

RESEARCH PAPER

Increased reach and effectiveness of a statewide tobacco quitline after the addition of access to free nicotine replacement therapy

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Background: Tobacco users receiving behavioural and pharmacological assistance are more likely to quit. Although telephone quitlines provide population access to counselling, few offer pharmacotherapy.

Objective: To assess change in cessation rates and programme impact after the addition of free nicotine replacement therapy (NRT) to statewide quitline services.

Design, setting, participants: An observational study of cohorts of callers to the Minnesota QUITPLANSM Helpline before (n = 380) and after (n = 373) the addition of access to free NRT.

Intervention: Mailing of NRT (patch or gum) to callers enrolling in multi-session counselling.

Main outcome measure: Thirty-day abstinence six months after programme registration.

Results: The number of callers increased from 155 (SD 75) to 679 (180) per month pre-NRT to post-NRT (difference 524, 95% confidence interval (CI) 323 to 725). Post-NRT, the proportion of callers enrolling in multi-session counselling (23.4% v 90.1%, difference 66.6%, 95% CI 60.8% to 71.6%) and using pharmacotherapy (46.8% v 86.8%, difference 40.0%, 95% CI 31.3% to 47.9%) increased. Thirty-day abstinence at six months increased from 10.0% pre-NRT to 18.2% post-NRT (difference 8.2%, 95% CI 3.1% to 13.4%). Post-NRT the average number of new ex-smokers per month among registrants increased from 15.5 to 123.6 (difference 108.1, 95% CI 61.1 to 155.0). The cost per quit pre-NRT was \$1362 (SD \$207). The cost per quit post-NRT was \$1934 (\$215) suggesting a possible increase in cost per quit (difference \$572, 95% CI –\$12 to \$1157).

Conclusion: The addition of free NRT to a state quitline is followed by increases in participation and abstinence rates resulting in an eightfold increase in programme impact. These findings support the addition of access to pharmacological therapy as part of state quitline services.

Increasing access to effective behavioural counselling and pharmacological tobacco treatments has the potential to save millions of lives.^{1,2} A prominent recommendation of the US National Action Plan for Tobacco Cessation is the provision of universal access to counselling and medications to treat tobacco dependence.¹

Telephone quitlines are an effective means to increase population access to counselling services.^{2–5} At present, 42 states in the United States offer quitlines and a single national access number (1-800-QUIT-NOW) has been established.⁶ While telephone counselling is widely available,⁷ access to pharmacological therapy from state quitlines is more limited. Only 10 quitlines offer medications at no cost to at least some of their callers.⁶

At present, it is unclear how the addition of access to pharmacological therapy as an ongoing part of statewide quitline services would influence programme impact. In a health plan population, reducing financial barriers to treatment increased use of services and overall population impact.⁸ Prior offers of free medications suggest considerable interest on the part of tobacco users and results from a recent large-scale distribution of free nicotine patches suggest cessation rates increase as well.^{9–12} Unfortunately, most offers of free medications are of short duration and do not provide information on programme impact beyond an initial period of high interest and participation.

The experience of the Minnesota QUITPLANSM Helpline addresses this issue. In September 2002, the Minnesota Partnership for Action Against Tobacco (MPAAT) began

providing nicotine replacement therapy (patches, gum) at no cost to helpline callers. We have previously reported on the increase in call volume associated with these changes.¹³ The purpose of this paper is to report on how changes in participation (that is, reach) and quit rates (that is, effectiveness) influenced the impact and associated costs of the Minnesota QUITPLAN Helpline after the addition of free nicotine replacement therapy (NRT) as part of helpline services.

METHODS

The Minnesota QUITPLAN Helpline collaborates with seven major health plans in Minnesota to provide statewide access to telephone counselling. At the time of this study, these health plans insured approximately 90% of the state population.¹⁴ The helpline attempts to transfer callers with insurance to their health plan for services. However, individuals with insurance who cannot identify their specific plan or who do not wish to be transferred are still eligible to receive assistance directly from the QUITPLAN Helpline.

