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Patient age, number and type of clinical encounters, and provider advice to quit smoking. BRFSS 2000

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ABSTRACT

PATIENT AGE, NUMBER AND TYPE OF CLINICAL ENCOUNTERS,

AND PROVIDER ADVICE TO QUIT SMOKING. BRFSS 2000

Sean C. Lucan (Sponsored by David L. Katz)

The purpose of this study was to determine how often smoking patients receive quit advice and if patient age, and number and type of clinical encounters are associated with odds of receipt. Behavioral Risk Factor Surveillance System (BRFSS) 2000 data were used to study 10,582 smokers (aged ≥ 18) having ≥ 1 of three types of clinical encounters in the past year: routine checkups, other physician encounters, or dental visits. Multivariate-adjusted odds ratios (ORs) for quit advice by patient age, encounter type, and number of doctor's visits were calculated. Almost 55% of patients were advised to quit smoking. There was a 4-23% chance of receiving quit advice at any given doctor's visit. Odds of receiving advice did not increase with increasing number of visits. With advancing age, men were more likely, women less likely, to receive quit advice—but only significantly for White men. Compared to those having dental visits, ORs for receiving quit advice for patients having checkups and other physician encounters were 3.35 (95% CI 2.ll, 5.31) and 3.03 (95%CI 1.32, 6.97) respectively. These cross-sectional data suggest that whereas a small majority of smoking patients are advised to quit at some clinical encounter, smoking patients are not advised to quit at the majority of encounters. Being young and male, or seeing dentists rather than doctors made patients less likely to receive quit advice—as did having lower education or BMI, no insurance or coverage other than military or private, not having asthma, or not having breast exams or follow-up Papanicolaou smears if female. Based on a previously-reported absolute quit difference of 1.9%, if smoking patients received quit advice just once at any of their encounters with physicians in a year, at least 800,000 more U.S. smokers would quit at an economic savings of $2.4 billion.

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INTRODUCTION

Tobacco use remains an enormous burden on the U.S. population. Active smoking is the number one preventable cause of disability and premature death in the U.S.(*1*) Passive smoking, or breathing others' smoke, is the number three preventable cause.(*2*) In terms of danger to smokers, cigarette use is a major risk factor for heart disease, cancer, stroke, and chronic lung disease, the four leading causes of death in the U.S. respectively.(*3*) In terms of danger to non-smokers, cigarette use is the number one cause of residential and total fire deaths in the United States.(*4*) Smoking by pregnant women results in over 1,000 cases of fetal demise each year.(*1*) Additionally, secondhand smoke is implicated in as many as 67,000 fatalities annually(*5*) from myocardial infarction, lung cancer, asthma attack, and sudden infant death.(*6*) Smoking causes an approximate total of 440,000 premature deaths in the United States each year and approximately $157 billion in annual health-related economic losses.(*1*) Intangible costs, such as the psychological stresses surrounding tobacco-related morbidity and mortality, are incalculable but equally important to consider.

Through brief interventions, health care providers have an opportunity to reduce the tremendous societal burden of tobacco use at every clinical encounter with smoking patients. The simplest intervention entails determining patients' smoking status and advising smoking patients to quit. Such intervention requires little time,(*7,8*) is welcomed by the majority of smoking patients,(*7,8*) and has consistently been shown to be effective in helping patients quit smoking.(*9,10*) While absolute cessation rates are variable between randomized trials—being somewhat greater in populations with established disease—the pooled effect of simple cessation advice corresponds to a

difference in quit rates between those who receive advice from a physician and those who do not of between 1.9 and 2.5%.(*9,10*) Notably, such effect is seen even after only a single, brief routine consultation,(*9*) with insufficient evidence to support greater effectiveness with greater intensity of the intervention.(*10*) While most trial data comes from delivery of advice by physicians in primary care settings, positive effect has been shown by physicians in other settings as well.(*9,10*) The highest level of evidence supports the provision of cessation advices by physicians in general.(*11*) The evidence for other clinicians is less strong, given the paucity of data on mid-level providers, but still suggestive of a positive effect. Based on the sum of evidence, the 2000 Clinical Practice Guidelines—sponsored by the U.S. Department of Health and Human Services (DHHS) Public Health Service and a consortium of seven Federal Government and nonprofit organizations including the Agency for Healthcare Research and Quality (AHRQ), Centers for Disease Control and Prevention (CDC), National Cancer Institute (NCI), National Heart, Lung, and Blood Institute, National Institute on Drug Abuse, Robert Wood Johnson Foundation, and University of Wisconsin Medical School's Center for Tobacco Research and Intervention—recommended that all patients be asked about smoking status and that a cessation intervention be provided to all smoking patients at each clinical visit.(*12*) This same recommendation had been made four years earlier by the Agency for Health Care Policy and Research, DHHS in the U.S. Preventive Services Task Force (USPSTF) Guide to Clinical Preventive Services.(*13*)

Despite simplicity, inoffensiveness, proven effectiveness, and evidence-based recommendations for clinical practice, providers do not capitalize on all opportunities to provide quit advice to smoking patients. Reported rates of advising smoking patients to

quit range from 17%-81%.(*14-24*) While the range for participation in advising is wide, most values tend toward the lower extreme. Given the low inconvenience and high potential benefit of advising smoking patients to quit, it is notable that rates of advising are not higher. Although rates of asking patients about there smoking status are also highly variable,(*14,15,19,25-28*) providers ask patients whether they smoke more often than they advise cessation.(*16,17,19,20*) Providers may also know or determine smoking status without asking patients directly, so lack of knowledge about smoking status is not the primary impediment to the provision of simple quit advice.

Among the reasons that healthcare providers do not engage more regularly in advising smoking patients to quit smoking may be factors relating to patient characteristics. Patient factors that have been associated with low rates of advising by providers include male gender,(*18,24,29*) minority race,(*18,20,23,30-32*) Medicare or no insurance versus private/HMO or military insurance,(*18,29,33,34*) and relatively low cigarette consumption.(*18,23,35*) Good general health(*18*)—and specifically the absence of diabetes,(*36*) respiratory disease,(*7,29*) poor mental health,(*37*) or smoking-related illnesses like cardiovascular disease(*7,23,24,38-41*)—has also been linked to lower rates of quit advice. A final patient factor associated with low advice from providers is young age. Youth in general,(*18,24,35*) and adolescence in particular,(*20,23,29,42,43*) have been correlated with low rates of provider advisement. Such age bias is of particular concern given that smoking initiation and prevalence are highest in youth.(*44,45*)

Provider factors, like provider specialty, may also be important in explaining inconsistent provision of cessation advice. For instance, investigators have reported that dentists are less likely to advise quitting than physicians (*43,46,47*), and specialist

physicians are less likely to advise quitting than primary-care doctors.(*21,26,30,37,41*) Different rates of advising by different provider types suggest an unequal appreciation of the clinician's role in helping patients quit smoking and missed opportunities for effective interventions at specific clinical encounters.

STATEMENT OF PURPOSE AND HYPOTHESES

Prior reports of factors associated with low quit advice come largely from small to modest-sized epidemiologic studies, limited in geographic representation and/or lacking in substantive control of potential confounding. The purpose of this study was to confirm low intervention rates and to test reported associations through multivariable analysis of a large, national dataset with several thousand observations. Specifically, cross-sectional analysis of BRFSS data from the 2000 administration was performed to determine rates of provision of simple quit advice and to examine if patient age, and number and type of clinical encounters relate to the odds of receiving advice for cessation. The hypotheses were that: (1) a minority of smokers seeing a healthcare provider in the past year would report being advised to quit smoking, (2) 'late adolescents' (18-24 years) would have the lowest odds of receiving quit advice of any age group, (3) odds of receiving quit advice would be greatest for smokers having routine checkups, lowest for those having dental visits, and somewhere in between for those having 'other' physician encounters, and (4) odds of receiving quit advice would be minimally correlated with number of provider visits.

METHODS

The data used for this cross-sectional analysis were generated from the year 2000 administration of the Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS is an on-going data collection program run jointly by the Centers for Disease Control and Prevention (CDC), and U.S. states and territories. The 2000 administration of the BRFSS included participation from all 50 states, the District of Columbia, Puerto Rico, and the Virgin Islands. A wide variety of behavioral risk factors and preventive health practices were assessed, predominantly through a telephone questionnaire of non-institutionalized U.S. residents aged $\geq$18 years. Various sampling designs using random digit dialing were employed. Interviews were generally conducted through computer-assisted telephone interviewing (CATI). In an effort to maximize participation and minimize selection bias, phone calls to potential participants were made 7 days per week, during both day and evening hours. State health personnel or contractors conducted interviews that were monitored either through real-time audio or call-back check-ins for quality control. In some states, in-home interviews were conducted.

A fixed panel of 'core' questions was asked of all respondents in all states and territories. Some of the core questions, asked in 2000, were part of a rotating set asked only during alternating years. In addition to core questions, the BRFSS questionnaire administered in certain states may have included state-added questions—which were not edited or evaluated by the CDC—as well as additional 'modules' of CDC-evaluated questions. Decisions to include any of the approved modules as part of the BRFSS questionnaire were made by individual states. As a result, in addition to the core questions asked consistently in all states, any number of modules may have been added to

a given state's BRFSS questionnaire. Both the inclusion of specific modules and the usage of specific questions for both modules and the core varied. There was also variability in response rates to all BRFSS questions.

All data was submitted to, and processed by, the Behavioral Surveillance Branch (BSB) of the CDC. Further details about data management procedures have been published elsewhere.(*48*)

Measures

The sample in this study was comprised of current smokers having at least one clinical encounter in the past year and asked whether a healthcare provider had advised smoking cessation during that time. Qualifying clinical encounters included having any routine checkup, breast exam, or pap smear (from BRFSS core questions), or any sigmoidoscopy/colonoscopy, diabetic foot exam/diabetic appointment with a health professional, eye exam, emergency room visit, teeth cleaning, or visit to a dentist (from module questions) (see Figure 1.). Respondents had to designate any qualifying encounter as occurring 'within the past year' in order to be included in the sample. Two other inclusion criteria were answering 'everyday' or 'some days' to 'Do you smoke cigarettes everyday, some days, or not at all?' (a core question) and giving any answer other than 'don't know/not sure' to 'Has a doctor or other health professional ever advised you to quit smoking?' (a module question).

For the 2000 administration of the BRFSS, there were 184,450 respondents (74,770 men, 109,680 women). About 22.5% (N = 41,416) of this group reported being a 'current smoker'—similar to the 1999 estimate for the U.S. population of 23.3%.(*49*) The

number of smokers having any clinical encounter in the past year was 30,475 (11,044 men, 19,431 women). Of these smokers, the final sample included those who additionally answered the module question, 'Has a doctor or other health professional ever advised you to quit smoking?', totaling 10,582 (3,763 men, 6,819 women). This sample represented smokers that had at least one clinical encounter in the past year, and therefore could have been advised to quit smoking by a healthcare provider during that period.

The dependent variable for this study was receipt of advice to quit smoking (yes/no). Receipt of quit advice was defined as answering 'Within the past 12 months' to 'Has a doctor or other health professional ever advised you to quit smoking?'. Any other response to this module question was considered non-receipt of quit advice.

The primary independent variable was respondent age. Reported age (from a core question) was divided *a priori* into four categories: late adolescent (18-24 years), young adult (25-39 years), middle aged (40-64 years), and older adult (≥65 years).

