Identifying Differences in Rates of Invitation to Participate in Tobacco Treatment in Primary Care

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ABSTRACT

Introduction: The progress achieved in reducing tobacco use has not been consistent across groups of smokers, and health systems are inconsistently implementing best practice guidelines. Guideline implementation could be associated with improved treatment invitation rates.

Aims: To evaluate differences in tobacco treatment invitation rates based on patient characteristics in primary care clinics implementing best practice guidelines.

Methods: A secondary analysis of patients presenting to 11 primary care clinics from 2 Wisconsin health systems from June 2010 to February 2013. The main outcome was whether patients received an invitation to participate in tobacco treatment. Invitation rates were examined by sex, age group (≤24 years, 25-44, 45-64, ≥64), race (white, black, other), insurance status (private, Medicare, Medicaid, none), and visit diagnosis ("high-risk" [cardiovascular and pulmonary disease, malignancy, pregnancy] vs "low-risk" [all other ICD-9 categories]). Moderation effects of health systems also were examined.

Results: Of the 95,471 patients seen, 84,668 (89%) were screened for smoking. Among the 15,193 smokers, 10,242 (67%) were invited to participate. Invited patients were older, white or black, and carried low-risk diagnoses. Invitation rates and patient-level differences varied between the health systems.

Conclusions: Variable treatment invitation rates and health system differences remain evident in the primary care setting employing robust clinical practice guideline recommendations.

INTRODUCTION

In 2008, the United States Public Health Service clinical practice guideline, *Treating Tobacco Use and Dependence*, highlighted the importance of having a systematic team-based effort to deliver smoking cessation treatments to smokers. Critical to achieving smoking cessation is the identification of, and intervention with, *all* smokers, harnessing the capabilities of the electronic health record to do so.[1] Offering consistent, evidence-based tobacco use treatment by health systems and insurers may be the most effective preventive clinical intervention available to primary care and would help to reduce the nearly $200 billion spent annually on medical care and lost productivity due to tobacco use in the United States.[1]

Despite these strong recommendations to identify and treat all smokers, the United States continues to see disparities in the use of tobacco products. Younger individuals, men, some racial and ethnic minority groups, those with substance use or mental health diagnoses and individuals from socioeconomically disadvantaged backgrounds have a higher prevalence of smoking than individuals over 65 years of age, women, non-Hispanic whites, and individuals with larger household incomes or higher educational attainment.[2] Wisconsin does not escape these national trends; the state loses $4.6 billion annually in health care costs and lost productivity due to smoking.[3] Smoking is nearly 4 times as prevalent in individuals who live in poverty and twice as prevalent in blacks as whites.[4] Wisconsin's insurance coverage for tobacco use treatment is also suboptimal: the state did not expand Medicaid and does not have a private insurance mandate for provision of tobacco cessation services.[5]

The difference in prevalence of tobacco use could be related to the fact that younger individuals, men, certain racial and ethnic minority groups, individuals struggling with mental health and substance use, and socioeconomically disadvantaged individuals are less likely to receive cessation advice and treatment from health care

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providers. This has been demonstrated in multiple studies since 1997.[6-9] One reason for the continued disparities in identification and treatment rates could be the limited numbers of health care systems that are able to implement all clinical practice guideline recommendations.[5] It has been demonstrated that quality improvement projects with clinical practice guidelines yield higher quality health care.[10] It has also been demonstrated that smokers are more likely to be identified and given cessation assistance by their primary care provider than by a clinician who is not their primary.[8]

In an attempt to address barriers to providing cessation treatment, the University of Wisconsin Partnership to Assist and Serve Smokers (UW-PASS) study, funded by the National Cancer Institute, was designed and implemented in 11 primary care clinics in southern Wisconsin. While its primary purpose was a primary care clinic-based effectiveness study,[11-13] UW-PASS included several key clinical practice guideline recommendations designed to improve smoker identification and invitation to treatment. Specifically, UW-PASS utilized a team-based approach to smoking cessation, standardization of the invitation to treatment via the electronic health record (EHR), elimination of the cost of treatment, and expansion of the reach of treatment services to all smokers, whether they were ready to quit or not.

This study is a secondary analysis of UW-PASS data, specifically documentation of tobacco treatment invitation rates in the setting of these multiple clinical practice guideline recommendations. It further assessed whether invitation rates varied based on sex, age, race, socioeconomic status, and medical conditions. This analysis could serve as an approximation of treatment invitation rates in primary care clinics implementing clinical practice guideline recommendations for tobacco use treatment. As such, results of these analyses may serve to document whether disparities remain despite standardization of the care process and elimination of the cost of treatment.

