



Prenatal Oral Health Counseling by Primary Care Physicians: Results of a National Survey

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Abstract

Objectives Limited information exists on the extent oral health is addressed in the context of prenatal care. This study sought to investigate characteristics of primary care physicians (PCP) who provide oral health counseling to pregnant women. **Methods** The study relied upon data from the 2013 Survey of PCP on Oral Health. Provision of oral health counseling to pregnant women (sometimes vs. rarely/never) was the primary outcome. Covariates included respondents' demographic and practice characteristics, oral health-related training, knowledge, attitudes, preparedness and clinical behaviors. The analytical strategy included bivariate tests and multivariable Poisson regression modeling, accounting for the survey design; inference was based upon marginal effects estimation. **Results** Two-thirds of PCP (233 out of 366 respondents) reported providing oral health counseling to pregnant women. In bivariate comparisons, female PCP, PCP with oral health-specific instruction during medical training, favorable oral health-related attitudes, behaviors, preparedness, and knowledge were more likely to provide counseling ($p < 0.05$). Multivariable analyses confirmed the independent associations of female gender [marginal effect = + 9.7 percentage points (p.p.); 95% confidence interval (CI) = 0.0–19.0], years in practice (– 0.4 p.p. for each added year; 95% CI = – 0.09 to 0.0), oral health continuing education (+ 13.2 p.p.; 95% CI = 2.6–23.8), preparedness (+ 23.0 p.p.; 95% CI = 16.9–29.0) and oral health counseling of adult patients with other conditions (+ 8.8 p.p.; 95% CI = 4.6–13.3) with prenatal oral health counseling. **Conclusions for Practice** A considerable proportion of PCP nationwide counsel pregnant patients on oral health. Provider attributes including education and preparedness appear as promising targets for interventions aimed to enhance pregnant women's oral health and care.

Keywords Primary care physicians · Oral health · Prenatal care · Counseling

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Significance

As the landscape of healthcare delivery changes, an imperative need exists for coordinated care among the health professions, oral health being no exception. This study provides estimates and determinants of primary care physicians' (PCPs) oral health counseling of pregnant women derived from a national survey.

Introduction

Delivery of oral health services to pregnant women remains a challenge, with over half of pregnant women reporting a lack of dental care despite its safety in all trimesters (Marchi et al. 2010). While many factors influence dental utilization, pregnancy presents an opportune

time to deliver important preventive oral health messages and facilitate women's dental care, especially when insurance coverage may improve access to dental services (American College of Obstetricians and Gynecologists, ACOG 2013; Plutzer et al. 2010). Ample evidence supports a strong association between maternal and child oral health (Weintraub et al. 2010). Therefore, reaching women during pregnancy may help break the cycle of poor oral health, particularly because women may be most adherent to health recommendations while pregnant (Michalowicz et al. 2006; Shieh et al. 2009; Thompson et al. 2013).

Achieving this goal does not lie solely on the dental profession, but requires coordination among all healthcare providers treating pregnant women. The 2012 national consensus statement by the ACOG and the American Dental Association provides guidance for prenatal oral health, and emphasizes the prenatal care provider's oral health role to assess, counsel and collaborate with dental providers by providing a referral to a dental home (*Oral Health Care During Pregnancy: A National Consensus Statement*, 2012). This statement is a significant step in the integration of prenatal oral health into primary care medicine; however, the widespread clinical adoption of practice recommendations is known to lag substantially (Cabana et al. 1999; Morris et al. 2011).

While obstetricians provide the majority of prenatal care, PCPs represent a significant proportion of the healthcare workforce caring for pregnant women and those of childbearing age. In a 2009 nationally representative survey, approximately one-third of pregnant women reported having consulted a family physician for medical care in the year prior (Kozhimannil and Fontaine 2013). The majority indicated receiving care from multiple clinicians, including family physicians, obstetricians, and midwives. As health care reform changes the landscape of health care delivery, it institutes an imperative need for coordinated care, with oral health being no exception. Limited information exists, however, regarding the extent PCP address prenatal oral health in accordance with the latest national consensus statement recommendations.