The secondary independent variable was types of clinical encounters had in the past year. Specifically assessed were all possible combinations of three clinical encounter types: (1) routine checkups ('Checkup'), (2) dental visits ('Dental'), and (3) other physician encounters ('Other'). 'Checkup' was defined by answering 'Within the past year' to 'About how long has it been since you last visited a doctor for a routine checkup?' (a core question). 'Dental', or dental visit, was defined by answering 'Within the past year' to either 'How long has it been since you had your teeth ‘cleaned’ by a dentist or dental hygienist?' or 'How long has it been since you last visited the dentist or a dental clinic for any reason?'(module questions). 'Other' physician encounters were

defined by reporting 'Within the past year' for any of the following: breast exam or pap smear (from core questions), or sigmoidoscopy/colonoscopy, diabetic foot exam/diabetic appointment with a health professional, eye exam, or emergency room visit (from module questions) (see Figure 1). From the three clinical encounters types, mutually-exclusive combinations were defined to describe the seven possible clinical experiences had by respondents in the past year: 'Dental only', 'Checkup only', 'Other only', 'Dental & Checkup only', 'Dental & Other only', 'Checkup & Other only', 'Checkup & Dental & Other'. For any given respondent, multiple encounters could have occurred in the past year for each of the three clinical encounter types comprising the seven combinations. For example, those reporting 'Checkup & Dental only' may have had one or more checkups and dental visits in the past 12 months but no 'Other' physician encounters in that time.

Potential confounders for associations between dependent and independent variables included: socioeconomic status (SES), current smoking intensity, type of medical insurance, poor general health, poor mental health, asthma, diabetes, and body mass index (BMI) (from core questions) as well as the presence or absence of cardiovascular disease (from module questions). Two other patient characteristics that were potential confounders of the association between the secondary independent variable (types of clinical encounters) and advice to quit smoking were gender and race (from core questions). Educational attainment was used as the proxy of SES because unlike income (>10% missing data), education had little missing data (<1% missing). Education was divided into four categories: 'some high school or less,' 'grade 12 or high school graduate,' 'some college,' and 'college graduate or beyond'. Current smoking

intensity was dichotomized *a priori* at half a pack of cigarettes per day. The two categories were '1-10 cigarettes/day (lighter smoking)' and '>10 cigarettes/day (heavier smoking)'. Type of medical insurance was determined by answer to 'What type of coverage do you use to pay for most of your medical care?'. The four possible categories were 'private or military' (coverage through 'your employer', 'someone else's employer', 'a plan that you or someone else buys on your own', 'the military, CHAMPUS, or the VA'), 'Medicare', 'Medicaid or medical assistance', or 'none'. Poor general health was determined from a 5-step Likert rating of personal health from 'poor' to 'excellent'. Only patient's who rated their health as 'poor' were considered to have poor general health. Poor mental health was determined from a question asking about days in the past 30 days when mental health was not good due to, for example, depression, problems with emotions, or stress. Any reported number of days was considered an indication of poor mental health. Patients were considered asthmatic if they had ever been told by a doctor that they had asthma. Diabetes status was determined similarly, except women told they had diabetes only during pregnancy were considered not to have diabetes. BMI was calculated from reported weight (kg) divided by the square of the reported height (m^2). BMI was divided into three groups: 'normal weight' (BMI<25), 'overweight' ($25 \leq BMI < 30$), and 'obese' ($BMI \geq 30$). Cardiovascular disease was determined from a positive response to any of three module questions: 'has a doctor ever told you that you had: angina or coronary artery disease? … heart attack or myocardial infarction? … stroke?' Gender was coded simply as 'male' or 'female'. Given the low number of ethnic minorities, race was categorized only as 'non-Hispanic White', 'non-Hispanic Black', or 'other'.

Additional potential confounders for female respondents included having a breast exam, the reason for breast exam, having a pap smear, and the reason for pap smear. These variables were all from core questions. Patients were considered to have had breast exams and pap smears if they reported ever having these encounters within the past year. For those having a breast exam in the past 12 months, the reason for the encounter was divided as: 'for routine exam' or 'for breast cancer/other breast problem'. For those having a pap smear in the last 12 months, the reason for the encounter was divided as: 'for routine smear' or ' for current or previous problem'.

Two final potential confounders were considered for the whole sample: having a personal health care provider, and health care rating. In answer to the module question 'Do you have one person you think of as your personal doctor or health care provider?', responses were categorized as 'no', 'yes', or 'more than one'. Health care rating was determined from a 5-step Likert scale, grading a patient's overall health care experience from '1' (worst possible) to '5' (best possible). This scale was presented in a module question. Patients who rated their health as '1-3' were considered to have a 'poor' impression of their overall health care whereas patients who rated their health care '4' or '5' were considered to have a good impression of their health care.

Percentages of patients in the sample asked about potentially confounding patient characteristics are displayed in Figure 2.

Data Analysis

Data were analyzed using SAS v.8 and Microsoft Excel 97 SR-1 software. Univariate frequencies were computed to determine the distribution of ages, encounter

types, and other patient characteristics for the sample. Bivariate associations for all other patient characteristics with both the primary independent variable (respondent age) and the secondary independent variable (types of clinical encounters) were determined using chi square statistics or, where appropriate, Fisher exact tests. Bivariate analyses using chi square and Fisher exact tests were also performed for associations of the dependent variable (advice to quit smoking) with primary and secondary independent variables and all other patient characteristics. Crude odds ratios and 95% confidence intervals were generated using simple logistic regression. For the primary independent variable, the exposure of interest was older age, or non-adolescence (age >24). The age category of 'late adolescent' (age 18-24) was therefore used as the referent. For the secondary independent variable, there were no patients having none of the three encounter types because having at least one clinical encounter was an inclusion criterion for the study. Since it was hypothesized that dental visits would be the least strongly associated with advice to quit smoking, the encounter of 'Dental only' was used as the referent in regression models. Regression models were also run using 'Other only' as the referent to look for significant differences in ORs between the two types of physician encounters (i.e. between 'Checkup' and 'Other'). 'Male', 'non-Hispanic White', 'some high school or less', '1-10 cigarettes/day', 'none', 'no' poor general health, 'no' poor mental health, 'no' asthma, 'no' diabetes, 'no' cardiovascular disease, and 'normal weight', were assigned as the reference categories for gender, race, education, current smoking status, type of medical insurance, reported poor general health, reported poor mental health, asthma, diabetes, cardiovascular disease, and BMI respectively. Adjusted odds ratios were determined using a multivariate logistic regression model. The multivariate model

included both of the independent variables as well as all other patient characteristics. Where appropriate, tests of linear trend for ordinal exposure variables were performed, substituting pseudo-continuous variables for indicator variables in regression models.

Potential confounders, either excluded completely from the main multivariate model or not considered independently, were included in later analyses. These variables included breast exam, pap smear, reason for breast exam, reason for pap smear, having a personal provider, and health care rating. Associations with these variables were assessed using chi square statistics, simple logistic regression, and, in the case of the four former variables, multivariate logistic regressions including both independent variables and all other potential confounders. Reference categories were 'no' breast exam, 'no' pap smear, 'routine breast exam', 'routine pap smear', 'no' person thought of as a personal provider, and 'poor' health care rating respectively.

Analysis of how race and gender modify the association between age and odds of receiving quit advice was performed. A variable combining race and gender was created for Blacks and Whites only. All other races were excluded due to both small total number and heterogeneity in the race category of 'other'. Bivariate analyses of advice to quit smoking by age category were performed for each race-gender group. Odds ratios were calculated using simple and multivariate logistic regression. For multivariate models, dental visits were excluded because over 79% of the respondents were missing data, rendering regressions invalid. Linear trend for age categories was assessed by substituting an ordinal age variable for the indicator variables of respondent age. All analyses were then repeated for women after excluding respondents having had breast exams or pap smears in the past year. These analyses were performed to see how the

experiences of women compared to that of men when only encounters that could be had by either sex were considered.

A sub-analysis examined the association between number of doctor's visits in the past year and odds of receiving quit advice. Number of visits was determined from the following module question, 'In the last 12 months, (not counting times you went to an emergency room), how many times did you go to a doctor's office or clinic to get care for yourself?', asked of <5% of the sample. Responses were categorized by number of visits: '0', '1', '2', '3', '4', '5-9,' and ' ≥10.' Bivariate associations with the dependent variable were assessed and odds ratios with 95% confidence intervals were calculated using simple logistic regression. Multivariate logistic regression was used for adjustment. In both simple and multivariate regressions, those with '0' visits were excluded because only increases in odds for those with additional doctor's visits over '1' visit were of interest. The multivariate model excluded both dental visits and cardiovascular disease, because no patients in the sub-sample were asked about these variables (i.e. 100% of the data was missing). To calculate a p value for linear trend, an ordinal variable was substituted for the indicator variables for number of doctor's visits. The potential contribution of ER visits and checkups to found associations were assessed by simple frequency distributions and simple logistic regression using the referent of 'Other only' (that is, 'Other' physician encounters excluding ER visits).

Based on probability, for each category of number of doctor's visits the numbers of patients that would have been advised to quit smoking had advice been given at 50% of all visits was calculated. A test for linear trend was then performed using a pseudocontinuous variable for number of visits in a simple logistic regression. Expected

values for number of patients receiving quit advice were compared by chi square test to the values actually observed for each number of doctors visits. Since the precise number of encounters where advice was given could not be determine from the data, the maximum and minimum possible percentages of visits where quit advice could have been received were computed using probability. Finally, the maximum and minimum probabilities of receiving quit advice at any given doctor's visit were calculated.

Statement of Student Contribution

My contributions to this research were as follows: I chose the BRFSS dataset, reviewed the raw data, developed all research questions, devised a literature search strategy, conducted a review of the literature, generated the hypotheses, defined study variables, decided on the statistical methods to be used, programmed all analytical code, performed all data analyses, interpreted all results, synthesized all conclusions, and prepared this written report including accompanying tables and figures. Mayur M. Desai, PhD, made early suggestions for simplifying definitions of my secondary independent variable: clinical encounter type. Specifically, encounters that were originally coded as 'generalist', 'specialist', 'generalist or specialist', and 'dentist', became 'checkup', 'other' and dentist'. Elizabeth W. Triche, PhD, critiqued very early versions of this paper, assisted with some SAS codes, and advised on formatting and presentation of data. David L. Katz, MD, MPH, raised critical questions with regard to my findings. His suggestions lead to the exploration of additional potential cofounders, sensitivity analyses, statements of population and economic impact, further review of the existing literature on recommendations and practice guidelines, and reassessment of conclusions.

RESULTS

The distributions of patient characteristics in the main sample (N = 10,582) are displayed in Table 1. The sample was predominantly female and White with educational level between grade 12 and some college. Two thirds of respondents smoked more than half a pack of cigarettes per day, with almost one quarter of the sample missing data on smoking intensity. Over seventy percent of respondents had private or military insurance. Less than 1% used Medicare as their primary form of coverage. About 6% used Medicaid or other medical assistance primarily, whereas over 20% reported no insurance at all. Overall, almost one sixth of the sample was missing data for medical insurance. About 6% of patients reported poor general health and greater than 40% reported poor mental health. Twelve percent of respondents were asthmatic, 6% diabetic, and 10% with cardiovascular disease (although >50% of the sample was missing data for this variable). About half the sample had a higher than normal BMI with greater than one third of this group being obese.