We hypothesized that treatment invitation rates in this study would demonstrate less variability with respect to patient-specific factors, as compared to previously reported literature.[6-8] In studies instituting an EHR intervention to increase tobacco use treatment rates, there have been mixed results, with some studies showing a lessening of differences,[14,15] while others showed continued differences in referral rates.[16,17] We hypothesized that team-based care, elimination of the financial burden to the patient, and standardized invitation prompts via the EHR would be associated with higher and less variable tobacco use treatment invitation rates. While multiple studies have examined tobacco use screening and treatment rates, this study examines these rates in an optimized outpatient setting to evaluate whether disparities decrease.

MATERIALS AND METHODS

Study Design, Setting

This study is a secondary analysis of tobacco treatment invitation rates in the UW-PASS comparative effectiveness research project that evaluated different counseling and medication interventions for smokers who wanted to quit and for those who wanted to cut down.[11-13] UW-PASS was implemented in 11 primary care clinics from 2 separate health systems (health system A and health system B) in southern Wisconsin. Patients presenting at these clinics were screened for tobacco use by clinic staff. If the patient was a current smoker, the EHR would prompt the clinic staff to invite the patient to participate in tobacco treatment—either cessation or reduction. All treatments related to the study were provided at the clinic with no cost to participants. Study staff worked with clinic staff to set and reach invitation goals, including providing feedback on invitation rates and incentives such as bagels or pizza parties.

Participants

Participants were recruited from June 2010 to February 2013. Inclusion criteria included >17 years old; >4 cigarettes/day for the previous 6 months; motivation to quit or willingness to cut down; ability to read, write, and speak English; agreeing to complete assessments; no plan to move from the area in the next 6 months; not currently taking bupropion or varenicline; agreement to use only study medication for the duration of the study (discontinuing any ongoing nicotine replacement therapy [NRT] use); no medical contraindications to NRT use; and agreement by female patients of child-bearing age to use an approved method of birth control. See Cook et al, Piper et al, and Schlam et al.[11-13] for additional details, including CONSORT diagrams. UW-PASS was approved by the University of Wisconsin Health Sciences Institutional Review Board and funded by the National Cancer Institute. Informed consent was obtained from all individual participants included in the study.

Invitation to UW-PASS

Upon rooming a patient, the clinic staff assessed smoking status as part of the patient's vital signs. If a patient reported being a current smoker, clinic staff were provided with a Best Practice Alert (BPA: an EHR prompt), which included a scripted invitation to join the UW-PASS research study. The accessibility of the BPA differed between the 2 health systems: in health system A, the BPA would only provide the invitation script if manually accessed by clinic staff after identifying a patient as a smoker. There were no cues to access the BPA in health system A. In health system B, the BPA was highlighted in yellow (it provided a visual cue) if the patient screened positive for smoking, prompting clinic staff to deliver the invitation.

Patients were considered "invited" if clinic staff recorded whether the patient was or was not willing to be referred to the study (ie, they were considered "invited" even if they declined to participate in the trial). Patients were identified as *not* being invited if they presented to the clinic during the recruitment timeframe and reported current smoking, but the BPA invitation was

either not accessed or there were no actions recorded by clinic staff to address the BPA. It was assumed that this lack of action indicated that the patient was not presented with the invitation to join the study.

Predictor Variables

This study examines a cohort of patients who had not yet consented to participate in the UW-PASS project. Accordingly, only aggregated, deidentified data were used. Data were obtained from the 2 health systems for both invited and not-invited participants. Data included sex, age, racial identification, insurance status, and visit diagnosis. Age was categorized as less than 24 years old, 25-44 years, 45-64 years, and older than 64 years old. Race was based on patient's self-identification as white, black, or nonwhite/nonblack. Insurance status included private, Medicare, Medicaid, or no insurance. Visit diagnosis was determined using the International Classification of Disease 9 (ICD-9) codes and grouped into high-risk versus low-risk. High-risk was any ICD-9 category pertaining to cardiovascular disease (codes 390-459), pulmonary disease (including infectious; 460-519), malignancy (140-239), and pregnancy (630-679). Low-risk was any other ICD-9 category.

Statistical Analysis

All analyses were completed using SAS/STAT software, Version 9.4 (Cary, NC). Univariate logistic regression examined the ability of each variable to predict invitation to the UW-PASS project. Multivariate analysis of patient-level predictors was not possible due to the nature of the aggregated dataset and lack of individualized data. We were able to test the potential moderating effect of health system on each of the patient-level predictor variables with multivariate logistic regression models. These models included the patient-level predictor variable, the health system variable (A or B), and the interaction between the predictor variable and health system. This allowed determination of whether the unique health systems were associated with different referral rates based on patient-level characteristics. Patient-level predictor variables that demonstrated significant moderation were then evaluated separately for each health system using univariate logistic regression to document the variability in invitation rates by patient-level characteristics within the unique health system.