In 2012, The US Department of Health and Human Services (DHHS) initiated a survey of a nationally representative sample of family medicine physicians (FMP) and primary care internists (PCI), and examined their oral health knowledge, training, and practice behaviors. While they differ in scope of practice, both FMP and PCI treat women of reproductive age and during pregnancy at opportune times to promote oral health. The purpose of this investigation was to determine the prevalence and predictors of PCP providing oral health counseling to pregnant women using these national survey data.

Methods

The study relied upon information from the 2013 Survey of Primary Care Physicians on Oral Health conducted by Westat on behalf of the Office on Women's Health (OWH), DHHS. The purpose of the survey was to determine the current state of preventive oral health care in primary care medicine through a mail survey of a national sample of PCP. For the purposes of the present study, we considered responses to survey items of interest among the subset of responders who reported treating pregnant women. The data analysis and manuscript proposal was reviewed by the University of North Carolina-Chapel Hill Office of Human Research Ethics (UNC IRB #14-2738), and determined to not constitute human subjects' research as defined by federal regulations.

Sample Design and Selection

The survey had a two-phase design and used a sample frame of all physicians in the US in internal medicine or family medicine. The Westat methodology including the study sample design, selection and weighting methods used to produce national estimates (Survey of Primary Care Physicians on Oral Health Methodology Report 2013), is detailed below and a flow chart depicting the present study's analytical sample selection is illustrated in Fig. 1.

Briefly, Westat identified a sample frame of 236,077 FMP and PCI in the National Provider Identifier (NPI) file, a database maintained by the Centers for Medicaid and Medicare Assistance. A 50% random sample of this NPI listing of FMP and PCI provided the final sampling frame from which a random sample of 1500 PCP were selected with equal probability after stratification by specialty, census region within specialty and ZIP code within region, to ensure geographical distribution across the US. The 1500 sampled PCP were telephone screened to determine eligibility, according to the following criteria: spent at least 20% of time treating patients in a primary care setting, and did not practice solely in an urgent care center, federal facility, nursing home, rehabilitation center, or correctional facility. The screening excluded 395 PCPs due to ineligibility or unavailability. The remaining 1105 PCP were mailed a self-administered questionnaire comprising 42 questions. The initial survey distribution was followed by a maximum of two follow-up mailings (February through May 2013) and telephone follow-up attempts to non-responders (March through June 2013). A 50 dollar incentive was provided. Of the 1105 surveys mailed, 583 were returned, with 485 meeting eligibility criteria.

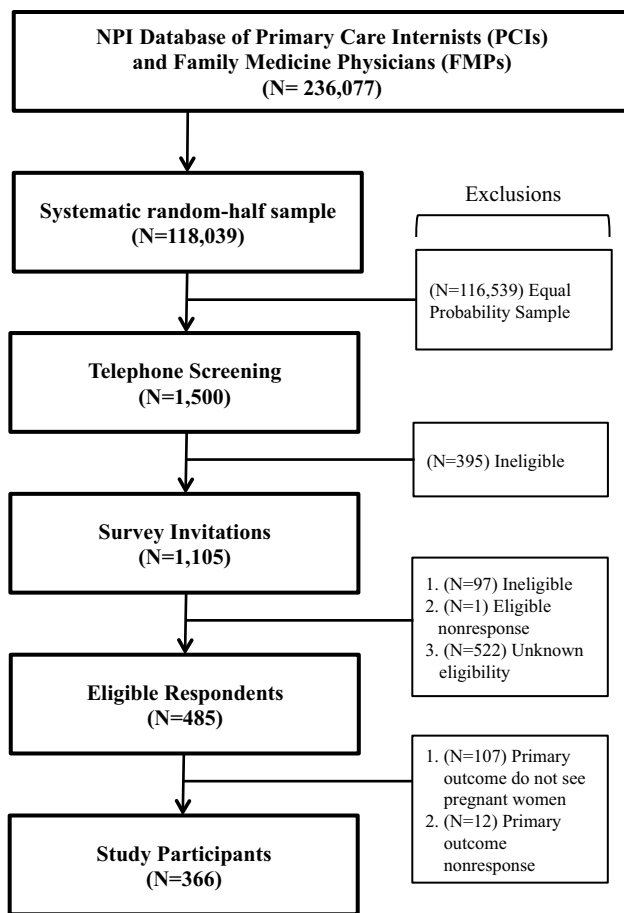


Fig. 1 Sampling procedure, exclusion criteria, and resulting sample size for PCP who reported treating pregnant women in 2013

Of these eligible respondents, 119 reported not providing any care for pregnant women, thus providing an analytical sample of 366 subjects for the present study.