Bivariate associations between the primary independent variable (respondent age) and other patient characteristics are also displayed in Table 1. Almost half of sample was 'middle aged' and almost one third was 'young adult'. These proportions were similar for both sexes. Compared to Whites and Blacks, there was a relative paucity of 'middle aged' and 'older adults' among other races and a somewhat higher representation of 'late adolescents' and 'young adults'. Those with the least education and lowest BMI had greater representation among 'older adults' and 'late adolescents' while those with the more education and higher BMI had lesser representation among these age groups. Reciprocal trends were noted for 'middle aged' and 'young adult' groups. Lighter smokers

(1-10 cigarettes per day) had almost twice the proportion of 'late adolescents' as heavier smokers (≥ 10 cigarettes per day) as well as a higher proportion of 'young adults'. Heavier smokers tended to be proportionately more 'middle aged' than those who smoked less. Those on medical assistance or with no health care coverage were generally younger than those having private of military insurance. The greatest proportion of Medicare users was disproportionately 'older adult'. Distributions by age of respondents with poor reported health, diabetes, and cardiovascular disease were comparable. Presence of any of these conditions was disproportionately associated with older age, while absence was associated with youth. The opposite appeared to be true of reported poor mental health and asthma, although differences by age were not as dramatic. Chi square tests of independence were all highly significant ($p < 0.001$).

Table 2 shows simple distributions of patient characteristics, as well as distributions of these characteristics by the secondary independent variable (types of clinical encounters). Almost 79% (8,380) of the main sample was missing data for the module questions assessing visits to dental professionals. Table 2 thus presents data on the remaining 21% of the sample for which information on dental visits was available. The effective sample size was reduced to 2,202 and all percentages are reported relative to this total for greater ease of interpretation. Simple distributions of patient characteristics in this 21% sub-sample were not appreciably different from those reported for the total sample. In bivaraiate analyses, about half of all women had all three encounter types in the past year with close to another 20% having both checkups & other physician encounters. In contrast, almost half of all men had 'Dental & Checkup only' with another 20% having just checkups. By race, the biggest differences were between

'Dental only' and 'Checkup & Other only' categories. Among Blacks, a much lower proportion had just dental visits while a higher proportion had 'Checkup & Other only' encounters within the past year compared to Whites and other races. The proportions of those having all three clinical encounter types and those having just dental visits increased with increasing education level. In contrast, the proportions of those having both 'Checkup & Other only' and those having 'Checkup only' decreased with increasing educational level. A greater percentage of lighter smokers had all three encounter types while smaller percentages had 'Dental only' or 'Checkup only' compared to heavier smokers. Those with private or military insurance as well as those using Medicaid or medical assistance most often had all three encounter types. In contrast, those with no insurance most often had 'Dental only'. There were too few users of Medicare for meaningful assessment of distribution by encounter type. Patients with reported poor health, reported poor mental health, asthma, or diabetes all appeared remarkably similar in their relative distributions compared to those without these conditions. All had greater percentages with all three encounter types and also 'Checkup & Other only', with lesser percentages having 'Dental only'. Those with cardiovascular disease differed from those with these other conditions in that relative to those without cardiovascular disease, a smaller percentage had all three encounter types. Those who were overweight but not obese had a higher percentage of 'Dental & checkup only' encounters and a lower percentage of having all three encounter types in the past year compared to normal weight and obese individuals. Normal weight and obese respondents had similar distributions across all combinations of clinical encounters. All chi-square tests of independence were significant at $p \leq 0.001$.

In Table 3, crude and adjusted odds ratios are presented for associations of advice to quit smoking with independent variables and other patient characteristics. Overall, approximately 55% of the main sample was advised to quit smoking. By crude analysis, respondents in the three older age categories had significantly greater odds of receiving quit advice than 'late adolescents.' After multivariate adjustment, however, significant differences in odds relative to 'late adolescents' disappeared. Point estimates showed a pattern of increasing odds with increasing age, however, this trend was not significant at alpha of 0.05.

For the secondary independent variable, crude analyses demonstrated that having 'Checkup only' or 'Other only' were both associated with a greater odds of receiving quit advice than having 'Dental only'. Odds ratios were calculated using 'Dental only' as the referent and all odds ratios were strengthened with multivariable adjustment. Those having 'Other only' had 3.0 times the odds, and those having 'Checkup only' had nearly 3.4 times the odds of being advised to quit as those having 'Dental only' encounters. Analyses were rerun using 'Other only' as the referent to test if the difference in odds between 'Checkup only' and 'Other only' was significant. By this method, the multivariate-adjusted OR for 'Checkup only' was 1.11 (95% CI 0.46, 2.64) indicating that difference in odds between those having checkups and those having 'other' physician encounters was not significant (data not shown).

The odds of receiving cessation advice appeared greater for those having any combination of two clinical encounter types than for those having any single encounter type alone. The pattern of odds ratios generated was consistent with the results one would expect given ORs for component encounter types: i.e. relative to 'Dental only,'

both 'Dental & Checkup only' and 'Dental & Other only' had greater ORs than 'Checkup only' and 'Other only' but lower ORs than 'Checkup & Other only'. However, none of these encounter combinations were significantly different from 'Other only' nor from 'Checkup only'. The only encounter combination yielding an OR that was significantly greater than either physician encounter alone was having all three types of clinical encounters in the past year. Those with 'Checkup & Dental & Other' had about twice the odds of being advised to quit smoking as those having either checkup or 'other' alone (data not shown)

Considering other patient characteristics in Table 3, women had significantly greater odds of being advised to quit smoking than men in crude analyses, but after adjustment significance disappeared and the difference changed direction. There was no significant difference in the odds of receiving quit advice by race although there was a suggestion of bias against Blacks. Those with greater education and those with higher BMIs were progressively more likely to be advised to quit smoking. Each increase in level of education was associated with 1.30 times greater odds of receiving advice for cessation. Each increase in BMI category was associated with 1.24 times greater odds. Heavier smokers were more likely in crude analysis, but were no more likely after multivariate adjustment, to receive cessation advice than lighter smokers. Respondents with private or military insurance had 1.59 times greater odds of being advised to quit smoking than those without insurance and 1.48 times greater odds of being advised to quit than all other types of insurance put together (data not shown). A hint of that those using Medicare or Medicaid might also have greater odds of receiving advice than those without insurance was also demonstrated, but ORs did not reach statistical significance.

By crude analysis, those with reported poor health, reported poor mental health, asthma, diabetes, and cardiovascular disease were all more likely to receive cessation advice than those without these conditions. After multivariate adjustment however, only asthma remained significant, with asthmatics having 2.73 times the odds of being advised quit smoking as patients without asthma.

Two potential confounders not included in Table 3 were health care rating and whether or not patients felt they had a personal provider. These variables were excluded from the main multivariate model because 96% and 88% of the data was missing for these factors respectively. The odds of being advised to quit smoking for those rating their healthcare as 'good' was not significantly different from those rating their healthcare as 'poor' (OR 0.92, 95% CI 0.57, 1.48)(data not shown). The crude OR for those having one person thought of as their personal doctor or health care provider was 1.92 (95% CI 1.39, 2.65). For those identifying more than one person as their personal provider, the OR was 1.84 (95% CI 1.14, 2.99) (data not shown).

Table 4 reveals odds ratios for the associations between age categories and advice to quite smoking stratified by race-gender group. Only data for Whites is presented since Blacks showed comparable trends but with smaller numbers of respondents and universally insignificant results. In crude analyses, 'late adolescents' were the least likely age group to receive quit advice although results were only significant for White men. After multivariate adjustment, it was noted that White men had 1.29 times greater odds of being advised to quit smoking with each advancing category of age. A similar pattern was demonstrated for Black males, although the trend was not significant (data not shown). For White women, the opposite trend was seen, albeit statistically insignificant.

Point estimates for ORs suggested that women had lower odds of receiving quit advice with advancing age. A comparable result was seen for Black females (data not shown). When women having breast exams and/or pap smears were subtracted from consideration—to limit clinical encounters in the sample to those that might be had by both men and women—the overall pattern for White women became more like the pattern for White men. Specifically, 'late adolescents' had the lowest odds of receiving quit advice. The same relationship was seen for Black women (data not shown). Differences in odds by age category did not reach significance for either race group.

Given the inversion in the direction of association based on exclusion of clinical encounters had exclusively by women, the independent predictive values of pap smears and breast exams were explored further. Table 5 shows crude and adjusted odds ratios for associations of pap smear and breast exams with advice to quit smoking. Both breast exam and pap smear were associated with greater odds of receiving quit advice in unadjusted analyses, but only breast exam remained significant after adjustment. In fact, the effect of breast exam was strengthened by adjustment such that women receiving breast exams had 2.55 times the odds of being advised to quit smoking as women not having these exams. When the reason for exams was assessed, women had greater odds of being advised to quit smoking if they had breast exams for a history of breast cancer or other breast problem. This difference in odds was not statistically significant, however. In contrast, for pap smears, women having smears for current or previous problems had 4.44 times the odds of being advised to quit smoking as women having smears for routine screening. Interestingly, a greater percentage of women asked about breast exams and

pap smears, and an even greater percentage of the women additionally asked the reason for these exams, were advised to quit smoking than women in general.

Table 6 presents crude and adjusted odds ratios for advice to quit smoking by number of doctor's office or clinic visits in the past year. Respondents reporting only one visit were set as the reference group. The odds of receiving quit advice for any number of visits was not significantly greater than this referent. The multivariate-adjusted p value for linear trend also was not significant.

The question about 'number of doctor's office or clinic visits' explicitly excluded emergency room (ER) visits, and also may have excluded any provider encounters had for reasons other than 'to get care for yourself'. Thus, there was potential for confounding by advice given at encounters missed by the question. For example, ER visits and checkups may very well have coexisted with the doctor's office and clinic visits in question, contributing to the total clinical experience had by respondents in the past year. But these encounters would have escaped capture by the question. Patients may have thus received quit advice that was counted in this analysis, at these clinical encounters that were not counted in this analysis. To check for such contamination, Table 7 was created. This table lists the actual percentages of co-experience with ER visits and routine checkups. Dental visits, which also may have co-existed with the doctor's office and clinic visits in question, were not additionally examined in Table 7 because questions about dental visits were not asked of anyone in the sub-sample (i.e. all data on dental visits was missing). As shown in the table, nearly 50% of patients reporting no doctor's office or clinic visits for care in the pat year had ER visits, and nearly 60% had checkups. The percentages of those having ER visits and checkups, and the percentages of those

who were advised to quit smoking having had these encounters, both seemed to increase with increasing number of doctor's office or clinic visits. Thus, the influence of these potential confounders, even if they were imperfectly controlled in the multivariate model, would have tended to produce a linear trend for number of doctor's visits that was not found.

Table 8 is an extrapolation from a finding in Table 6, specifically that those having only one doctor's visit in the past year were advised to quit smoking about 50% of the time in the crude analysis. Had advice actually been given to patients at 50% of all visits, the odds ratios shown in Table 8 would have been observed. The odds of being advised to quit smoking would have increased 2.59 times with each increasing category of number of doctor's visits. As shown in Table 9, the difference between the number of patients actually advised to quit smoking and the number that would have been advised had advice in fact been given at 50% of visits, was statistically significant (χ^2<0.001). Whereas 62.8% of the sample from the multivariate model was actually advised to quit smoking, 79.1% would have been advised had patients received quit advice at 50% of their visits.