MPAAT contracted with Free & Clear, Inc (Seattle, Washington) to provide QUITPLAN services. QUITPLAN callers choose between a one-call comprehensive session or a multiple-session programme that includes four additional proactive calls. Interventions are grounded in social cognitive theory¹⁵ and incorporate motivational interviewing¹⁶ and cognitive-behavioural counselling techniques.² Participants learn problem solving and coping skills and are encouraged to use evidence-based behavioural strategies (that is,

acquiring social support, avoiding high risk situations, etc) with specific approaches tailored to the individual needs of each caller. The efficacy of the Free & Clear programme has been demonstrated in prior randomised trials.^{17 18}

On 3 September 2002 the helpline began offering nicotine patches or gum to callers who enrolled in QUITPLAN's multi-session programme. For those who enrolled in multi-session counselling, NRT was recommended for callers who smoked five or more cigarettes per day, planned to quit within 30 days, were age 18 or older, and did not have contraindications to the use of NRT (such as pregnancy, prior sensitivity, chest pain, etc). Eligible callers were mailed an eight-week supply of nicotine patch or gum with the starting dose determined by their baseline level of tobacco use.

At the time when NRT was introduced, there were few changes in other policy or social-environmental factors in Minnesota that might have influenced helpline call volume.¹⁹ There was no change in the price of cigarettes nor were there any changes in city, county, or state restrictions on smoking in public places. MPAAT's media efforts to encourage cessation (\$1.5 million annually) were also unchanged in the period before versus after the introduction of NRT. Specifically, no paid media announced the addition of NRT to helpline services. The addition of NRT to the helpline was reported by major news outlets, including a front-page story in the state's largest newspaper.

MPAAT contracts with Professional Data Analysts, Inc to evaluate the QUITPLAN Helpline. The evaluation plan is shown in fig 1. Data sources include programme registration information (demographic characteristics and initial readiness to quit), helpline administrative records (counselling, delivery of medications, costs), and phone surveys administered two weeks (tobacco use history) and six months (quit attempts, use of medications, cessation outcomes) after registration. Information from the 2003 Minnesota Adult Tobacco Survey, a statewide phone survey (response rate 56.4%, 18% prevalence of tobacco use, n = 1368 current smokers identified), allow for comparison of characteristics of helpline callers with the general population of smokers in Minnesota.

Consecutive callers to the helpline were selected to be part of evaluation cohorts if the caller (1) requested counselling services (that is, not calling on behalf of others or seeking information only—73% of all callers) and was (2) age 18 or older (over 99% of all callers). To account for possible seasonality in call volume and abstinence rates, cohorts were selected at predetermined periods throughout the calendar year. Four cohorts (n = 670) were selected in the year before the introduction of NRT (September 2001 to August 2002) and two cohorts (n = 596) in the nine months after the introduction of NRT (September 2002 to May 2003). Callers who were transferred to their health plan are excluded (n = 247 pre-NRT, n = 174 post-NRT) because it was considered the responsibility of health plans to evaluate their services for their own members. Of those callers who received QUITPLAN services, some are excluded because the time window for completion of their six-month survey (beginning two weeks before and ending four weeks after the six-month anniversary of programme enrolment) closed before any attempts were made to contact these individuals (n = 5 pre-NRT, n = 24 post-NRT). Also excluded are individuals who asked not to be contacted for the six-month follow-up (n = 7 pre-NRT, n = 1 post-NRT). To determine quit rates, we excluded callers who reported they had already stopped smoking at the time of registration (n = 31 pre-NRT, n = 24 post-NRT). This leaves 380 callers in the pre-NRT sample and 373 in the post-NRT sample for evaluation of cessation outcomes. For these remaining cohort members, a

minimum of seven attempts was made to complete follow-up phone surveys at two weeks and again at six months.

The primary cessation outcome is self-reported abstinence from all tobacco products for 30 days or longer on the six-month follow-up survey. Secondary outcomes include seven-day point prevalence abstinence at six months and the number of quit attempts. Process measures include use of pharmacological therapy and receipt of phone counselling. Abstinence rates are presented both among survey respondents and as determined by intention-to-treat with all non-respondents considered to be continuing smokers.