Survey Instrument and Study Variables

The survey instrument was developed by Westat in consultation with OWH. The process was informed by reviews of previously used questionnaires and relevant survey results, existing instructional materials in oral health for PCP, and cognitive interviews with physicians. The dependent variable on oral health counseling of pregnant women was constructed using answers to the survey question: “How often do you typically talk to your adult patients about oral health when they are pregnant?” Respondents answered with one of the following options: (1) rarely/never, (2) during initial visit only, (3) only when the patient presents with an oral problem, (4) during preventive care visits, or (5) do not see patients in this group or does not apply. PCP in the latter category ($n = 107$) in addition to non-respondents ($n = 12$) were excluded from analyses. Responses for the remaining

sample were recoded to create a binary variable for counseling pregnant women (0 = rarely/never, 1 = sometimes: including initial visit only, preventive visits, or only when patient presents with oral problem).

Eighteen explanatory variables (covariates) in eight domains were selected from the questionnaire and included in the analysis. Providers’ sex, practice characteristics (specialty, practice type, hours per week providing care) and oral health training (medical school, residency, continuing education) were coded as categorical variables. Two variables, one in the demographic domain (age in years) and one in the practice characteristic domain (years providing patient care), were included as continuous variables. Perceived preparedness through education or experience to identify oral health issues in pregnant women and to counsel patients on the importance of dental care during pregnancy (0 = not well, 1 = well) were each measured with a single question. Respondents’ attitude toward the importance of preventive dental care for patients’ overall health was assessed with a single question coded as a binary variable (1 = very important, 0 = not important, slightly important or somewhat important).

Five composite scales were created to measure oral health-related practice behaviors for adult patients (examine, palpate, counsel), knowledge, and belief in PCP role in oral health assessments by averaging assigned scores for responses to each item within the individual scales. Two composite scales measured whether PCP typically examine each of seven oral anatomical sites or palpate each of three anatomical sites, both using three-level response options (0 = no, 1 = sometimes, 2 = all patients). The likelihood of counseling adult patients with conditions other than pregnancy on six dental topics was assessed using a five-point Likert-type item (0 = very unlikely to 4 = very likely). Self-reported knowledge of five oral health problems was measured using a three-level item (0 = little or no knowledge, 1 = some knowledge, 2 = extensive knowledge). Respondents’ agreement that PCP should know how to identify signs of five dental problems was assessed using a five-point Likert-type item (0 = strongly disagree to 4 = strongly agree).

Analytical Approach

Descriptive statistics and bivariate tests of association for survey data were used for initial data analysis and presentation. All estimates were adjusted for the complex survey design using appropriate sampling weights, with variance and corresponding 95 confidence intervals (CIs) computed using a *jackknife* estimator. Multivariate analysis was based on Poisson regression modeling and estimation of average marginal effects [i.e., changes in the predicted probability (percentage points, p.p.) of the outcome adjusting for all other model covariates] and 95% CI. Selection of covariates

for inclusion in the final multivariate model departed from a ‘full’ model including all variables associated with counseling in bivariate analysis and employed a backward stepwise variable selection procedure using $p < 0.2$ inclusion and retention criteria. All analyses were performed using Stata 15.1 (StataCorp, College Station, TX).

Results

The sample’s descriptive information and bivariate association results of prenatal oral health counseling are presented in Table 1.

