RESEARCH PAPER

Medicaid reimbursement for prenatal smoking intervention influences quitting and cessation

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Background: 40% of births in the USA are covered by Medicaid and smoking is prevalent among recipients. The objective of this study was to evaluate the association between levels of Medicaid coverage for prenatal smoking cessation interventions on quitting during pregnancy and maintaining cessation after delivery.

Methods: Population based survey study of 7513 post-partum women from 15 states who: participated in Pregnancy Risk Assessment Monitoring System (PRAMS) during 1998–2000; smoked at the beginning of their pregnancy; and had Medicaid coverage. Participating states were categorised into three levels of Medicaid coverage for smoking cessation interventions during prenatal care: extensive (pharmacotherapies and counselling); some (pharmacotherapies or counselling); or none. Quit rates among women who smoked before pregnancy and rates of maintaining cessation were examined.

Results: Higher levels of coverage during prenatal care for smoking cessation interventions were associated with higher quit rates; 51%, 43%, and 39% of women quit in states with extensive, some, and no coverage, respectively. Compared to women in states with no coverage, women in states with extensive coverage had 1.6 times the odds of quitting smoking (odds ratio (OR) 1.58, 95% confidence interval (CI) 1.00 to 2.49). Maintenance of cessation after delivery was associated with extensive levels of Medicaid coverage; 48% of women maintained cessation in states with extensive coverage compared to 37% of women in states with no coverage. Compared to women in states with no coverage, women with extensive coverage had 1.6 times the odds of maintaining cessation (OR 1.63, 95% CI 1.04 to 2.56).

Conclusions: Prenatal Medicaid coverage for both pharmacotherapies and counselling is associated with higher rates of quitting and continued cessation. This suggests policymakers can promote cessation by broadening smoking cessation services in Medicaid prenatal coverage.

The adverse health and economic impact of smoking during pregnancy is well established.^{1–7} Smoking among pregnant women has implications for the Medicaid system as it covers prenatal and birth costs for approximately 40% of births in the USA,^{8,9} and women who receive Medicaid are 2.5 times more likely to smoke during pregnancy than women who do not receive Medicaid.¹⁰ Effective smoking cessation interventions for use during prenatal care include counselling (for example, individual, group, or telephone) and pharmacotherapies (for example, over the counter and prescription).^{11–14} Counselling has been recommended as especially appropriate for pregnant women due to the controversy of whether or not pharmacotherapies are safe during pregnancy. Recent work, however, concludes that the potential benefit of pharmacotherapies outweigh the risks of continued smoking—especially for those women for whom counselling is not effective.^{13,14} Specifically, the increased cessation rates with the addition of pharmacotherapies yield a higher benefit than exposure of the fetus to carbon monoxide and other toxins if maternal smoking continues.¹³

Reimbursement for smoking cessation interventions during pregnancy is promoted as an important step to address key provider and system level barriers.^{15–19} Recommendations for reimbursement are based on proven effectiveness of smoking cessation interventions^{11,19,20} and evidence that they are cost effective, especially during the prenatal period. Every dollar spent on smoking cessation interventions for a pregnant smoker saves \$3 in neonatal costs and \$6 in long term care costs for infants with disabilities caused from smoking.²¹

Although Medicaid is a federally mandated programme, states have flexibility in their level of coverage beyond the

basic benefit package.^{15,18} Smoking cessation interventions are not in the basic benefit package. States may elect to decrease Medicaid benefits as a short term solution in response to budget shortfalls or as a way to balance increasing demand. The challenging fiscal situation in states requires evaluation of how Medicaid resources can be applied most effectively to promote health. Although the economic case to promote coverage of smoking cessation interventions is a strong one, a limited number of studies have addressed the effect of incremental increases in coverage.^{22–24} System level changes that have increased coverage have had mixed results, with an increased use of smoking cessation services²² and increased quit rates over 12 month follow up intervention periods²³ in two studies, and no change in quit rates in another study with added coverage for pharmacotherapies.²⁴ None of these studies specifically assessed the influence of increasing coverage for smoking cessation interventions among pregnant women.

The purpose of this study was to evaluate the association between levels of Medicaid coverage for prenatal smoking cessation interventions on smoking. We used Pregnancy Risk Assessment Monitoring System (PRAMS) data from 15 states to assess if: (1) quitting during pregnancy, and (2) maintaining cessation after delivery was associated with the level of state Medicaid coverage for smoking cessation interventions.