Programme impact is determined by calculating the number of new ex-smokers per month among QUITPLAN callers. To exclude the one-time effects of high initial response to the availability of NRT, we compared the period from January to May in the year before and after the introduction of NRT. Cost per caller and cost per quit are determined from the perspective of the funding agency based upon actual programme costs in US\$. MPAAT costs are determined on a per caller basis under the contract in place at the time with Free & Clear. Pre-NRT, these costs are determined by the number of individuals who receive single or multi-session counselling. Post-NRT, MPAAT costs include both the cost of providing phone counselling and the cost of providing free NRT. MPAAT media expenditures (unchanged pre-NRT versus post-NRT) are not included because media efforts promoted cessation in general and did not specifically mention the availability of NRT from the helpline.

Analysis for this study was performed by Professional Data Analysts, Inc using SPSS 13.0. Comparison of caller characteristics pre-NRT versus post-NRT was performed using χ^2 for categorical variables and t test or non-parametric tests for continuous variables. Comparison of abstinence outcomes was performed using χ^2 tests. To examine possible reasons for changes in abstinence following the addition of NRT, we examined the odds of 30-day abstinence post-NRT versus pre-NRT using three logistic regression models. The first model presents the unadjusted odds of 30-day abstinence. The second model examines the odds of 30-day abstinence after adjusting for potential differences in the baseline characteristics of callers. Baseline characteristics included in this model (age, gender, education, readiness to quit, tobacco use history) were selected a priori based upon their predictive value in prior studies.²⁰⁻²⁶ The third model examines the odds of abstinence after controlling for caller characteristics and use of cessation services (one-call versus multi-session counselling, use of medications). All tests for level of significance are two-tailed.

This study was reviewed by the University of Minnesota's Institutional Review Board and determined to be exempt under federal guidelines 45 CFR 46.101 (b) for existing data.

RESULTS

Survey response

The response rate for the two-week survey was higher pre-NRT (n = 301/380, 79.2%) than post-NRT (n = 257/373, 68.9%, p = 0.001). Non-respondents (mean age 37.8 (SD 12.4) years) were younger than respondents (41.8 (13.6) years, p < 0.001). The response rates for the six-month survey were similar pre-NRT versus post-NRT (n = 216/380, 56.8% v 219/373, 58.7%, respectively, p = 0.60). Compared to survey respondents at six months, non-respondents were younger (37.3 (13.3) years v 43.3 (12.9) years, p < 0.001), more likely to belong to a non-white ethnic group (13.7% v 7.6%, p = 0.007), and less likely to have completed any education after high school (53.5% v 38.9%, p < 0.001). For the two-week and six-month surveys, survey response was not related to gender, residence (metro v non-metro), or readiness to quit at registration.

