoking	668	92.1
Reduce amount of fat in your diet	2450	53.5
Increase amount of fiber in your diet	2450	40.5
Avoid harmful effects of sun	2535	49.2
Have a mammography screening exam	748	74.1

[a] Patients who reported one or more medical visits in past 12 months at 24-month Follow-up.

[b] Among patients at risk for target behavior at baseline

Table 3

Other Patient variables in analysis sample[a]

Variables	N	Mean (SD) or Percent
Perceived health, mean score (SD)	3501	3.48 (0.91)
(range 1–5, 1=poor, 5=excellent)		
Perceived cancer risk, mean score (SD)	3503	2.79 (0.91)
(range 1–5, 1=much lower than average, 5=much higher than average)		
Target risk factors, % reported at baseline		
Smoking	3551	18.67
High fat diet	3512	68.41
Harmful effects of sun	3523	72.18
Mammography		
number of women ≥ age 50	748	-
% off schedule of women ≥50		7.22
Total score on Diet Behavior Scale	2345	75.95 (12.49)
(range 34–110) (higher score is higher fat diet)		
Total score on Sun Protection Behavior Scale	2456	22.82 (5.62)
(range 7–35) (higher score is more sun protection)		
Body Mass Index, %	3373	
< 25		50.13
25–30		31.49
≥ 30		18.38
Satisfaction with care at last doctor visit	3540	3.92 (0.93)
(range 1–5, 1=poor, 5=excellent)		
Home-based treatment assignment, %	3557	
Expert system		45.97
Control		54.03

[a]Patients who reported one or more medical visits in past 12 months at 24-month Follow-up.

Table 4

Percent of patients reporting 4 A's at 24-months by Target Behavior[a]

	Smoking (N=663)	Diet (N=2450)	Sun protection (N=2535)	Mammography[b] (N=748)
Ask	79	56	30	90
Advise	71	39	27	86
Assist	43	22	11	71
Arrange follow-up	16	8	2	41
Combined 4-A score[c]				
Mean	4.18	2.30	1.25	6.39
SD	3.19	2.93	2.22	3.28

[a]Among patients at risk at baseline, who reported a medical visit in past 12 months in any medical office

[b]All women ≥50

[c]Combined 4-A weighted score: Ask=1, Advise=2, Assist=3, Arrange=4, total possible range 0–10

Table 5

Significant predictors of more thorough counseling (more of 4-A's) at 24 months among at-risk patients on four cancer risk behaviors

	Physician/practice factors		Patient factors	
	Preliminary Models	**Final Models**	**Preliminary Models**	**Final Models**
Smoking	Prior advice More visits	More visits	Higher age Less educ. Pt satisfaction Lower perceived health	Higher age Less educ. Pt satisfaction
Diet	Specialty Prior advice fat Prior advice fiber More visits	Specialty Prior advice fat More visits	Higher age Lower Percvd hlth Poorer diet Higher BMI Pt satisfaction At risk on sun protection	Lower percvd hlth Poorer diet Pt satisfaction Higher BMI
Sun Protection	Prior advice More visits	Prior advice More visits	Higher age Female gender Pt satisfaction No mail intervention Better sun behavior	Higher age Better sun behav. Pt satisfaction Assessment only (vs. expert sys)
Mammography Screening	Prior advice More visits	Prior advice More visits	Off-schedule Pt satisfaction At risk diet Higher age Higher BMI Lower perceived health	Off-schedule Pt satisfaction At risk diet