Because the actual number of doctor's visits where patients received quit advice could not be precisely determined from the data, maximum and minimum possible values were calculated from the known number of doctor's visits and the known number of patients advised to quit smoking. Results are listed in Table 10. Using estimates most generous to the minimum value (see footnote B), the maximum percentage of visits where quit advice could have been received was about 68%, and the minimum was about

18%. These values correspond with a maximum 23% chance and minimum 4.4% chance of being advised to quit smoking at any given doctor's visit (see Tables 10 and 11).

DISCUSSION

This was a large cross-sectional study of BRFSS 2000 data, having four hypotheses: (1) a minority of smokers seeing a healthcare provider in the past year would report being advised to quit smoking, (2) 'late adolescents' (18-24 years) would have the lowest odds of receiving quit advice of any age group, (3) odds of receiving quit advice would be greatest for smokers having routine checkups, lowest for those having dental visits, and somewhere in between for those having 'other' physician encounters, and (4) odds of receiving quit advice would be minimally correlated with number of provider visits. Results actually showed that: (1) overall, a small majority of smokers seeing a healthcare provider in the past year were advised to quit smoking, although among women not receiving gynecologic care, only a minority were advised to quit, (2) 'late adolescents' had the lowest odds of receiving quit advice of any age group but only for White men, (3) the odds of receiving quit advice was lowest for those having dental visits, but the difference in odds between those having checkup and those having 'other' physician encounters was not significant, and (4) the odds of receiving quit advice was not even minimally correlated with the number of provider visits.

Until data was stratified by gender and race, there was no significant difference in the odds of receiving quit advice by respondent age. Age bias against 'late adolescents', as demonstrated for White men and suggested for other race-gender groups, is consistent with prior reports.(*18,20,23,24,29,35,42,43*) The reason why young patients, are less

likely to receive cessation advice is not clear and indeed may be multi-factorial. There may be an unwillingness among providers to challenge adolescents' invincible concept of self, coupled with the notion of smoking as a 'passing phase' or temporary act of rebellion that will correct on its own without intervention. Nonetheless, the vast majority of new young smokers do not quit. While 28.5% of high school students smoke, 23.3% of adults smoke, and most of these adults began smoking in their teens.(*49-53*) Another possible explanation for why patients have greater odds of receiving quit advice with increasing age would be physicians tending to treat quit advice as a therapeutic intervention rather than a preventive one.(*35*) Since many of the adverse health affects of smoking are not realized until later in life, relatively higher rates of advising smoking cessation in older patients might merely reflect the increasing prevalence of smoking-related illnesses with aging. A third possibility to explain age bias could stem from provider fears of eliciting negative responses or jeopardizing tenuous doctor-patient relationships with young patients.(*39*)

Whatever the reason, not offering cessation advice as frequently to the young is concerning. The prevalence and incidence of smoking remain highest in youth,(*44,45*) and smoking has very real immediate health consequences both for the adolescent smoker and others exposed to their smoke. Furthermore, tobacco is known to be a 'gateway drug' and being permissive or ambivalent about young patients' tobacco use could be an open invitation for the use of other drugs and alcohol which place young patients at additional risk.(*54*) Providers should be vigilant about encouraging tobacco cessation in all young smokers.

For women, when those having breast exams and pap were considered, an opposite, albeit insignificant, trend was demonstrated: 'late adolescents' had the greatest odds of receiving quit advice, and receipt of quit advice appeared less likely with advancing age. Age bias against 'older adults', a phenomenon which has been reported previously,(*27*) seemed in this case directly related to having women's health encounters. Women having breast exams had almost 3 times greater odds, and women having pap smears for follow-up of problems had 4 times greater odds, of being advised to quit smoking. The percentages of women having breast exams and pap smears fell progressively from the youngest to the oldest age category—from 88% down to 72% and from 93% down to 51% respectively. The same decrease was not seen for women having checkups, where there was greater participation with increasing age—from 81% to 92% (data not shown). Thus, elder bias among women appeared to be driven primarily by isolated gynecologic care, separate from primary care checkups. Older women, having less regular women's health visits, were at a relative disadvantage—in fact a disadvantage of such magnitude as to completely reverse the relative advantage suggested by analysis of women having non-gynecologic encounters exclusively. Gynecologic care was such a strong predictor of receipt of cessation advice for women in general that while the percent of women advised to quit smoking in the main sample was 59%, compared to 49% for men, the percent of women having neither breast exams nor pap smears who were advised to quit smoking was only 38%. It is possible that other clinicians defer counseling for smoking cessation to gynecologic providers, to whom women are thought to go for primary care. Regardless, the data suggest that the bulk of the advice women receive to quit smoking is at encounters of the gynecologic type.

Encounter type, more broadly, was associated with the odds of receiving quit advice in that compared to those having dental visits, the odds for those having checkups or other physician encounters were much greater. Greater odds of receiving quit advice at encounters with physicians than at encounters with dental professionals has been reported previously.(*43,46,47*) It is well-documented that tobacco cessation activities are not a routine part of dental practice (*55*) despite the fact that tobacco is a major risk factor for diseases of the lips, gums, tongue, buccal mucosa, and teeth.(*56*) And although 70% of the 8,000 annual deaths from oral and phayrngeal cancers are attributable to tobacco use,(*25*) for example, more physicians than dentists considered smoking a "very serious" threat to patients' health.(*47*) Besides such attitudinal difference, discrepant patterns of advising between dentists and physicians might also be explained by differences in preparedness. Although, training varies by dentist type and geographical region (*55*) the majority of dentists feel under-prepared to provide cessation counseling and desire further exposure to tobacco education.(*46*)

Compared to those having 'other' physician encounters, the odds of receiving quit advice was slightly greater for those having checkups. Whereas specialists can perform routine checkups, generally checkups are the realm of primary-care providers. Likewise, while primary-care physicians can perform many of the services included as 'other' physician encounters, generally such work is the domain of the specialist. As such, the difference between 'Checkup' and 'Other' might be used to approximate the difference between 'primary care' and 'specialty care'. Prior studies have reported that patients are more likely to receive advice to quit smoking from primary-care doctors than from specialist physicians.(*21,26,30,37,41*) The difference in odds between 'Checkup only'

and 'Other only' in this study, while in the expected direction, was not significant. A statistically significant result might have been found with improved 'primary-care'/'specialist care' delineation and/or with a greater variety of specialist encounters contributing to the category of 'Other'.

Although patients having all three encounters types (checkups, other physician encounters, and dental visits) had significantly greater odds of being advised to quit smoking than those having any single encounter type alone—suggesting an additive effect of multiple encounters with health care providers—in sub-analyses, the number of doctor's office or clinic visits had by a patient was not correlated with odds of receiving cessation advice. In fact interestingly, although ORs were not significant, those having two or three doctor's visits in the past year actually had lower odds of receiving advice to quit smoking than those having only one doctor's visit. One explanation would be that a greater percentage of those reporting one visit had a routine checkup, where preventive counseling is part of the visit. This possibility did not seem to be the case, however, given the findings in Table 7. Another explanation would be that those having a single visit saw a physician for a smoking-related complaint (e.g. cough) while those with two or three visits presented to a physician for a complaint not obviously related to tobacco use and then had follow-up visits for the same complaint (e.g. psoriasis). Those with four or more visits—having insignificantly greater odds of being advised to quit—might represent patients with regular examinations for chronic conditions contributed to or exacerbated by smoking (e.g. hypertension). Alternatively, they might represent very sick patients, presenting urgently on multiple occasions with complaints prompting

advice for tobacco cessation (e.g. respiratory distress, angina, lower extremity claudication, transient ischemic attack, etc.).

It cannot be determined whether patients with multiple doctor's visits saw the same provider at each reported encounter or if multiple physicians were involved in their treatment. Therefore, no conclusions can be drawn about how continuity of care relates to odds of receiving quit advice. However, interestingly in terms of therapeutic alliance, patients who reported having one or more persons considered to be a personal provider had almost twice the odds of being advised to quit smoking in unadjusted analyses.

Of patients having just a single doctor's visit in this study, about 50% reported being advised to quit smoking. If advice to quit smoking was in fact given at 50% of all doctor's visits, then with each increasing category of number of doctor's visit had by a patient, there would have been 2.59 times greater odds of being advised to quit smoking. In this study, an increase of only 1.10 times greater odds was found that was not only statistically insignificant, but likely an overestimation since the question assessing number of doctor's visits failed to capture checkups, ER visits, dental visits, and potentially other clinical encounters where quit advice may have been received. Moreover, the percent of patients advised to quit smoking in each category of number of doctor's visits in the multivariate model was almost universally greater than in the crude model. In other words, the experience of patients in the multivariate model overestimated the experience of the sample in general.

By the most generous estimates, patients had at best a 23% chance, and at worst a 4% chance, of being advised to quit smoking at any given doctor's visit. These limits undoubtedly overestimate the true range for the reasons just explained. The low

probabilities of being advised to quit smoking strongly suggest that patients are not receiving quit advice at the vast majority of clinical encounters and that, by extension, clinicians are not providing it.

While the absolute rate of receiving cessation advice was low at 55%, with only a small chance of being advised to quit at any given doctor's visit, perhaps most concerning was that certain patient characteristics were associated with a lower odds of being advised to quit. Specifically being young and male, not having breast exams or follow-up pap smears if female, having low education, being uninsured or having any insurance other than military or private, having a low BMI, or having no asthma made patients less likely to receive quit advice. Doescher and Saver made similar findings in a report based on a comparable study of the national 1996 Community Tracking Study (CTS) Household Survey. In their report, 48% of patients seeing at least one health care provider in the past year were advised to quit smoking. Advice was less likely for patients that were young, male, lower health care service users, uninsured or having insurance other than military, and healthier.(*18*) The authors also found that lighter smoking was associated with lower rates of cessation advice, but they used different cut-off values than used in this study. The apparent difference in the overall percentage of patients advised to quit between the two studies likely does not represent a true increase in the proportion of patients receiving quit advice between 1996 and 2000. Among other differences, the sample from the CTS study had proportionately fewer women and Whites.

Strengths and Limitations

The 2000 BRFSS made use of random digit dialing and computer-assisted telephone interviewing (CATI). While 95% of U.S. households have phones, telephone coverage ranges from 87-98%, with lower coverage among minorities, low-income groups, and those living in Southern states.(*57*) A system of applying weights could have been used to adjust BRFSS variables for differences in probability of selection, non-response, and non-coverage,(*48*) but the variables used in this study were unweighted. While systematic differences between participants and non-participants were therefore possible, forgoing weighting did not seem to compromise the reliability of results in this study. The study's findings are comparable to those of an equivalent study of a U.S. housed, non-institutionalized population that also employed a telephone survey and did use weighted data.(*18*) Moreover, results from crude associations were universally consistent with those reported in prior literature. For example, as previously reported, advice to quit smoking was more likely for patients who were older,(*18,20,23,24,29,35,42,43*) female,(*18,24,29*) White,(*18,20,23,30-32*) heavier smokers,(*18,23,35*), with private or military insurance,(*18,29,33,34*), or with poor health(*18*)—specifically with diabetes,(*36*) respiratory disease,(*7,29*) poor mental health,(*37*) or smoking-related illnesses like cardiovascular disease(*7,23,24,38-41*)—in unadjusted analyses.