Sixty-one percent of respondents reported prenatal oral health counseling. Male PCP outnumbered females in a ratio of 3:2, almost two-thirds were FMP and 38% were PCI. Respondents had 20 years of practice experience on average and most worked more than 20 h per week. Less than half recalled oral health-related training in medical school (45%), residency/fellowship (39%) and continuing education (13%). The mean oral health knowledge score was 0.9, on a scale from 0 to 2, indicating that most PCP have little to some knowledge of common oral health problems. However, on average, PCP agreed (mean score of 3.3, on a scale from 0 to 4) that they “should be able to identify signs of tooth decay, periodontal disease, oral malignancies, pre-cancerous lesions, xerostomia, and Sjögren’s syndrome” in their adult patients. When asked, “How important do you think preventive dental care is to your patients’ overall health?” 69% of PCP answered “very important.” For adult patient practice behaviors, when conducting oral exams on adult patients, on average, PCP examined seven and palpated three oral anatomical structures (mean score of 1.5 and 1.3, respectively, on a scale from 0 to 2), however, they were relatively less likely to counsel on five oral health topics (mean score of 1.9 on a scale from 0 to 4). Less than half of respondents felt prepared by their education and experiences during training to identify oral health issues and counsel pregnant patients on the importance of oral health (45 and 48%, respectively).

Close to two-thirds of PCP who reported treating pregnant women also reported “sometimes” counseling them on oral health during one of the following clinical circumstances: during initial visit only (10%), only when the patient presents with an oral problem (25%), or during preventive care visits (26%). All variables examined were significantly associated with counseling except for age, practice discipline, practice type, weekly practice hours, and examination of oral structures. The final multivariate Poisson regression model included five variables as predictors of counseling and is presented in Table 2. Both relative and absolute measures of association were generated; because absolute measures may have greater public health relevance than relative measures they are presented and discussed.

Accounting for all other variables in the model, we confirmed independent associations of female gender [marginal effect = +9.7 percentage points (p.p.); 95% CI = 0.0–19.0], years in practice (−0.4 p.p. for each added year; 95% CI = −0.09 to 0.0), oral health continuing education (+13.2 p.p.; 95% CI = 2.6–23.8), preparedness (+23.0 p.p.; 95% CI = 16.9–29.0) and oral health counseling of adult patients with other conditions (+8.8 p.p.; 95% CI = 4.6–13.3) with prenatal oral health counseling.

To aid interpretation of these measures of association and explore possible interactions, we computed and present in Fig. 2 the margins (i.e., adjusted model-predicted probabilities) of counseling for combined strata of sex and receipt of CE by practice years.

Among young practitioners (e.g., 5 years in practice) differences in counseling are negligible. Counseling practices of males and females diverge with increasing seniority (females are more likely to provide prenatal oral health counseling) and receipt of CE appears to be more strongly associated with counseling increments among females.

Discussion

This is the first study to provide national estimates and predictors of PCP prenatal oral health counseling. We found that a considerable proportion of PCP address prenatal oral health in the form of counseling. While the vast majority agreed that preventive dental care is very important, a large proportion has not received oral health training, highlighting a disconnect between the prenatal oral health practice guidelines and PCP workforce preparedness to address oral health related issues. The results are promising in that most PCP acknowledged their role in oral health and agreed that they should be able to identify oral health issues in adult patients, whereas receipt of CE courses and perceived preparedness were strongly and positively associated with prenatal oral health counseling.

A greater number of FMP than PCI reported treating prenatal patients—given their differences in practice scope, FMP may be more inclined to provide oral health counseling to this population. Prenatal care, however, remains relevant in both areas of primary care medicine. Current trends have shown a decline in FMP providing prenatal care, namely obstetric care; however, FMP remain important comprehensive care providers to pregnant woman in the medical home in some geographic areas (Rayburn et al. 2014). FMP are uniquely positioned to care for both the pregnant woman and her child, having the opportunity to impact the oral health outcomes of both with proper education and experience during training (Hale 2003; ACOG 2013). Recent evidence suggests that newer FMP desire to broaden their scope of practice amidst recent efforts to boost training in the areas

Table 1 Descriptive statistics and bivariate associations of PCP characteristics with prenatal oral health counseling practices, n = 366

