A Smoking Cessation Program at a Public Antenatal Clinic

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ABSTRACT

Objectives. A randomized trial evaluated the impact of smoking cessation interventions on point prevalence and consecutive quit rates at an Australian public prenatal clinic.

Methods. Self-reports and urine cotinine tests confirmed patients' smoking status at the midpoint and end of pregnancy and 6 weeks postpartum.

Results. At all points, validated abstinence rates were significantly higher in the experimental group than in the control group. The rate of failed biochemical validation was significantly higher in the control group than in the experimental group.

Conclusions. Prenatal clinic staff can significantly increase quit rates by using cognitive–behavioral strategies. Brief advice appears to be ineffective. (*Am J Public Health.* 1997;87:1201–1204)

Introduction

Maternal cigarette smoking is an important cause of adverse pregnancy outcomes.[1–3] The prevalence of smoking is high among women attending public maternity clinics in developed nations.[4–6] Usual care providers are well placed to provide cessation interventions; however, the majority of smokers attending public clinics do not recall receiving quit advice.[7–9]

The efficacy of smoking cessation programs during pregnancy has been demonstrated in randomized trials.[10–16] However, only one of these studies evaluated an intervention delivered by usual care providers.[14] Smoking cessation programs suitable for use by medical and nursing staff need to be developed and evaluated.[17]

This report documents the evaluation of a structured, cognitive–behavioral smoking cessation program for pregnant women delivered by usual care providers in a public hospital antenatal clinic.

Methods

This study was conducted at the antenatal clinic of an urban teaching hospital in Australia. Screening was conducted at the first prenatal visit by usual care midwives from January 1990 to May 1991. Patients were classified as current smokers if they answered yes to the question "Are you a smoker?"

Evaluation Design

A prospective randomized, control group design was implemented to assess smoking status via self-reports and urine cotinine tests. At the first visit, consenting patients were assigned to an experimental group or a control group by means of precoded questionnaires contained in manila envelopes. The sequence was computer generated, and midwives were instructed to extract the questionnaires only after consent had been obtained.

Health Education Methods

Control group. The control intervention reflected the prestudy smoking advice given. At the first visit, control patients were informed by both the doctor and the midwife that smoking was an important cause of pregnancy problems and that they should stop smoking. The midwife also gave each patient a package of anti-smoking materials that included a sticker, a risk pamphlet for women, and a two-page cessation guide. None of these materials were tailored specifically for pregnant women.

Experimental program group. First-visit components for the experimental group were as follows:

- Doctor advice: approximately 2 to 3 minutes of standardized risk information.
- Videotape: a 14-minute program, shown mainly to individual participants, containing three sections: risk information, rebuttal of barriers to quitting, and cessation tips.
- Midwife counseling: approximately 10 minutes of standardized information and counseling following the videotape format and using a flip chart. A quit date was negotiated when possible.
- Self-help manual: during the counseling session, women were taught how to use a self-help manual that included sections on risks, barriers, and cessation. Patients were also offered four packets of confectionary gum.

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TABLE 1—Point Prevalence of Cessation of Smoking in a Randomized Trial in an Australian Public Antenatal Clinic: Numbers of Patients Abstaining at Midpoint, End of Pregnancy, and Postpartum, Based on Self-Reports and Chemical Validation

	Control Group (n = 125)		Experimental Group (n = 127)			
	Abstaining, No.	Abstaining, % (95% CI)	Abstaining, No.	Abstaining, % (95% CI)	Difference χ^2	*P*
Self-report						
At midpoint	9	7 (3, 13)	25	20 (13, 28)	8.41	.0037
At end of pregnancy	10	8 (4, 14)	24	19 (12, 27)	6.41	.0113
At postpartum	8	6 (3, 12)	17	13 (8, 21)	3.44	.0636
Chemical validation						
At midpoint	2	2 (0, 6)	20	16 (10, 23)	15.82	.0001
At end of pregnancy	7	6 (2, 11)	17	13 (8, 21)	4.43	.0353
At postpartum	1	1 (0, 4)	13	10 (6, 17)	10.69	.0011

Note. For chi-squared tests, *df* = 1. CI = confidence interval.

- Lottery: patients were informed that all biochemically validated abstainers at the second visit would be eligible for a lottery. Four donated prizes (approximately US$75 each) were awarded.
- Social support: Where practicable, an adult accompanying the patient was invited to participate in the program. The manual included a supporter tip sheet with a contract and form letter stressing the importance of cessation support.
- Chart reminder: a sticker was placed in the medical record.