Due to inconsistent use of module questions among U.S. States, not all members of the sample were asked all questions. This limitation, combined with often poor response rates for the questions actually administered, resulted in a substantial amount of missing data for covariates. For instance, the number of doctor's visits had in a year

could not be controlled in the multivariate model for the main analysis because >95% of the sample was missing data for this module question. Other variables with missing data severely limited the size of the mulitvariate sample. Of variables included in the model, only those with very large effects could be detected at statistical significance. It is possible that factors not found to be significant in this study, like race, diabetes, cardiovascular disease, and poor reported health, would have been significant with less missing data.

This study was constrained by the limitations of pre-collected cross-sectional data. As such, determination of neither the actual number of visits for each encounter type ('Checkup', 'Dental', or 'Other') nor the actual number of times cessation advice was received could be made. Presumedly, patients would not have had more than one checkup in a year though, while they could have two or more dental visits for instance. Thus, the reported ORs relative to dental visits, especially for checkups, are likely underestimations. Furthermore, it cannot be definitively shown that quit advice ascribed to dental visits, or any encounter for that matter, was actually provided at that encounter and not at some other clinical interaction not asked about in the BRFSS survey and not included in this study. Any missed interactions would have most likely been with physicians since inquiries about types of dental encounters by the BRFSS questionnaire seemed reasonable complete. With the possibility of undetected physician encounters contaminating the results, dentists may have received credit for quit advice actually provided by doctors. This phenomenon describes another reason why the found ORs between dentists and physicians ('Checkup' and 'Other') may be underestimations.

Another limitation of the cross-sectional data was that patients were asked about most exposure variables in the present (at their telephone interview) but other exposure variables and the outcome variable in the past (over the course of the last 12 months). As a consequence, patients might have been of different age, education level, smoking intensity, type of medical insurance, general or mental health, chronic disease status, or BMI at the time of their telephone interview than at the time of their clinical encounters when they could have received quit advice. Such exposure misclassification would likely have been non-differential though, biasing associations towards the null.

Relying on self-reported data as this study did, imperfect recall and/or biased reporting were concerns. Although past studies have supported the validity of patient report of physicians' quit advice,(*23*) patients may have reported, or failed to report, being advised to quit smoking whether or not such advice was provided. Patients also may have reported, or failed to report, having clinical encounters whether or not such encounters were had. The same inaccuracies may have been manifest for potential confounders. For instance, in their study validating factors assessed by the BRFFSS, Bowlin and colleagues showed that accurate assessment of BMI was less than optimal due to systematic overestimation of height and underestimation of weight.(*58*) These investigators also showed that one quarter of true diabetics were not even aware of their disease.(*58*) Such phenomena cannot be ruled out as contributors to found associations, but there is no reason to believe that any information bias that may have existed was differential.

Because the 2000 BRFSS data were generated through patient interviews exclusively, potentially relevant provider factors could not be addressed. Provider factors

that have been associated with low provision of quit advice in prior literature include: perceived lack of time (*25,38,59*) and reimbursement,(*25*) expected patient resistance or negative response,(*25,60*) and low expectations of effectiveness.(*34,38,39,59*) Other provider factors that may have been relevant but that could not be explored were: provider level (physician, nurse practitioner, physician's associate, etc.), encounter setting (physician's office, community clinic, hospital ward, etc.), provider specialty, provider gender, provider smoking status, length of visit, and the number of visits to the same provider in the past year.

In spite of these limitations, this study had many important strengths. The main strength was the use of a large sample of non-institutionalized adults, ultimately including respondents from 19 U.S. states and D.C. Inclusion of a wide range of potential confounders, stratification by race and gender, and consideration of the experience of women both inclusive and exclusive of gynecologic encounters were merits of the analysis. The discovered effect modification by gender and by gynecologic encounters on the relationship between age and the odds of receiving quit advice had not been reported previously. Another finding unreported in the identified prior literature was an estimate of the probability of being advised to quit smoking at any given doctor's visit. Additionally, the calculation of a p value for linear trend for the odds of receiving quit advice by number of doctor's visits led to the determination that a patient’s odds of being advised to quit smoking does not increase with increasing number of encounters with physicians. Finally, the separate consideration of encounter types and the inclusion of encounters with dental professionals were strengths.

Summary and Implications

In summary, this study demonstrated that only about half of smokers seeing a health care provider in the past year reported being advised to quit smoking, with less than one quarter of doctor's visits resulting in delivery of quit advice, even by the most generous estimates. These findings are consistent with prior literature. They strongly suggest that that the majority of opportunities for brief intervention are being missed. Different provider patterns for delivery of cessation advice are worrisome because they imply that all providers do not have the same appreciation for the health consequences of tobacco use nor for their role in helping patients quit smoking. More worrisome is that there may be preferential delivery of quit advice to certain patients based on personal characteristics. Further, given greater odds of receiving advice for patients with respiratory illness and abnormal pap smears, but also for patients with greater age and higher BMI, there is an implication that advice is not being delivered preventatively but rather therapeutically—to address mainly issues of existing tobacco-related diseases rather than risk of developing such diseases.

Many patients may see providers only rarely. To ensure that no smoker who might receive effective counseling is overlooked, it is vital that all clinicians make providing brief quit advice a priority for all encounters with smoking patients. Smoking contributes to myriad chronic and acute conditions and the needless consumption of valuable individual and community resources. It remains the number one preventable cause of premature death, disease, and disability in the U.S., a significant cause of direct and indirect economic losses, and source of incalculable costs to smokers and their families in terms of intangible psychological stresses. Healthcare providers in all fields

should be unified in their resolve to reduce the tremendous burden to patients and society caused by tobacco use.

In their systematic review of 16 randomized-controlled trials, Silagy and Stead showed that brief advice for smoking cessation, compared to no advice or to usual care, results in an absolute difference in quit rate of 2.5%, persisting for at least 6 months of follow-up.(*10*) Law and Tang showed a comparable difference of 1.9% after only a one-time provision of simple quit advice by a physician, with no relapse up to one year.(*9*) Given these small absolute rates of efficacy, it is understandable that physicians might feel discouraged providing cessation advice to smoking patients when they would succeed in getting only one person to quit smoking for every 176-233 patients they asked about smoking status, and every 40-53 smokers they advised. But the population impact of having even this small fraction of additional smokers quit would be enormous. Assuming a 2002 (the last year for which census estimates are available) U.S. population of 227,772,265 for those 15 years and older,(*61*) and a smoking prevalence of 22.8 %,(*62*) the number of smokers in the U.S. would be roughly 51,920,676. For the number of times these smokers see a doctor, Silagy and Stead state that 80% of the general population visits a physician annually.(*10*) Although 84% of sample in this study had a doctor's visit in the past year—which may bee more reflective of the average experience for smokers in general—using the more conservative estimate of 80%, 41,536,541 U.S. smokers would see a physician in a year. If all of these smokers received simple cessation advice just once with an absolute quit difference of just 1.9%,(*9*) almost 800,000 of them would quit. And assuming all smokers contribute equally to the $157

billion in annual health-related economic losses,(*1*) then 800,000 fewer smokers would translate to a cost savings of roughly $2.4 billion.

Since most patients have multiple provider visits in year, a substantial improvement would result even if provision of quit advice were imperfect and physicians did not advise smoking cessation at 100% of visits. As seen in this study, if smokers received advice at just 50% of their visits to physicians, 79% of smoking patients would be advised to quit smoking at least once in a year's time. This percentage translates to 32,855,404 smokers by the 2002 estimates. Of this group, about 625,000 would be expected to quit at a cost savings of $1.9 billion to the health care system.

Even factoring the inefficiencies at the individual provider level with high numbers needed to screen and treat, the net cost saving would still be substantial. Using the largest estimate of per minute cost of physician time in 1995 dollars of $2.20, (*63*) adjusting this value for inflation into 2002 dollars at $2.60,(*64*) and then assuming that 1 minute is needed per patient to advise smoking cessation,(*63*) the net cost savings to the healthcare system for a year would still be at least $1.8 billion. Importantly, the number of smokers who would quit and the projected cost savings exclude the potential contributions of ER visits, checkups, and potentially other physicians encounters where quit advice might be received and are therefore very much underestimations. Also, figuring a whole minute to provide cessation advice is likely a substantial overestimation of the time actually needed. Asking patients "Do you smoke?" and then advising smoking patients with a message like, "Quitting smoking is the most important action you can take to stay healthy/improve you health," may take only seconds.

It is worth noting that the estimates above ignore the potential contribution of encounters with dentists. Although there are no clinical trials looking specifically at the effectiveness of cessation advice coming from dental professionals, have no proof of benefit does not equate to having proof of no benefit. Until trials including dentists are available, firm conclusions about the role oral health professionals can play in helping patients quit smoking cannot be drawn. In the meantime, the Surgeon General has released a report on Oral Health in America that makes some recommendations. One of the central themes of the report is that oral health is integral to general health. It is clear that tobacco use profoundly affects patient health and there is a call to action for all healthcare providers to advise patients in matters of tobacco cessation.(*56*) Currently, dentists are more likely than physicians and other health professionals to accurately estimate their patients' tobacco use but are less likely to intervene and more likely to perceive barriers to intervention.(*46*) Nevertheless, at least for African American patients, advice from dentists is generally viewed as a powerful influence on patient behavior.(*47*) A randomized trial should be conducted looking at the effect of simple quit advice delivered by dental professionals to see if advice from these clinicians carries the same weight and has comparable effect as advice delivered by physicians.

As for physicians, there is no question that the simple cessation advice they deliver is effective. The only questions are: (1) how to prioritize advice for smoking cessation within the time constraints of clinical practice, especially given competing demands for preventive services that are equally well supported, and (2) how to effectively increase rates of doctor-delivered advice.