Respondent characteristics	Entire sample Col. %* or mean (95% CI)	Counsel on prenatal oral health		p-value**
		Sometimes Row %* or mean (95% CI)	Rarely/never Row %* or mean (95% CI)	
Row % (95% CI)	100	61 (56–66)	39 (34–44)	
Demographics				
Gender				
Male	60 (55–65)	53 (46–60)	47 (40–54)	<0.05
Female	40 (35–45)	73 (65–80)	27 (20–35)	
Age				
Age in years (mean)	49 (47–50)	48 (47–49)	49 (47–51)	0.52
Practice characteristics				
Specialty				
Family medicine	62 (57–67)	65 (58–71)	35 (29–42)	0.06
Internal medicine	38 (33–43)	55 (46–63)	45 (37–54)	
Discipline				
Doctor of Medicine	85 (81–89)	60 (54–65)	40 (35–46)	0.26
Doctor of Osteopathy	15 (11–19)	68 (54–79)	32 (21–46)	
Practice type				
Single Specialty Family Medicine	50 (45–56)	62 (55–69)	38 (31–45)	0.61
Single specialty internal medicine	28 (23–33)	61 (51–70)	39 (30–49)	
Multispecialty	22 (17–26)	56 (44–67)	44 (33–56)	
Weekly patient care				
< 20 h	11 (8–15)	71 (55–83)	29 (17–45)	0.23
20–40 h	51 (46–56)	57 (50–64)	43 (36–50)	
> 40 h	38 (33–43)	63 (54–71)	37 (29–46)	
Patient care years				
Years (n, mean)	20 (18–21)	19 (17–20)	21 (19–23)	0.06
Oral health instruction and training				
Medical school				
Yes	45 (40–51)	71 (63–77)	29 (23–37)	<0.05
No	55 (49–60)	53 (46–60)	47 (40–54)	
Residency or fellowship				
Yes	39 (34–45)	68 (59–75)	32 (25–41)	<0.05
No	61 (55–66)	56 (50–63)	44 (37–50)	
Continuing education				
Yes	13 (10–17)	81 (67–90)	19 (10–33)	<0.05
No	87 (83–90)	58 (52–63)	42 (37–48)	
Perceived preparedness in oral health care of pregnant women				
Identify oral health issues				
Well	48 (43–53)	83 (77–88)	17 (12–23)	<0.05
Not well	52 (47–57)	41 (34–48)	59 (52–66)	
Counsel on importance of oral health				
Well	45 (39–50)	88 (81–92)	12 (8–18)	<0.05
Not well	55 (50–61)	39 (32–46)	61 (54–68)	
Attitude				
Importance of preventive dental care				
Very important	69 (64–74)	67 (61–73)	33 (27–39)	<0.05
Other	31 (26–36)	47 (38–57)	53 (43–62)	

Table 1 (continued)

Respondent characteristics	Entire sample Col. %* or mean (95% CI)	Counsel on prenatal oral health		p-value**
		Sometimes Row %* or mean (95% CI)	Rarely/never Row %* or mean (95% CI)	
Oral health practice behaviors for adult patients				
Examine oral structures				
Mean score ^b (95% CI)	1.5 (1.5–1.6)	1.5 (1.5–1.6)	1.5 (1.4–1.6)	0.43
Palpate oral structures				
Mean score ^c (95% CI)	1.3 (1.2–1.3)	1.3 (1.2–1.4)	1.2 (1.2–1.3)	<0.05
Counsel adults with other conditions				
Mean score ^d (95% CI)	1.9 (1.8–2.0)	2.2 (2.1–2.4)	1.3 (1.2–1.5)	<0.05
Knowledge				
Oral health knowledge				
Mean score ^e (95% CI)	0.9 (0.9–1.0)	1.0 (0.9–1.0)	0.8 (0.8–0.9)	<0.05
PCP role				
Identify oral health issues				
Mean score ^f (95% CI)	3.3 (3.2–3.4)	3.4 (3.3–3.4)	3.2 (3.1–3.3)	<0.05

*Survey weights were used to produce means and proportions inferred to 88,590 physicians nationwide in the sampling frame, **bivariate associations were based on weighted estimates accounting for the survey design

^aDefined as during the initial or preventive care visits or if oral problem exists

^{b,c}Higher score (0–2) indicates increased self-reported behavior when conducting oral examinations

^dHigher score (0–4) indicates increased self-reported likelihood of provider discussing preventive dental care or the importance of oral health

^eHigher score (0–2) indicates increased self-reported knowledge of five oral health problems

^fHigher score (0–4) indicates increased agreement that PCP should identify signs and symptoms of five oral health problems

of prenatal care and oral health (Coutinho et al. 2015). PCI also play a role in the primary care of women of childbearing age, especially those presenting with medical complexities, and likely treat some women early in pregnancy. PCI were less likely to report counseling pregnant women on oral health than FMP, indicating that internists may be less equipped than their family medicine counterparts. Future investigations into effective strategies for medical training that promote the translation of prenatal oral health guidelines into clinical practice for both FMP and PCI would benefit maternal and child oral health.