METHODS

Study population

PRAMS provides population based, state specific data for a variety of maternal behaviours around the time of pregnancy with linked information from birth certificates.²⁵ PRAMS was

established in 1987 by the Centers for Disease Control and Prevention (CDC). In each participating state, 100–200 new mothers are selected each month from live birth certificates using a stratified systematic process with over-sampling of women with specific risks or characteristics (for example, low birth weight infants, mother's race). These women receive a mailed questionnaire between two and six weeks after delivery. Non-responders receive up to two repeat mailings and, if necessary, telephone contact. Response rates generally range from 70–80%. To adjust for over-sampling, the PRAMS data from each state are weighted so it is representative of all women giving birth within the selected time period.²⁵

We used data collected in 1998–2000 from 15 states that participated in PRAMS: Alaska, Alabama, Arkansas, Colorado, Florida, Illinois, Louisiana, Maine, North Carolina, New Mexico, New York (excluding New York City), Oklahoma, South Carolina, Washington, and West Virginia. Among the 77 981 respondents, 32 272 women reported that their prenatal care was covered by Medicaid (41%). We defined Medicaid coverage as a combined variable including women who had Medicaid before pregnancy, prenatal care coverage by Medicaid, and prenatal care paid by a state specific programme (for example, Medipass). Among the 32 272 women with Medicaid, 20 287 had complete responses to the questions regarding smoking before, during, and after pregnancy (63%). The 7513 women whose prenatal care was paid by Medicaid, who had complete smoking data, and who reported smoking before pregnancy are the study population for this analysis. Because this study used a secondary source for data with no attached identifiers, the Biomedical Institutional Review Board of the University of North Carolina at Chapel Hill deemed it exempt from review.

Study variables

The main outcomes for this study included: (1) quitting among women who smoked before pregnancy; and (2) maintaining cessation after delivery among women who quit smoking during pregnancy. Women were considered to be smokers if they reported smoking before pregnancy. Women who reported no smoking at some later point during their pregnancy were considered to be quitters. Among those who stopped smoking during pregnancy (quitters), those who reported no smoking after pregnancy at the PRAMS postpartum follow up (mean time to follow up 4.1 months) were considered to have maintained cessation after delivery. In addition to our two main outcomes, we examined whether participants reported discussion of smoking information with prenatal providers. Women were considered to have discussed smoking cessation if they responded affirmatively to the PRAMS question: "During any of your prenatal visits, did a doctor, nurse or other healthcare worker talk with you about cigarette smoking?"

The main independent variable was state level of Medicaid coverage from smoking cessation services in 1998. Coverage for the following smoking cessation interventions was considered: over the counter medications (for example, nicotine gum, nicotine patch, or any combination), prescriptions (for example, bupropion, spray, inhaler, or any combination), and counselling (group, individual, telephone, or any combination). The level of coverage in each state included in this analysis was obtained from work by Schauffler, Barker, and Orleans.^{26–27} We grouped coverage into three categories of extensive, some, or none. States with coverage for both counselling (individual, group, or both) and pharmacotherapies (over the counter, prescription, or both) were classified as extensive. States with coverage for any kind of either counselling or pharmacotherapies (over the counter or prescription) for tobacco dependence were

classified as some. States with no coverage for smoking cessation interventions were classified as none. We chose to use the level of Medicaid coverage as reported in 1998 to assign states into the three levels of coverage because no state's coverage was worse in 2000 than 1998, and only four states had increased coverage in 2000. We assumed that increased coverage in 2000 would not necessarily have been adopted immediately at the practice level. Other independent variables of interest included maternal characteristics (for example, age, education level, employment, race/ethnicity, marital status), level of prenatal care, and previous reproductive history (for example, parity, previous preterm birth, previous low birthweight birth).

Statistical analysis

We used separate bivariate analyses to assess the relationship of level of state Medicaid coverage (extensive, some, none) to each of our two outcomes: (1) quit smoking during pregnancy (quitters), and (2) maintained cessation after delivery (maintainers). We used a χ^2 test to examine if the percentage of women for each outcome differed by level of Medicaid coverage received. To assess whether any observed associations between Medicaid coverage and each outcome might be confounded by other factors, we compared other characteristics of the women to see if they were unequally distributed by level of Medicaid coverage. These variables included maternal age, marital status, race/ethnicity, education, parity, previous low birth weight, and previous preterm birth. We fit separate logistic regression models for each outcome. Each model included Medicaid coverage and all potential covariates. Since our definition of coverage was based on state, and women from the same state may have other factors contributing to observed differences in outcomes, we also included state in our analyses as a random effect. To assess confounding, we compared β estimates for Medicaid coverage for each outcome with and without potential confounders. If the β estimates for Medicaid coverage did not change ($> 10\%$) when covariates were dropped, these covariates were not included in the final models. Using the β estimates from the final logistic regression models, we estimated odds ratios and adjusted proportions (reported as percentages) by Medicaid coverage for each outcome. All analyses were performed using the survey commands from Stata 8.2²⁸ for weighted analysis to adjust for the PRAMS sampling methods. However, there were two complications with adjusting the analyses for the sampling scheme stratification variable. First, it was not possible to control simultaneously for both the sampling strata and state in the weighted analyses because the strata were defined uniquely within each state. Second, because our outcomes were a subset of the entire PRAMS sample (smokers, and then smokers who quit) some strata were reduced to only one observation in a stratum. To assess the effect of the sampling strata on the standard error estimates, we examined all our analyses adjusting for these strata using only observations with more than one woman per stratum and without adjusting for a state effect. The influence on the standard errors was negligible (that is, differences in the fourth decimal place). However, the state variable had a much more profound effect on our estimates. Therefore, we corrected all the analyses for the state effect, as well as the probability sampling weights (based on the subpopulations of the sample), but not the sampling strata.