RESULTS

During the recruitment period, a total of 95,471 patients were seen in the 11 Wisconsin-based clinics. Of these, 84,668 (88.7%) were screened for smoking, and 15,193 (17.9%) were identified as current smokers. Of current smokers, there were significant differences between the health systems. Health system A had more women and more high-risk diagnoses. Health system B had younger patients and more individuals with private insurance. Both health systems cared for patients who were predominantly white (Table 1). Within the 2 health systems, 10,242 (67%) were invited to participate in the UW-PASS program; 4,951 smokers (33%) were not invited. The 11 clinics varied widely in invitation rates, from 40% to 88% (mean = 73%).

Univariate logistic regression analyses revealed that smokers who were invited to participate in UW-PASS tended to be older, self-identified as either white or black, and had a low-risk diagnosis (see Table 2). Patients with Medicare insurance were more likely

Table 1. Demographics of Smokers in Health System A and B

	Health System A	Health System B
Sex*		
Men	4,438 (45%)**	2,579 (50%)**
Women	5,373 (55%)**	2,565 (50%)**
Age*		
18-24 years	983 (10%)	623 (12%)
25 – 44 years	3,933 (40%)	2,187 (43%)
45 – 64 years	4,105 (42%)	1,854 (36%)
≥ 65 years	823 (8%)	472 (9%)
Race*		
White	8,657 (88%)	4,541 (88%)
Black	694 (7%)	311 (6%)
Other	463 (5%)	292 (6%)
Insurance*		
Private	5,032 (56%)	3,406 (66%)
Medicare	1,450 (16%)	449 (9%)
Medicaid	1,578 (18%)	900 (17%)
None	945 (10%)	389 (8%)
Visit Diagnosis*		
Low-risk	4,083 (69%)	4,371 (75%)
High-risk	1,836 (31%)	1,455 (25%)

*Denotes statistically significant difference, P < 0.05, between health systems.
**238 smokers were of unreported gender which accounts for the discrepancy in the first 2 lines of Health System A and Health System B.

Table 2. Univariate Predictors of Receiving an Invitation for Tobacco Treatment

	Invited	OR (95% Confidence Interval)	*P*-value
Sex			
Male	4,662 (66.4%)	Reference	0.2452
Female	5,345 (67.3%)	1.04 (0.97 – 1.12)	
Age			
18-24 years	950 (59.2%)	Reference	< 0.001
25-44 years	3,944 (64.4%)	1.25 (1.12 – 1.40)	
45-64 years	4,208 (70.6%)	1.66 (1.48 – 1.86)	
≥ 65 years	927 (71.6%)	1.74 (1.49 – 2.04)	
Race			
White	8,904 (67.5%)	Reference	< 0.001
Black	681 (67.8%)	1.01 (0.88 – 1.16)	
Other	419 (55.5%)	0.60 (0.52 – 0.70)	
Insurance			
Private	5,742 (68%)	Reference	< 0.001
Medicare	1,390 (73.2%)	1.28 (1.14 – 1.43)	
Medicaid	1,653 (66.7%)	0.94 (0.86 – 1.04)	
None	876 (65.7%)	0.90 (0.80 – 1.02)	
Diagnosis			
Low-risk visit	5,706 (67.5%)	Reference	
High-risk visit	2,022 (61.4%)	0.77 (0.71 – 0.83)	< 0.001

Table 3. Health System-Specific Predictors for Smokers Receiving an Invitation for Smoking Treatment

	Health System A OR (95% CI)	Health System B OR (95% CI)
Sex		
Men	Reference	Reference
Women	1.00 (0.92 – 1.09)	1.34 (1.18 – 1.54)
Age		
< 24 years	Reference	Reference
25-44 years	1.52 (1.32 – 1.75)	0.93 (0.75 – 1.15)
45-64 years	2.16 (1.87 – 2.48)	1.22 (0.97 – 1.52)
> 65 years	2.16 (1.78 – 2.61)	1.25 (0.92 – 1.68)
Insurance		
Private	Reference	Reference
Medicare	1.61 (1.42 – 1.83)	1.06 (0.83 – 1.36)
Medicaid	1.01 (0.90 – 1.13)	0.90 (0.75 – 1.07)
None	1.12 (0.97 – 1.29)	0.68 (0.54 – 0.86)
Diagnosis		
Low-risk visit	Reference	Reference
High-risk visit	0.70 (0.62 – 0.77)	1.03 (0.90 – 1.19)

to receive an invitation compared to those with private insurance.