A recent national study reported a general lack of PCP training in oral health (Silk et al. 2012). Our results support this, and show a significant association between counseling pregnant women on oral health and receiving oral health instruction at the medical school, residency, and continuing education levels. PCP with receipt of oral health continuing education had a 13 p.p. higher likelihood of counseling pregnant women on oral health than respondents who did not. Male and female PCP with CE and up to 20 years in practice were much more likely to counsel compared to females and males without receipt of CE, respectively. This is likely due to the existence of minimal oral health education during the

time of most respondents' medical school training, given that respondents were in practice for 20 years on average.

Within the last decade, oral health curriculum voids in medical school education were acknowledged and increases in oral health content have since been promoted (Ferullo et al. 2011; AAMC 2008). These findings encourage further incorporation of oral health training within each level of medical education. A prime example is the national oral health curriculum, Smiles for Life, designed with the intent of facilitating the integration of oral health into primary care provider training (Clark et al. 2010). While this curriculum provides a platform for education of primary care providers, evidence suggests multi-methods training, involving a combination of didactic training, observation of and applying recommended practices in-office might be effective in influencing physician behavior (Herndon et al. 2015; Rabiei et al. 2012; Satterlee et al. 2008). This type of training approach may be most influential in equipping the upcoming primary care workforce to address the oral health of pregnant women in the manner proposed by the national consensus statement.

The language of the 2012 consensus statement specifically calls for physicians who treat pregnant women to participate in oral health assessment, counseling, and dental

Table 2 Results of multivariate Poisson regression*, based on information from 366 respondents representing 88,590 physicians nationwide

Predictor	Relative effects		Absolute effects	
	Prevalence ratio	95% CI	AME** (p.p.)	95% CI
Gender				
Female	1.17	1.00–1.37	9.7	0.0–19.0
Male	<i>Referent</i>		<i>Referent</i>	
Continuing education ^a				
Yes	1.24	1.04–1.48	13.2	2.6–23.8
No	<i>Referent</i>		<i>Referent</i>	
Perceived preparedness ^b	1.46	1.3–11.63	23.0	16.9–29.0
Counsel adults with other conditions ^c	1.19	1.08–1.30	8.8	4.6–13.3
Patient care years ^d	0.99	0.99–1.00	–0.4	–0.09–0.0

All estimates presented in the table have associated p-values of less than 0.05

*The Poisson regression model-building departed from a full model including all variables nominally associated with the outcome in bivariate analyses, included survey weights, a jackknife variance estimator, accounted for the survey design and employed a backward stepwise selection procedure retaining variables with $p < 0.2$ [prevalence ratios and average marginal effects and 95% confidence intervals (CIs)] of prenatal oral health counseling (sometimes vs. rarely/never) in the 2013 national survey of primary care providers on oral health

**Average marginal effects, corresponding to change in percentage points (p.p.) in prenatal oral health counseling for each examined covariate

^aParticipation in any continuing education specifically about oral health since residency or fellowship training

^bPractice experience and education preparation for identifying key oral health issues for pregnant women and counseling them on the importance of dental care during pregnancy

^cLikelihood of providing oral health counseling to adult patients with other conditions

^dYears providing care to adult patients in ambulatory settings

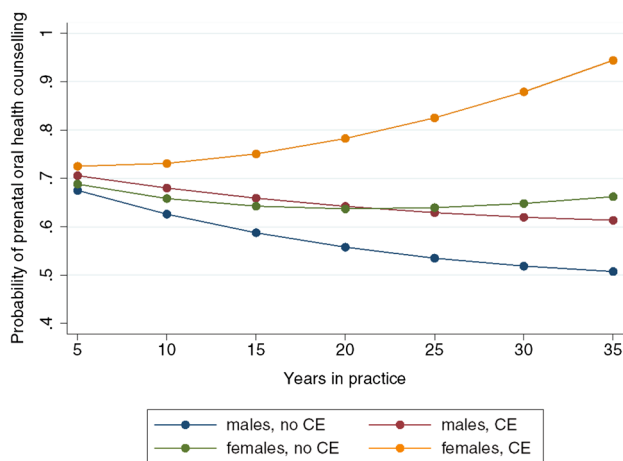


Fig. 2 Multivariable Poisson model-adjusted average probabilities of prenatal oral health counseling for combined strata of sex and receipt of CE by average years in practice