Given that cigarette smoking remains the leading preventable cause of disease, disability, and premature death in the U.S.(*1*), it would be hard to argue that any other preventive service merits higher priority than advice for smoking cessation at the population level. In fact, in a survey of family physicians, designed to assess prioritization in provision of preventive services, when two scenarios with a hypothetical 53-year old female patient were presented—a 30-minute physical examination, and the 5 minutes at the end of an illness visit for sinusitis—smoking cessation was the preventive service most physicians reported they would provide (75% of physicians ranking it the in the top 3 of services they would provide for the 5-minute encounter, 46% of physicians ranking it in the top 3 for the 30 minute encounter).(*65*) The results from this survey suggest that advice for tobacco cessation is given higher priority when time with patients is most limited. When physicians have more time with patients, as during a physical exam, however, advice for smoking cessation is given lower priority than several more time-intensive preventive services (i.e. breast exam, blood pressure, pelvic exam, and pap smear).(*65*) The 46% of physicians ranking quit advice in their top three choices for the 30-minute physical exam corresponds well with the 51% of patients in the BRFSS study who had routine checkups and who reported quit advice. However, the 75% of physicians ranking cessation counseling in the top three for the 5-minutes after an illness visit cannot easily be reconciled with the comparatively low 44% of patients in the BRFSS study reporting quit advice from 'other' physician encounters. It is possible there is a discrepancy between what doctors report and what they provide. In fact, prior work has shown that physicians perform fewer preventive services than are recommended, and fewer services than they think they do.(*65*)

But if physicians appreciate the importance of tobacco cessation counseling, give counseling high priority, and would like to provide counseling for smoking patients, what measures can be taken to help physicians improve their participation rates? A systematic review by the Task Force on Community Preventive Services offers some possible solutions.(*66*) One approach is a provider reminder system which can take the form of chart stickers, vital sign stamps, checklists, or electronic medical record prompts. Such reminders prompt providers to bring up tobacco use at every patient encounter. They are effective in increasing provider delivery of advice to quit smoking, with a median absolute increase of 13 percentage points (range 7-31% in the five studies qualifying for inclusion in the review). Another approach is provider education. Education in the form of lectures, written materials, seminars, or tutorials may be effective at changing provider behavior. One study cited an absolute increase in provider delivery of quit advice of 73% following provider education. However, with a median increase of only 2.2 percentage points for the ten included studies, and with four studies reporting no effect or a negative effect, evidence is insufficient to make broad recommendations for education alone. Provider education in combination with provider reminders may be effective, though, with a median increase in delivery of quit advice of 12.5 % (range 6-39%) for the seven studies examining this dual approach. Unfortunately, since there was no direct comparison made between such dual approach and simple reminders alone, it is not clear there is extra benefit of adding education on top of simple reminders, which had comparable effect when used alone. A final approach is feedback of provider performance. Feedback, as through chart review, is a retrospective assessment designed to motivate behavior prospectively. Unfortunately, none of the qualifying studies

examining feedback attempted to measure changes in provider delivery of advice to quit. What the three included studies showed was that feedback resulted in improvements in provider recognition of tobacco use status, with a median absolute increase of 21% (range 13-39%). Feedback as an approach can be combined with both provider reminders and provider education, and while there is no data to support efficacy of the combination, it is possible that the greatest effect on improving physician advising patterns might come through use of all three approaches together. In addition to these strategies, any physician resistance—due to perceived lack of time,(*25,38,59*) expected patient opposition,(*25,60*) or low expectations of success (*34,38,39,59*)—should be addressed by reassuring physicians that simple quit advice is fast, (*7,8*) welcomed by the majority of smoking patients,(*7,8*) and proven to be effective.(*9,10*)

Understandably, physicians may feel discouraged by the relatively high numbers needed to screen (176-233) and treat (40-50) to produce one quit, and by personal experiences with long-time smoking patients seemingly refractory to their advice. While there have been no studies addressing repeated provision of simple quit advice alone, the effect of repeated reminders might be inferred from trials of one-time quit advice. Indeed, it is likely that the patients in these trials had already been advised to quit smoking at some point in the past by one or more physicians. Yet despite not quitting smoking in response to past advice, a significantly greater proportion of patients quit smoking when quit advice was provided, or re-delivered, in these trials. Thus, re-delivery of quit advice is likely more effective than the alternative of no further advice, even for patients not adhering to earlier advice who are seemingly recalcitrant. Still, to optimize efficiency, intuition might suggest forgoing provision of advice to recalcitrant

patients, reserving efforts instead for the patients most likely to change. The one trial that examined readiness to quit, however, showed no significant difference in effect by patients' stage of change.(*10*) Thus, determination of patient readiness or preparedness to quit should not influence a physician's decision to provide simple quit advice. Although the vast majority of smoking patients will not stop smoking due to quit advice alone, enough patients will quit so that the cost-benefit ratio favors universal and consistent provision. There is no evidence to support improvement in efficiency by being selective in delivery, and no potential quit should be missed due to a physician's sense of futility. Simple quit advice represents an effective intervention that offers a large public health return for multiple tiny investments of time.

Conclusion

The devastating impact of tobacco use on both the individual and public-health levels has been known for decades. Smoking continues to be the number one preventable cause of disease, disability, and death in the U.S., despite volumes of literature pointing out the harms and the need for action. A concerted effort among healthcare providers is needed to screen all adults for tobacco use and to deliver advice for smoking cessation to all smoking patients. This has been the recommendation of the USPSTF since 1996.(*67*) Some authors have even suggested that smoking status be considered the "fifth vital sign",(*68*) to ensure clinicians interact with patients about tobacco use at every clinical encounter. Unfortunately, as seen in this study, providers currently advise smoking patients to quit at only a minority of encounters. Furthermore, there seems to be selective treatment of certain populations based on patient characteristics and types of clinical

encounters. The failure to advise all smoking patients uniformly at all visits, is hard to justify given that delivery of quit advice is so quick, simple, effective, and well-received. Evidence from systematic reviews demonstrates that even one-time counseling by a physician makes a significant difference in quit rates, and while the current evidence for other providers is not quite as strong, it is suggestive. Systematic reviews also suggest effective strategies for improving intervention rates among clinicians. Until other approaches are convincingly shown to be superior, clinicians might do well to start with these. Currently, the evidence is best for reminder messages, with or without supplemental provider education. Universal implementation of this strategy would most probably lead to increased advising among physicians, increased quitting among smoking patients, and reductions in unnecessary morbidity, premature mortality, economic strain, and a variety of intangible costs for the U.S. population.

Question Type	(%)[A]	#	Qualifying Encounter	(%)[B]	Encounter Type	(% / %)[C]
Core	(30.0)		Routine check	(100)	Checkup	(88.0 / 89.1)
			Breast exam	(58.5)	Other	(58.5 / 58.5)
			Pap smear	(62.6)		
Module	(70.0)	9	Sig/Col	(1.8)		
		1	DM visit/foot	(5.9)		
		1	Eye exam	(5.9)		
		5	ER visit	(4.3)		
		6	Teeth/dentist	(20.8)	Dental	(15.5 / 74.3)

Figure 1. Basic study design features and percentages.
[A]Percentage of total questions defining the qualifying encounters.
[B]Percentage of patients in the sample asked about the specific encounter.
[C]Percentage of patients in the entire sample having the encounter type / percentage of patients having the encounter among those asked about the encounter.

Core = fixed BRFSS question; asked of all respondents in all states and territories, included questions about: routine checkups, breast exams, and pap smears.
Module = question from CDC-approved set that could be asked in addition to BRFSS core; administered at the discretion of individual states, included questions about: sigmoidoscopy/colonoscopy, diabetic appointments, eye exams, emergency room visits, and dental visits.
= module number, designating a specific set of CDC-approved questions.
Routine check = routine checkup.
Sig/Col = sigmoidoscopy/colonoscopy.
DM visit/foot = diabetic foot exam or other diabetic appointment with a health professional.
ER = emergency room.
Teeth /dentist = teeth cleaning or dental visit.
Checkup = having routine checkup(s) in the past year.
Other = having breast exam(s), pap smear(s), sigmoidoscopy/colonoscopy, diabetic appointment(s), eye exam(s), or emergency room visit(s) in the past year.
Dental = having teeth cleaning(s)/visit(s) to a dentist in the past year.

Question Type	(%)[A]	#	Patient Characteristic	(%)[B]
Core	(72.7)		Gender	100
			Race	100
			Education	100
			Smoking Intensity	77.8
			Insurance type	83.2
			General health	100
			Mental health	100
			Asthma	100
			Diabetes	100
			BMI	100
			Breast exam	58.5
			Breast exam reason	58.5
			Pap smear	62.6
			Pap smear reason	62.6
Module	(27.3)	13	Cardiovascular Dz	47.3
		5	No. Doctor's visits	4.3
		5	Personal provider	11.9
		5	Health care rating	3.6

Figure 2. Patient characteristics and percentages.
[A]Percentage of total questions defining the patient characteristics.
[B]Percentage of patients in the sample asked about the specific patient characteristic.

Core = fixed BRFSS question; asked of all respondents in all states and territories, included questions about: gender, race, education, smoking intensity, type of medical insurance, general health, mental health, astma, diabetes, BMI, breast exams, and pap smears.
Module = question from CDC-approved set that could be asked in addition to BRFSS core; administered at the discretion of individual states, included questions about: cardiovascular disease, number of doctor's visits, having a personal provider, and healthcare rating.
= module number, designating a specific set of CDC-approved questions.
BMI = body mass index.
No. Doctor's visits = number of doctors visits in the past 12 months.
Cardiovascular Dz = cardiovascular disease.

Table 1. Distributions of other patient characteristics by respondent age[A], BRFSS 2000.

		Respondent Age (Primary Independent Variable)			
Other Patient Characteristics	**N**	**% Late Adolesc (18-24 yrs)**	**% Young Adult (25-39 yrs)**	**% Middle Aged (40-64 yrs)**	**% Older Adult (≥ 65 yrs)**
Total sample	10,582	11.6	32.2	46.6	9.2
Gender					
Male	3,763	11.5	29.5	49.4	9.5
Female	6,819	11.6	33.6	45.1	9.0
Race					
Non-Hispanic White	8,225	11.7	31.5	46.6	9.9
Non Hispanic Black	1,208	8.1	32.0	51.2	8.2
Other	1,093	14.8	38.2	41.6	4.9
Education					
Some high school or less	1,618	12.7	28.3	42.5	16.3
Grade 12 or high school grad	4,128	12.4	31.5	46.7	8.9
Some college	3,073	13.2	32.7	46.6	7.3
College grad or beyond	1,743	6.0	36.5	50.3	6.4
Current smoking intensity[B]					
1-10 cigarettes/day (lighter)	2,697	14.8	35.8	39.8	9.2
>10 cigarettes/day (heavier)	5,448	8.4	29.2	53.0	9.1
Type of medical insurance[B]					
None	1,913	18.8	38.2	41.7	1.2
Medicaid/medical assist.	506	19.0	46.3	33.4	1.0
Medicare	28	3.6	32.1	14.3	50
Private or Military	6,353	10.7	35.0	53.4	0.5
Reported poor general health					
No	9,880	12.2	33.5	45.4	8.5
Yes	688	2.9	13.2	65.0	18.6
Reported poor mental health					
No	6,048	9.4	29.2	48.7	12.2
Yes	4,342	15.0	36.6	43.6	4.5
Asthma					
No	9,270	11.0	32.0	47.1	9.5
Yes	1,303	16.0	33.3	43.3	7.2
Diabetes					
No	9,905	12.2	33.4	45.4	8.5
Yes	664	1.8	13.0	65.1	19.9
Cardiovascular disease[B]					
No	4,511	11.9	34.4	45.8	7.4
Yes	484	1.0	12.8	58.9	27.3
BMI					
normal weight (BMI < 25)	5,157	15.4	32.3	41.2	10.7
overweight (25 ≤ BMI < 30)	3,220	8.7	30.3	52.0	8.8
obese (BMI ≥ 30)	1,888	6.3	34.0	53.2	6.3

Percentages are row percentages. Percentages may not sum to 100% due to missing data and/or rounding. Numbers may not sum to total due to missing data. Adolesc = Adolescent. Yrs = years. BMI = body mass index. P values for chi square statistics for all bivariate associations <0.001.

[A]for the main study sample (current smokers having any of the following clinical encounters in the past 12 months: routine checkup, breast exam, pap smear, sigmoidoscopy/colonoscopy, teeth cleaning/dental visit, diabetic appointment, eye exam, emergency room visit).

[B]23%, 17%, and 53% of the sample was missing data for 'Current smoking intensity', 'Type of medical insurance', and 'Cardiovascular disease' respectively.

Table 2. Distribution of patient characteristics by types of clinical encounters[A], BRFSS 2000.