A form letter signed by the first-visit midwife (and including a sticker) was sent within 10 days. At the second visit and the 34- to 36-week visit, midwives provided approximately 5 minutes of counseling, and doctors gave approximately 1 to 2 minutes of risk advice. Patients smoking at the 34- to 36-week visit were encouraged to attend an external cessation course.

Measurement

Baseline. The log recorded patients' age, marital status, education, gravidity, parity, language spoken at home, and estimated gestational age. Patients completed a written consent form and a questionnaire assessing employment, racial status, recall of any previous quit advice, and smoking knowledge and behavior. Patients were informed about the urinalysis procedure.

Follow-up. Smoking status was reassessed approximately 4 weeks after the first visit (midpoint), at the visit closest to the 34th week of gestation (end of pregnancy), and at 6 to 12 weeks postpartum. Any subject who reported smoking one or more cigarettes in the previous week was classified as a smoker. When smoking data were not collected at the clinic, a questionnaire was mailed to the patient's home. For patients not completing questionnaires, a blinded interviewer made up to five phone calls and/or three home visits. Patients with missing self-report or biochemical data were classified as smokers.[18] Point prevalence and consecutive cessation rates were calculated. Consecutive cessation relates to patients who were abstinent at two or three consecutive visits.

Cotinine procedure. Urine samples were analyzed by high pressure liquid chromatography with absorbance detection.[19,20] Cotinine tests were performed when patients reported that they had not smoked in the past week. A cotinine value of 500 nmol/L or lower was used as the cutoff to validate self-reports.[21]

Provider time commitment. Audio recordings of consultations were timed by stopwatch to obtain information concerning the duration of cessation components. After each consultation, doctors and midwives assessed the acceptability of the time commitment.

Costs of the interventions. Recurrent costs were estimated because they provide an indication of how much it would cost similar antenatal clinics to implement the control and experimental programs.[16] Estimates included training costs, staff salaries required to deliver the interventions, clerical time, and the costs of postage, written materials, and chewing gum.

Results

Sample Selection

A total of 1909 patients were screened by 28 midwives. Smoking prevalence was 38.0%. Of the 725 smokers screened, 187 (26%) were ineligible because they were of more than 26 weeks' gestation (n = 129) or were judged by the midwife to be too ill or psychologically disturbed (n = 47); 11 patients were excluded for other reasons. Of the 538 who were eligible, 293 (54%) agreed to participate. Consent rates for the 7 midwives who screened more than 10 eligible smokers varied significantly (range = 9% to 76%).

After randomization and prior to the end-of-pregnancy observation, 41 patients became ineligible as a result of withdrawal from the clinic (experimental group, n = 7; control group, n = 7), abortion or miscarriage (experimental group, n = 10; control group, n = 10), or preterm delivery (experimental group, n = 4; control group, n = 3). It was impractical and/or unethical to follow up such patients. Two hundred fifty-two pregnant smokers—127 experimental and 125 control patients—were eligible for follow-up at the end of their pregnancy.

There were no significant baseline differences between the two groups on any of the 12 demographic, obstetric, and smoking-related variables tested. However, a significantly higher proportion of refusers had less than a high school education ($\chi^2 = 13.89, df = 1, P < .0001$), and this group evidenced a significantly higher mean gestational age (*t* test, $P = .008$). Forty-four percent of experimental patients were accompanied on their first visit by another adult.

Follow-Up Rates

The percentages of women who could not be located at each observation point were as follows: midpoint, 10% (experimental, 9%; control, 10%); end of pregnancy, 10% (experimental, 10%; control, 9%); and postpartum, 25% (experimental, 22%; control, 27%).

Smoking Cessation

Point prevalence of smoking cessation using self-reported and validated abstinence is detailed in Table 1. Consecutive cessation is detailed in Table 2.

Cotinine data were available for 84% of self-reports of abstinence (experimental group, 86%; control group, 78%). The overall proportion of control patient tests (52%) that were inconsistent with self-reports was significantly greater ($P = .0005$) than the proportion of experimental patient tests (12%).

Provider Time Commitment

Midwives averaged significantly more time (t test, $P < .0001$) discussing smoking with experimental patients (7 minutes, 12 seconds) than with control patients (1 minute, 46 seconds). On 96% of checklists, midwives indicated that the experimental intervention was of an acceptable duration. The mean time spent discussing smoking by the doctors was significantly longer (t test, $P = .0199$) with experimental patients (4 minutes, 19 seconds) than with control patients (2 minutes, 20 seconds). After 70% of experimental consultations, doctors noted that the intervention was of an acceptable duration.