Differences in invitation rates by health system were noted. Health system A had a lower tobacco screening rate (88%), higher tobacco use prevalence (22%), and only 61.5% of smokers were invited to join UW-PASS. Health system B had a 96% tobacco screening rate, 14% tobacco use prevalence, and nearly 80% of smokers were invited to join UW-PASS. Moderation analyses revealed that health system moderated the relation between invitation rates and all predictor variables except race ($Ps < 0.05$). For instance, health system A had lower invitation rates for younger smokers and those with high-risk diagnoses. In health system B, invitation rates were higher among women. (See Table 3 for differential odds ratios by health system.)

DISCUSSION

This study sought to determine whether tobacco treatment invitation rates would differ based on age, sex, race, and socioeconomic status, in the setting of a research study in primary care clinics implementing key clinical practice guideline recommendations. While we obtained a 67% overall invitation rate, we demonstrated that patient-specific factors remained associated with whether or not a patient was invited to a tobacco use treatment program.

Despite having incorporated multiple clinical practice guideline recommendations as part of the research protocol, younger individuals, those who identify as nonwhite/nonblack, and those with high-risk diagnoses were invited less frequently. The age and racial differences have been noted in previous research,[16,17] although age has shown mixed results.[14,15,18] The observation that Medicare patients were more likely to be invited to participate is likely confounded by our age findings. Unlike prior research, which demonstrated that the presence of comorbid conditions either did not change or increased rates of tobacco use treatment,[9,18–22] we demonstrated that individuals with high-risk diagnoses received fewer invitations to treatment than those with low-risk diagnoses. This could be explained by time demands in caring for patients with high-risk diagnoses. Alternatively, perhaps high-risk individuals frequented the clinics more often, resulting in clinical staff anticipating that they would not be interested in smoking cessation based on past knowledge of their interactions with the patient, leading to fewer invitations.

Treatment invitation rates in general were higher in health system B, and the differences in invitation rates by patient-level characteristics were lower. There are important factors to consider beyond just the limitations inherent in comparing 2 different health systems. Health system B served younger smokers with private insurance, utilized a visual cue to prompt medical staff to invite the patient to UW-PASS, and their clinics were located in more affluent communities compared to the clinics in health system A. With respect to the visual cue to prompt invitation, previous research does not provide a direct test of the effects of 2 different styles of EHR functionality. However, 2 studies examined cue-based EHR interventions and patient-level characteristics.[16,23] They found that high-risk patients and older patients were at least as likely to receive treatment for tobacco use compared to low-risk and younger patients, although nonwhite patients were still screened for smoking less often than white patients. The fact that 1 health system had clinics in less affluent areas increases the chances of more medically and socially complex patients seen by that clinic,[24] possibly contributing to the greater differences in treatment invitation rates.

The current study has limitations. First, because the data collected was prior to the consent process, data were aggregated to be HIPAA compliant; as such, inferences about individual patient characteristics are limited. Second, this study is a secondary analysis; the original study was not specifically designed to examine differences in invitation rates. This study did not collect preintervention rates of tobacco use treatment invitation, so we are unable to determine if the invitation rates presented are an improvement over baseline tobacco use treatment invitation rates at those clinics. This study also assumed that patients were not invited if the BPA was not accessed; it is possible that patients may have been invited, and declined, without the clinical staff accessing the invitation script. It is also possible that patients were not invited to the UW-PASS study based on eligibility criteria (of chief concern is the requirement to read/write English). However, clinic staff were not explicitly informed about UW-PASS eligibility criteria, and of the 600 patients referred and screened for eligibility, only 9 failed due to the language requirement. Finally, different clinics had differing levels of clinical staff engagement in the study, reflecting clinic-specific factors such as staff burden or the presence of a smoking cessation "champion," potentially contributing to the wide range of intervention rates seen in the different clinics.

CONCLUSION

This secondary analysis of a study incorporating several clinical practice guideline recommendations into patient care at 11 Wisconsin-based primary care clinics, including an EHR prompt to encourage tobacco treatment engagement, found encouraging rates of smokers being invited to participate in treatment. However, younger patients, patients of nonwhite/nonblack racial background and patients with high-risk diagnoses were still being invited less frequently than their counterparts. It also found important invitation rate differences by health system, which need further research to better understand the causes of these differences. Wisconsin, like the United States, continues to struggle with uneven declines in smoking rates among different populations. This paper shows that despite organized systems (ie, EHR) in place to prompt the delivery of clinical practice guideline tobacco treatment recommendations, there are disparities in treatment invitation rates in primary care clinics and health systems. More intervention research is needed in this area to improve these rates of screening and treatment.

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