		Types of Clinical Encounters (Secondary Independent Variable)						
Patient Characteristics	**N**	**% Dental Only**	**% Other Only**	**% Checkup Only**	**% Dental & Other Only**	**% Dental & Checkup Only**	**% Checkup & Other Only**	**% Checkup & Dental & Other**
Total sample[B]	2,202	16.2	2.3	11.1	3.9	21.7	12.0	31.2
Gender								
Male	877	25.9	0.0	20.0	0.3	45.5	2.1	3.9
Female	1,315	9.8	3.8	5.2	6.2	6.0	18.6	49.3
Race								
Non-Hispanic White	1,749	18.2	2.3	10.5	3.7	21.3	11.6	30.6
Non Hispanic Black	208	4.3	1.4	14.9	2.4	23.1	18.8	35.1
Other	234	12.4	3.0	12.4	6.0	23.1	9.0	32.5
Education								
Some high school or less	273	11.0	1.8	22.3	2.6	17.6	18.3	22.0
Grade 12 or high school grad	904	15.6	3.1	11.5	4.0	22.5	14.1	28.1
Some college	659	17.6	2.0	9.4	4.3	20.5	8.8	36.0
College grad or beyond	363	19.0	1.1	4.7	3.9	25.1	8.3	36.9
Current smoking intensity[C]								
1-10 cigarettes/day (lighter)	576	12.5	2.1	9.2	3.5	19.1	13.7	38.7
>10 cigarettes/day (heavier)	1,184	19.0	2.5	13.3	4.4	20.7	11.5	26.4
Type of medical insurance[C]								
None	360	25.0	5.0	12.5	6.9	14.4	16.1	16.7
Medicaid/medical assist.	110	5.5	2.73	11.82	4.6	10.0	21.8	40.9
Medicare	7	14.3	0.0	0.0	0.0	28.6	28.6	28.6
Private or Military	1,346	16.7	1.5	8.3	3.6	25.2	8.3	35.1
Reported poor general health								
No	2,086	16.6	2.4	10.6	3.9	22.1	11.6	31.4
Yes	113	7.1	0.9	19.5	2.7	15.0	21.2	28.3
Reported poor mental health								
No	1,321	17.1	2.0	11.3	3.5	24.5	10.8	29.3
Yes	839	14.5	2.7	10.5	4.7	18.1	13.6	34.1
Asthma								
No	1,937	16.5	2.1	11.1	3.8	21.9	11.5	31.5
Yes	261	14.2	3.8	11.1	3.8	19.9	15.7	29.1
Diabetes								
No	2,066	17.1	2.3	11.2	4.0	22.8	10.9	30.1
Yes	131	2.3	1.5	9.2	2.3	3.8	29.8	49.6
Cardiovascular disease								
No	2,007	17.1	2.4	9.9	4.1	21.6	11.4	31.9
Yes	193	6.2	0.5	23.3	1.6	23.3	18.7	23.8
BMI								
normal weight (BMI < 25)	1,075	16.5	2.0	10.1	4.9	18.8	12.6	33.6
overweight (25 ≤ BMI < 30)	674	16.3	2.2	12.2	3.6	28.5	10.7	24.2
obese (BMI ≥ 30)	373	16.1	3.2	12.6	1.6	20.4	12.3	33.0

Percentages are row percentages. Percentages may not sum to 100% due to missing data and/or rounding. Numbers may not sum to total due to missing data. Dental = Dental visit(s) in the past year. Checkup = routine checkup(s) in the past year. Other = other physician encounter(s) in the past year. BMI = body mass index. P values for chi square statistics for all bivariate associations <0.001

[A]for the main study sample (current smokers having any of the following clinical encounters in the past 12 months: routine checkup, sigmoidoscopy/colonoscopy, teeth cleaning/visit to dentist, diabetic foot exam/diabetic appointment with a health professional, eye exam, emergency room visit).

[B]79% of the main sample (N = 10,582) was missing data for module questions on dental visits, reducing total sample size to 2,202 for analyses of types of clinical encounters.

[C]20% and 17% of the sample was missing data for 'Current smoking intensity' and 'Type of medical insurance' respectively.

Table 3. Crude and adjusted odds ratios for the associations of advice to quit smoking with independent variables and other patient characteristics[A], BRFSS 2000.

Characteristic	N	% Advised to Quit Smoking	OR[B]	95% CI	N Multi-variate Model	% Advised to Quit Smoking	OR[C]	95% CI
Total sample	10,582	54.8			1,338	54.9		
Primary Independent Variable								
Respondent age								
Late Adolescent (18-24 years)	1,227	48.3	1.00		135	49.6	1.00	
Young Adult (25-39 years)	3,402	53.6	1.24	1.09, 1.41	502	54.4	1.02	0.67, 1.55
Middle Aged (40-64 years)	4,935	57.3	1.44	1.27, 1.63	686	56.5	1.12	0.73, 1.70
Older Adult (≥ 65 years)	972	55.1	1.32	1.11, 1.56	15	46.7	1.23	0.32, 4.68
					multivariable p for trend = 0.460		1.07	0.89, 1.29
Secondary Independent Variable								
Types of clinical encounters[D]								
Dental only	356	26.7	1.00		258	27.9	1.00	
Other only	50	44.0	2.16	1.17, 3.96	32	50.0	3.03	1.32, 6.97
Checkup only	244	51.2	2.89	2.05, 4.07	138	52.9	3.35	2.11, 5.31
Dental & Other only	85	57.7	3.74	2.29, 6.11	65	58.5	4.72	2.50, 8.90
Dental & Checkup only	478	53.6	3.17	2.36, 4.26	293	57.7	3.45	2.36, 5.03
Checkup & Other only	265	59.3	3.99	2.84, 5.61	140	60.7	5.50	3.26, 9.28
Checkup & Dental & Other	687	63.9	4.86	3.67, 6.45	412	68.5	6.68	4.30, 10.4
Other Patient Characteristics								
Gender								
Male	3,763	50.1	1.00		541	48.8	1.00	
Female	6,819	57.5	1.35	1.24, 1.46	797	59.1	0.86	0.56, 1.25
Race								
Non-Hispanic White	8,225	56.1	1.00		1,128	55.1	1.00	
Non Hispanic Black	1,208	51.4	0.83	0.73, 0.94	103	53.4	0.76	0.48, 1.18
Other	1,093	50.0	0.78	0.69, 0.89	107	55.1	0.99	0.64, 1.53
Education								
Some high school or less	1,618	54.5	1.00		144	43.1	1.00	
Grade 12 or high school grad	4,128	54.2	0.99	0.88, 1.11	586	53.6	1.70	1.12, 2.56
Some college	3,073	56.2	1.07	0.95, 1.21	405	56.8	1.99	1.29, 3.07
College grad or beyond	1,743	54.5	1.00	0.87, 1.15	203	63.6	2.59	1.58, 4.26
					multivariable p for trend <0.001		1.30	1.13, 1.50
Current smoking intensity[E]								
1-10 cigarettes/day (lighter)	2,697	55.5	1.00		429	54.8	1.00	
>10 cigarettes/day (heavier)	5,448	60.8	1.25	1.14, 1.37	909	55.0	1.18	0.91, 1.53
Type of medical insurance[E]								
None	1,913	48.3	1.00		268	42.5	1.00	
Medicaid/medical assist.	506	61.9	1.74	1.42, 2.13	78	60.3	1.35	0.76, 2.40
Medicare	28	60.7	1.66	0.77, 3.56	4	50.0	2.32	0.19, 28.3
Private or Military	6,353	55.7	1.35	1.22, 1.49	988	57.9	1.59	1.16, 2.17
Reported poor general health								
No	9,880	53.7	1.00		1,285	54.6	1.00	
Yes	688	70.2	2.03	1.71, 2.40	53	64.2	1.11	0.57, 2.16
Reported poor mental health								
No	6,048	52.1	1.00		792	52.5	1.00	
Yes	4,342	58.3	1.29	1.19, 1.39	546	58.4	1.22	0.95, 1.56
Asthma								
No	9,270	53.6	1.00		1,186	52.7	1.00	
Yes	1,303	63.7	1.52	1.34, 1.72	152	72.4	2.73	1.82, 4.11
Diabetes								
No	9,905	54.0	1.00		1,281	54.3	1.00	
Yes	664	66.6	1.70	1.44, 2.00	57	68.4	1.05	0.55, 2.00
Cardiovascular disease[E]								
No	4,511	52.9	1.00		1,250	54.2	1.00	
Yes	484	68.2	1.91	1.56, 2.33	88	65.9	1.40	0.84, 2.32
BMI								
normal weight (BMI < 25)	5,157	53.1	1.00		681	51.4	1.00	
overweight (25 ≤ BMI < 30)	3,220	55.5	1.10	1.01, 1.20	423	57.5	1.33	1.02, 1.75
obese (BMI ≥ 30)	1,888	58.2	1.23	1.11, 1.37	234	60.7	1.48	1.06, 2.07
					multivariable p for trend = 0.010		1.24	1.05, 1.45

Percentages are row percentages. Numbers may not sum to total due to missing data. OR = odds ratio. CI = confidence interval. Dental = Dental visit(s) in the past year. Checkup = routine checkup(s) in the past year. Other = other physician encounter(s) in the past year. BMI = body mass index. P values for chi square statistics for all bivariate associations <0.001.
[A]for the main study sample (current smokers having any of the following clinical encounters in the past 12 months: routine checkup, sigmoidoscopy/colonoscopy, teeth cleaning/visit to dentist, diabetic foot exam/diabetic appointment with a health professional, eye exam, emergency room visit).
[B]Crude OR.
[C]Adjusted for primary and secondary independent variables and all other patient characteristics listed in this table.
[D]79% of the main sample (N = 10,582) was missing data for module questions on dental visits.
[E]23%, 17%, and 53% of the sample was missing data for 'Current smoking intensity', 'Type of medical insurance', and 'Cardiovascular disease' respectively.

Table 4. Crude and adjusted odds ratios and 95% confidence intervals for the association between respondent age and advice to quit smoking stratified by race-gender groups[A], BRFSS 2000.

Race-Gender Group	N	% Advised to Quit Smoking	OR[B]	95% CI	N Multi-variate Model	OR[C]	95% CI
White men	2,847	51.9			931		
Late Adolescent (18-24 years)	342	39.0	1.00		106	1.00	
Young Adult (25-39 years)	812	47.9	1.45	1.12, 1.87	288	1.46	0.89, 2.38
Middle Aged (40-64 years)	1,410	56.5	2.04	1.60, 2.59	525	1.80	1.11, 2.92
Older Adult (≥ 65 years)	283	56.5	2.04	1.48, 2.82	12	1.71	0.45, 6.50
			multivariable p for trend = 0.017			1.29	1.05, 1.60
White women	5,351	58.3			1,570		
Late Adolescent (18-24 years)	623	56.0	1.00		164	1.00	
Young Adult (25-39 years)	1,775	58.7	1.12	0.93, 1.34	617	0.89	0.62, 1.29
Middle Aged (40-64 years)	2,419	59.1	1.13	0.95, 1.35	780	0.89	0.62, 1.29
Older Adult (≥ 65 years)	534	56.0	1.00	0.79, 1.26	9	0.34	0.06, 1.93
			multivariable p for trend = 0.534			0.95	0.81, 1.12
White women (no breast exam / pap)[D]	626	45.2			230		
Late Adolescent (18-24 years)	24	29.2	1.00		9	1.00	
Young Adult (25-39 years)	184	44.0	1.91	0.76, 4.83	74	1.43	0.28, 7.33
Middle Aged (40-64 years)	328	47.5	2.20	0.89, 5.45	145	1.39	0.28, 6.93
Older Adult (≥ 65 years)	85	43.5	1.87	0.70, 4.98	2	<.001	<.001, >999
			multivariable p for trend = 0.930			1.02	0.60, 1.73

Percentages are row percentages. OR = odds ratio. CI = confidence interval
[A]for the main study sample (current smokers having any of the following clinical encounters in the past 12 months: routine checkup, sigmoidoscopy/colonoscopy, teeth cleaning/visit to dentist, diabetic foot exam/diabetic appointment with a health professional, eye exam, emergency room visit).
[B]Crude OR.
[C]Adjusted for primary and secondary independent variables and all other patient characteristics listed in Table 3 except for gender, race, and dental visits.
[D]for the main sample of White women excluding all patients who had pap smears or breast exams from analyses.