RESULTS

Among the 20 287 women who received Medicaid for prenatal care, 34% ($n = 7513$) reported smoking in the three months before pregnancy and were therefore classified as smokers and included in the analysis. Among these

Table 1 Sociodemographic characteristics of study women, weighted to reflect PRAMS sampling, from 15 states, 1998–2000

	Smokers (%) n = 7513
Age (in years)	
12–19	27
20–29	58
30 +	15
Race/ethnicity	
Non-Hispanic white	74
Non-Hispanic, non-white	17
Hispanic	9
Marital status	
Currently married	36
Other	64
Education	
Less than 12 years	41
HS graduate or GED	44
Some college or more	15
Employed	
Yes	81
No	19

GED, General Educational Development; HS, high school.

women most were between the ages of 20–29 (58%), non-Hispanic, white (74%), not currently married (64%), and with an educational level at, or above, graduation from high school (59%) (table 1). Among smokers, 39% quit during pregnancy. Among quitters, 39% maintained cessation after delivery.

In the 15 states in this analysis, eight states (53%) had no coverage, five states (33%) had some coverage, and two states (13%) had extensive coverage in 1998. Table 2 provides the state specific level of Medicaid coverage and proportions of women from each state who reported smoking before pregnancy, quitting during pregnancy, and maintaining cessation after delivery. In 1998, 50% of study women had no smoking cessation coverage from Medicaid, 46% had some coverage, and 4% had extensive coverage. A majority (89%) of women (smokers and non-smokers) reported a prenatal discussion about smoking with their health care provider.

After adjusting for covariates, higher levels of Medicaid coverage in 1998 were associated with an increased likelihood of quitting (table 3). Specifically, 51% of women in states with extensive coverage quit smoking during pregnancy compared to 43% of women in states with some

Table 3 Relationship between level of Medicaid coverage in 1998 and quitting and maintaining cessation, from 15 states, 1998–2000

	Quit during pregnancy (n = 7513)		Maintained after delivery (among quitters) (n = 2829)	
	%*	Odds ratio (95% CI)*	%†	Odds Ratio (95% CI)†
Coverage				
Extensive	51	1.58 (1.00 to 2.49)	48	1.63 (1.04 to 2.56)
Some	43	1.18 (1.03 to 1.34)	37	1.02 (0.89 to 1.18)
None	39	1.00	37	1.00

*Adjusted for maternal age, marital status, race, previous preterm birth.

†Adjusted for marital status, previous preterm birth.

coverage and 39% of women in states with no coverage. Compared to women in states with no coverage, women in states with extensive coverage had 1.6 times the odds of quitting smoking (odd ratio (OR) 1.58, 95% confidence interval (CI) 1.00 to 2.49); women in states with some coverage had 1.2 times the odds of quitting (OR 1.18, 95% CI 1.03 to 1.34). Maintenance of cessation after delivery was associated with extensive levels of Medicaid coverage (table 3). Specifically, 48% of women in states with extensive coverage maintained cessation after delivery, while 37% of women who quit smoking during pregnancy in states with no or some coverage maintained cessation. Compared to women in states with no coverage, women with extensive coverage had 1.6 times the odds of maintaining cessation (OR 1.63, 95% CI 1.04 to 2.56). The odds of maintaining cessation were similar for women in states with some and no coverage (OR 1.02, 95% CI 0.89 to 1.18).

DISCUSSION

This work shows the inclusion of prenatal Medicaid coverage for both pharmacotherapies and counselling is associated with higher rates of quitting during pregnancy and maintaining cessation after delivery. Combined with the effectiveness and cost effectiveness of smoking cessation interventions¹⁹ and previous recommendations to provide extensive smoking cessation coverage,^{11 14 19 29} this work supports increasing resource allocation to prenatal Medicaid smoking cessation interventions.