home referral. At the time of the survey administration, these guidelines had been disseminated, but familiarity and acceptance among respondents cannot be assumed. Guidelines cannot be expected to directly influence physician practice behavior change, but dissemination is the first step towards

this change (Cabana et al. 1999). While the survey did not include a specific question to assess guideline awareness our results suggested a trend of agreement among PCP, who treat pregnant patients, that they have a role in oral health and should be able to identify oral health issues in adult patients. Also, the majority of PCP expressed that preventive dental care was very important. PCP positive attitudes on preventive oral health coupled with their perceived role in identifying oral health issues may provide a foundation for positive provider behavior change. Comparing estimates of prenatal oral health practice behaviors among PCP to those of obstetrician/gynecologists would be helpful; the latter group may have increased likelihood of accessing the consensus statement practice recommendations originating from their specialty organization.

Examining the oral health-related practice behaviors for all adult patients was important for gaining insight into whether PCP might address oral health with pregnant women differently in comparison to other adult patient populations. An important finding was that PCP counsel adult patients with other conditions on oral health infrequently. While exploratory analyses suggested pregnant women may experience a lack of oral health counseling when compared to other patient populations, our results suggest the

likelihood of counseling of adult patients with other conditions is predictive of prenatal oral health counseling. This signals the need to further understand how oral health is addressed in primary care medicine for all patient populations and how oral health messaging can be encouraged using a systems-based approach to improve PCP participation in oral health of adults in addition to pregnant women.

When comparing the effect of provider gender after adjusting for years in practice, female physicians were 10 p.p. more likely to counsel pregnant women on oral health than males. This finding is important because males make up a larger proportion of PCP providing prenatal care. The literature suggests significant differences in practice and communication style between male and female physicians; notably, female physicians are more likely to focus on preventive measures and psychosocial counseling (Bertakis and Azari 2012; Bertakis et al. 2009; Roter et al. 2002). Patient gender may also influence differences in communication styles. Perhaps in the context of prenatal oral health, female physicians are more likely to counsel and communicate health information to female patients more effectively than male providers. The results reflect this theory somewhat; after 20 years in practice, the probability of counseling was higher among female PCP, with or without CE.

In addition to barriers male providers may face in addressing prenatal oral health, an important consideration is the quality of physician counseling, an integral component of patient-centered care. Effective counseling is positively correlated with patient adherence to provider recommendations, elevating the importance of promoting communication skill building medical training and continuing education (Levinson et al. 2010; Zolnieriek and Dimatteo 2009). A measure of counseling quality was not available in this study and more information on the quality of physician counseling is needed.

Several limitations are considered in this study. Self-reported practice behaviors might overestimate actual behaviors, and social desirability bias may have a similar effect (Cheng et al. 1999). Also, while we examined the outcome of prevalence of counseling, we were unable to evaluate the quality of this practice. Measures and constructs used in analyses were not tested for reliability and validity. As with any survey, a risk of nonresponse bias is inherent—survey weights attempted to adjust for this. Despite these limitations, our findings are novel and informative. As the first study of its kind, it contributes new information to the field. A major strength of this study is its basis on a national survey design and accompanying utilization of analytical weights, which aids the generalizability and improves the external validity of the reported results.

In conclusion, we provide baseline information for how prenatal oral health is being addressed in primary care medicine at the national level. Our findings inform oral health-related gaps in primary care and shed light into areas of

future research, including counseling quality among physicians and physician barriers to addressing prenatal oral health. A very small proportion of PCP recalls oral health training during medical school and residency/fellowship, and while the years since training varied among respondents, this suggests that the current workforce has insufficient oral health knowledge and preparedness from training in addressing prenatal oral health. The identification of predictors of positive oral health-related behaviors may be used to facilitate future strategy development to promote evidence based practice, with further work needed to assure equitable and quality prenatal care.

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