Table 5. Crude and adjusted odds ratios for the associations of advice to quit smoking with additional potential confounders for female respondents[A], BRFSS 2000.

Potential Confounder	N[B]	% Advised to Quit Smoking	OR[C]	95% CI	N Multi-variate Model	% Advised to Quit Smoking	OR[D]	95% CI
Exam pair	6,819	57.5			723	60.2		
Breast exam								
No	1,101	46.3	1.00		182	40.7	1.00	
Yes	5,059	60.7	1.79	1.57, 2.04	541	66.7	2.55	1.52, 4.28
Pap smear								
No	1,479	52.4	1.00		194	46.9	1.00	
Yes	5,113	59.3	1.33	1.18, 1.49	529	65.0	1.02	0.61, 1.73
Reason pair	6,819	57.5			493	66.1		
Reason for breast exam								
routine exam	4,792	60.5	1.00		477	65.6	1.00	
Exam for problem (cancer/ other)	260	64.6	1.19	0.92, 1.55	16	81.3	2.08	0.55, 7.85
Reason for pap smear								
routine smear	4,744	59.1	1.00		469	65.0	1.00	
smear for problem (current/previous)	364	62.4	1.15	0.92, 1.43	24	87.5	4.44	1.19, 16.5

Percentages are row percentages. Numbers may not sum to total due to missing data. OR = odds ratio. CI = confidence interval.
[A]for the main study sample (current smokers having any of the following clinical encounters in the past 12 months: routine checkup, sigmoidoscopy/colonoscopy, teeth cleaning/visit to dentist, diabetic foot exam/diabetic appointment with a health professional, eye exam, emergency room visit).
[B]N of total sample (10,582) minus male repsondents (3,763).
[C]Crude OR.
[D]Adjusted for other potential confounder in pair, the primary and secondary independent variables (subtracting breast exams and pap smears from the encounter type 'other'), and all other patient characteristics listed in Table 3

Table 6. Crude and adjusted odds ratios for the association between advice to quit smoking and number of doctor's visits in the past year[A], BRFSS 2000.

Number of Doctor's Visits[B]	N	% Advised to Quit Smoking	OR[C]	95% CI	N Multi-variate Model	% Advised to Quit Smoking	OR[D]	95% CI
0[E]	75	24.0						
1	98	51.0	1.00		56	60.7	1.00	
2	81	54.3	1.14	0.63, 2.06	57	59.7	0.80	0.34, 1.84
3	49	49.0	0.92	0.46, 1.83	27	44.4	0.44	0.16, 1.25
4	51	64.7	1.76	0.88, 3.54	36	66.7	1.07	0.41, 2.80
5 – 9	56	66.1	1.87	0.95, 3.69	33	69.7	0.96	0.34, 2.70
≥10	48	75.0	2.89	1.34, 6.18	25	80.0	2.43	0.69, 8.51
					multivariate p for trend = 0.294		1.10	0.92, 1.32

Percentages are row percentages. OR = odds ratio. CI = confidence interval.
[A]for the main study sample (current smokers having any of the following clinical encounters in the past 12 months: routine checkup, sigmoidoscopy/colonoscopy, teeth cleaning/visit to dentist, diabetic foot exam/diabetic appointment with a health professional, eye exam, emergency room visit).
[B]The question generating these data: "In the last 12 months, (not counting times you went to an emergency room), how many times did you go to a doctor's office or clinic to get care for yourself?" was not part of the core questionnaire. >95% of sample was missing data for this question.
[C]Crude OR.
[D]Adjusted for primary and secondary independent variables and all other patient characteristics listed in Table 3 except for dental visits and cardiovascular disease.
[E]Zero ('0') doctor's visits set to missing and excluded from simple and multivariate logistic regressions (when '0' visits included, multivariate P for trend = 0.013, OR 1.21, 95% CI 1.04, 1.41).

Table 7. Potential influence of ER visits and routine checkups on the association between advice to quit smoking and number of doctor's visits in the past year[A], BRFSS 2000.

Number of Doctor's Visits[B]	% Having ER Visit(s)[B]	% Having ER Visit(s) Advised to Quit Smoking	% Potential Contribution of ER to % Advised to Quit Smoking	% Having Checkup(s)	% Having Checkup(s) Advised to Quit Smoking	% Potential contribution of Checkup to % Advised to Quit Smoking
0	48.9	22.7	11.1	57.8	30.8	17.8
1	17.9	50.0	9.0	78.6	65.9	51.8
2	28.1	68.8	19.3	94.7	59.3	56.2
3	44.4	33.3	14.8	77.8	52.4	40.8
4	44.4	68.8	30.5	86.1	71.0	61.1
5 – 9	48.5	75.0	36.4	97.0	68.8	66.6
≥10	52.0	69.2	36.0	80.0	85.0	68.0

Percentages are row percentages. ER = emergency room visit(s) in the past year. Checkup = routine checkup(s) in the past year.
[A]for the main study sample (current smokers having any of the following clinical encounters in the past 12 months: routine checkup, sigmoidoscopy/colonoscopy, teeth cleaning/visit to dentist, diabetic foot exam/diabetic appointment with a health professional, eye exam, emergency room visit).
[B]The questions generating these data were not part of the core questionnaire. >95% of sample was missing data for these questions.

Table 8. Projection of the association between advice to quit smoking and number of doctor's visits in the past year given a 50% probability of being advised to quit smoking at any given doctor's visit[A], BRFSS 2000.

Number of Doctor's Visits	N Multi-variate Model	Cumulative Probability of Being Advised to Quit Smoking	OR	95% CI
1	56	0.500	1.00	
2	57	0.750	3.07	1.38, 6.83
3	27	0.875	8.00	2.16, 29.4
4	36	0.938	17.0	3.72, 77.7
5 – 9	33	0.969	32.0	4.09, 250.6
≥10	25	0.999	>999	<0.01, >999
		p for trend <.001	2.59	1.80, 3.72

OR = odds ratio. CI = confidence interval.
[A]for the main study sample (current smokers having any of the following clinical encounters in the past 12 months: routine checkup, sigmoidoscopy/colonoscopy, teeth cleaning/visit to dentist, diabetic foot exam/diabetic appointment with a health professional, eye exam, emergency room visit).

Table 9. Comparison of the actual number of patients who received quit advice to the number of patients that would have received advice had advice been given at 50% of visits[A], BRFSS 2000.

Number of Doctor's Visits	Patients in Multivariate Model	N Advised to Quit Smoking	% Advised to Quit Smoking	N Advised to Quit Smoking if Advice at 50% Visits	% Advised to Quit Smoking if Advice at 50% Visits
1	56	34	60.7	28	50.0
2	57	34	59.6	43	75.0
3	27	12	44.4	24	87.5
4	36	24	66.7	34	93.8
5 – 9	33	23	69.7	32	96.9
≥10	25	20	80.0	25	99.9
Totals	234	147	62.8	185	79.1

Percentages are row percentages. OR = odds ratio. CI = confidence interval.
p for χ^2 <0.001.
[A]for the main study sample (current smokers having any of the following clinical encounters in the past 12 months: routine checkup, sigmoidoscopy/colonoscopy, teeth cleaning/visit to dentist, diabetic foot exam/diabetic appointment with a health professional, eye exam, emergency room visit).

Table 10. Maximum and minimum possible numbers and percentages of visits where quit advice was actually received[A], BRFSS 2000.

Number of Doctor's Visits	N Patients in Multi-variate Model	N Total Patient Visits	N Maximum Possible Visits Where Quit Advice Received	% Maximum Possible Visits Where Quit Advice Received	N Minimum Possible Visits Where Quit Advice Received	% Minimum Possible Visits Where Quit Advice Received
1	56	56	34	60.7	34	60.7
2	57	114	68	59.6	34	29.8
3	27	81	36	44.4	12	14.8
4	36	144	96	66.7	24	16.7
5 – 9[B]	33	165	115	69.7	23	13.9
≥10[B]	25	250	200	80.0	20	8.0
Totals	234	810	549	67.8	147	18.1

Percentages are row percentages. OR = odds ratio. CI = confidence interval.
[A]for the main study sample (current smokers having any of the following clinical encounters in the past 12 months: routine checkup, sigmoidoscopy/colonoscopy, teeth cleaning/visit to dentist, diabetic foot exam/diabetic appointment with a health professional, eye exam, emergency room visit).
[B]'5-9' and '≥10' set to '5' and '10' respectively. When set to '9' and '14' respectively, maximum and minimum possible percentages of visits where quit advice was received were 69.2%, and 14.1% respectively.

Table 11. Probabilities of being advised to quit smoking at any given doctor's visit corresponding to the maximum and minimum possible numbers and percentages of visits where quit advice was actually received[A], BRFSS 2000.

Number of Doctor's Visits	N Patients in Multi-variate Model	N Total Patient Visits	N Visits Where Quit Advice Received (advice at 23% visits)	% Visits Where Quit Advice Received (advice at 23% visits)	N Visits Where Quit Advice Received (advice at 4.4% visits)	% Visits Where Quit Advice Received (advice at 4.4% visits)
1	56	56	13	23.0	2	4.4
2	57	114	46	40.7	10	8.4
3	27	81	44	54.3	10	12.1
4	36	144	93	64.8	22	15.4
5 – 9[B]	33	165	120	72.9	30	18.4
≥10[B]	25	250	232	92.7	73	29.3
Totals	234	810	549	67.7	148	18.2

Percentages are row percentages.
[A]for the main study sample (current smokers having any of the following clinical encounters in the past 12 months: routine checkup, sigmoidoscopy/colonoscopy, teeth cleaning/visit to dentist, diabetic foot exam/diabetic appointment with a health professional, eye exam, emergency room visit).
[B]'5-9' and '≥10' set to '5' and '10' respectively. When set to '9' and '14' respectively, probabilities of being advised to quit smoking at any given doctor's visit corresponding to the maximum and minimum possible percentages of visits where quit advice was received were 17% and 2.1% respectively.

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INSTRUCTIONS FOR HARD-COVER BINDING

To appear imprinted on the FRONT COVER:

Patient Age,
Number and Type of Clinical Encounters,
and Provider Advice to Quit Smoking.
BRFSS 2000

Sean C. Lucan
Yale University, 2004

To appear imprinted on the SPINE:

… Advice to Quit Smoking. BRFSS 2000 Sean C. Lucan, 2004