TABLE 2—Indicators of Smoking Cessation on Consecutive Visits: Numbers of Patients Who Were Abstinent, Based on Self-Reports and Chemical Validation

	Control Group (n = 125)		Experimental Group (n = 127)			
	Abstaining, No.	Abstaining, % (95% CI)	Abstaining, No.	Abstaining, % (95% CI)	Difference χ^2	P
Self-report						
At midpoint and end of pregnancy	4	3 (1, 8)	17	13 (8, 21)	8.56	.003
At midpoint, end of pregnancy, and postpartum	1	1 (0, 4)	10	8 (4, 14)	7.55	.006
Chemical validation						
At midpoint and end of pregnancy	0	0	12	9 (5, 16)	12.40	<.001
At midpoint, end of pregnancy, and postpartum	0	0	8	6 (3, 12)	. . .[a]	.0037

Note. CI = confidence interval.
[a]Fisher's Exact Test (one-tailed) was used because of small expected frequencies.

Costs of the Interventions

The experimental program cost more per patient than the control intervention (US$13.95 vs US$1.83). The cost per end-of-pregnancy validated abstainer was US$121.41 in the experimental group, compared with US$37.88 in the control group.

Discussion

Except for the postpartum self-report, self-report and biochemically validated quit rates in the experimental group were significantly higher than in the control group at all three points, whether point prevalence or consecutive cessation measures were used. The 9% validated consecutive cessation rate difference at the end-of-pregnancy observation was similar to that achieved by programs delivered by health educators.[11–13,15,16] This result is in contrast to the failure of a recent trial involving low-intensity interventions delivered by clinic staff to demonstrate an increase in validated quit rates.[22]

Windsor et al.[16] reported a trend of increases in control group quit rates; rates in their study ranged from 5% to 8%. However, the 0% validated consecutive cessation rates in our control group indicate that brief advice is a highly ineffective strategy with this population. Two descriptive studies[23,24] have documented high rates of postpartum relapse. Therefore, it is encouraging that, in this trial, the biochemically validated quit rate difference remained significant at postpartum. Two other pregnancy trials describing short-term postpartum quit rates also documented significant between-group differences.[14,25]

Overall, the rate of false negatives in this study was 23.1%, which was higher than the mean rate of 12.9% in three studies involving cotinine validations of high-risk/medical patients.[26] This observation, together with the finding of significant between-group differences in rates of false reporting, provides support for the view that biochemical validation is useful in antenatal studies.[22,27]

Midwives averaged about 28% less time with experimental women than the protocol estimated was necessary to deliver their intervention component fully. In contrast to the midwives, doctors averaged 44% more time discussing smoking with experimental women than the protocol required. This additional burden may be reflected by the finding that, in almost one third of cases, doctors did not agree that the intervention was of an acceptable duration.

Although there were substantial intermidwife variations in consent rates, it is unlikely that selection biases were operating, given the randomization method used and the close balance between study groups. The 54% overall consent rate achieved in this study was lower than that achieved in many other studies.[17] However, most studies have used research staff to recruit smokers. In primary care settings, it has been found that research personnel achieve higher recruitment rates than practice staff.[28] The consent rate finding has important implications for estimates of the impact of program dissemination. In estimating the number of extra smokers who would have quit if their program had been disseminated statewide, Windsor et al.[16] attenuated the quit rate difference to take into account routine delivery by nurses rather than health educators. However, no allowance was made for the possibility that under usual care conditions, a smaller proportion of eligible smokers might be recruited into the program.

Although the experimental program was more effective than the control intervention, the cost-per-quitter analysis indicates that it was less cost-effective. However, any judgment about the viability of the program must particularly take into account its potential cost-benefit. The cost per patient of the experimental program (US$14) compares favorably with breakeven estimates of US$32 by Shipp et al.[29] and US$100 by Marks et al.[30]

Conclusion

This study demonstrates that a smoking cessation program conducted by usual care providers in a public antenatal clinic can produce significant increases in sustained quit rates. The zero rates of consecutive cessation in the control group emphasize that more intensive interventions, such as the experimental program described here, are required to encourage sustained cessation. Comparisons with US estimates indicate that the experimental program should be cost-beneficial.

Data on trial recruitment caution against generalizing consent rates achieved by research staff to normal conditions. Future studies involving midwife recruitment should implement strategies designed to maximize participation rates. Although worthwhile from a public health viewpoint, the quit rate differences achieved in this study were modest. This highlights the importance of developing more effective smoking-cessation programs that are feasible in antenatal settings. □

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