For increased reimbursement strategies to be successful, other supporting components are needed to expand the capacity to deliver smoking cessation interventions.¹⁸ A

Table 2 State profiles of level of Medicaid coverage, smokers (before pregnancy), quitters (among smokers), and maintainers (among quitters)*

	Level of coverage 1998 ²⁶	Smoked the 3 months before pregnancy (%)	Quit during pregnancy (% of smokers)	Maintained cessation after delivery (% of quitters)
Alaska	None	47	40	45
Alabama	None	32	37	41
Arkansas	None	42	29	43
Colorado	Some	40	42	44
Florida	Some	28	39	37
Illinois	None	31	39	37
Louisiana	Some	27	40	38
Maine	Extensive	57	36	62
North Carolina	Some	35	40	38
New Mexico	Extensive	33	54	44
New York	None	43	40	32
Oklahoma	Some	46	46	43
South Carolina	None	31	40	35
Washington	None	31	38	43
West Virginia	None	56	32	44
Average		34	39	39

*Percentages weighted for sampling scheme.

What this paper adds

Effective smoking interventions for use during pregnancy are available to limit the adverse health and economic impact of smoking during pregnancy. Although the economic case to promote coverage of smoking cessation interventions is a strong one, a limited number of studies have addressed the effect of incremental increases in coverage and none have specifically assessed the influence of increasing coverage for smoking cessation interventions among pregnant women.

Prenatal Medicaid coverage for both pharmacotherapies and counselling is associated with higher rates of quitting and continued cessation. This suggests policymakers can promote cessation by broadening smoking cessation services in Medicaid prenatal coverage.

suggested model for comprehensively addressing this goal for pregnant women includes: support from top leadership in the health organisation; clinical information systems to track individual patient information; ongoing training of providers and staff; the assignment of specific staff to provide smoking cessation counselling; innovative support systems for smokers trying to quit; and community support.¹⁸

Increasing each state's capacity to deliver smoking cessation interventions needs to address the barriers that exist at the level of the prenatal provider.^{11 14 30} Something as essential as a provider's awareness of changes in reimbursement for coverage needs to be considered. An evaluation of physician knowledge about Medicaid coverage for smoking cessation in two states with extensive coverage (included counselling and pharmacotherapy) found that only 58% of providers were aware of coverage for pharmacotherapy and only 23% were aware of coverage for counselling.³¹ Clearly, providers who are unaware of improved coverage for smoking cessation interventions will be less likely to change their practice and incorporate such procedures.

The limitations of this study include the reliance on retrospective and self reported smoking descriptions which may result in reporting bias as individuals, especially during pregnancy, may underreport the amount of smoking or report cessation when they continue to smoke.^{32–34} In addition, several considerations limit our ability to determine causality in this project. There may have been state level factors other than the level of Medicaid reimbursement that affected whether pregnant women quit, or maintained cessation. For example, both Maine and New Mexico (states with extensive coverage) may have had unique characteristics such as an emphasis on smoke-free environments, enhanced prenatal provider education, or increased stigma for reporting smoking during pregnancy. The determination of direct causality is also limited by the lack of detail offered from the PRAMS question regarding what specific components of an intervention that a participant received. Prenatal care providers may not have known the level of Medicaid reimbursement and therefore their practice may not have been affected by the reimbursement level. Our use of the level of coverage in 1998 was selected as a way to allow time for state level change in the Medicaid reimbursement to filter down to the practice level.

In conclusion, this work provides timely evidence regarding the importance of continuing to increase Medicaid reimbursement for smoking cessation interventions as states struggle with critical funding decisions.³⁵ Without improved resource allocation to provide coverage to pregnant women receiving Medicaid, we are missing an opportunity to affect positively the short and long term maternal and child health status to the women who begin their pregnancy as a smoker.

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AD WATCH.....

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Tobacco advertising on mini-motors

Comprehensive smoke-free legislation has been in place in New Zealand for over 15 years and for much of that time advertising of tobacco products or the use of tobacco trademarks on goods other than tobacco products has been banned. Despite this legislation, retail products occasionally appear that clearly breach the legislation. The most recent example of such products was found in Dunedin in 2005. In this example, mini-bikes (also referred to as pocket bikes) displayed branding for Lucky Strike and Camel cigarettes. Although it is not clear if British American Tobacco or RJ Reynolds were aware of the use of their product trademark, the trademarks closely resembled those used by the manufacturers. These motorised bikes were

manufactured in China and appear to appeal to young males aged 12–13 years and older. The bikes were withdrawn from sale when the retailer was notified of the violation of legislation.

Even in a country with legislation that explicitly removes tobacco brand images and advertising there remains a need to be vigilant for tobacco product promotion, whether this promotion is directly as a result of tobacco manufacturer activity or not.

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