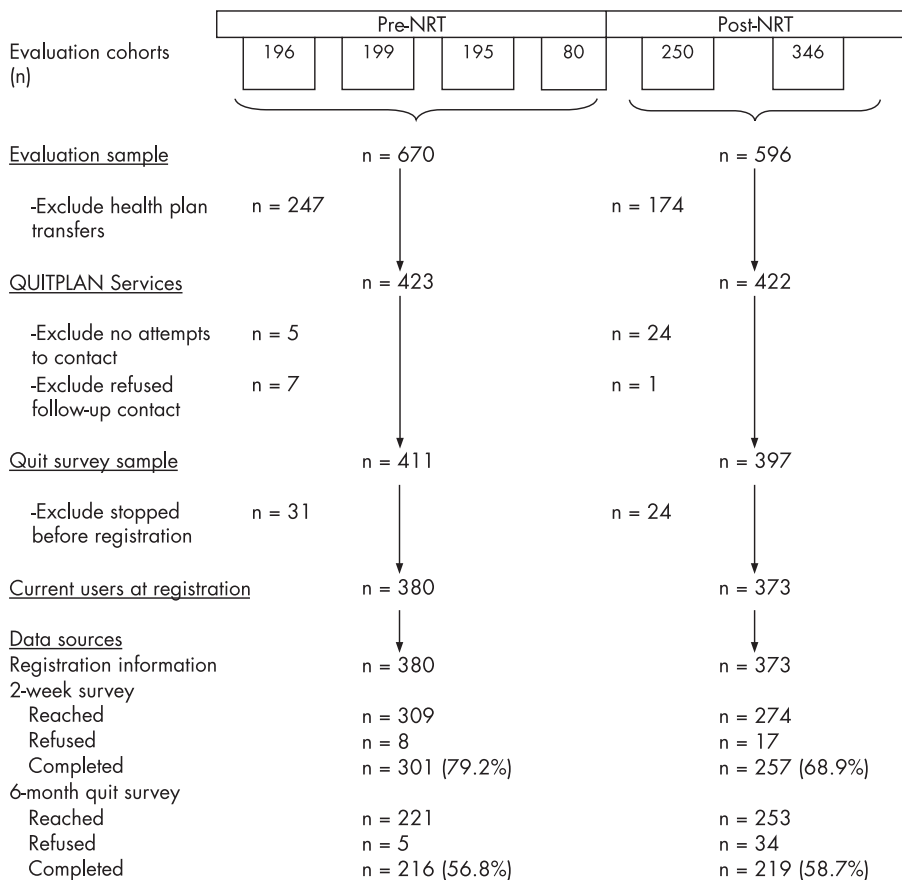


Figure 1 Evaluation plan.

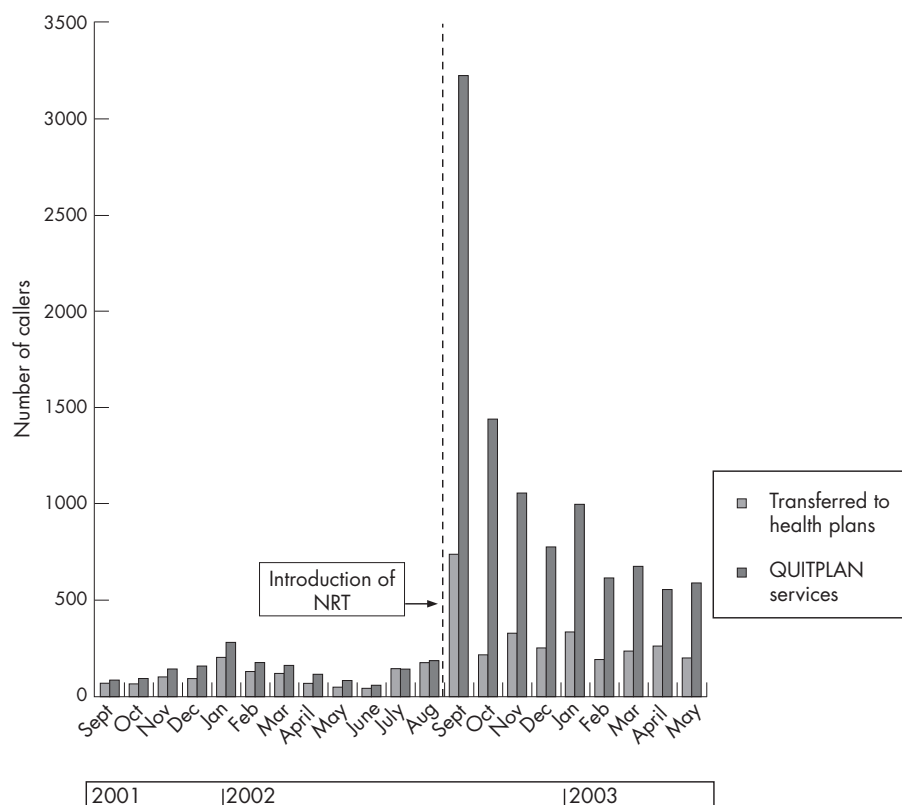


Figure 2 Number of callers transferred to health plans or receiving QUITPLAN helpline services before and after introduction of nicotine replacement therapy (NRT).

Call volume

The number of callers receiving QUITPLAN services or being transferred to health plans is shown in fig 2. From January to May in the year before the introduction of NRT approximately 155 (SD 75) callers per month registered for QUITPLAN services. From January to May in the year after the introduction of NRT the number registering for QUITPLAN services increased approximately fourfold to 679 (180) callers per month (difference 524 callers per month, 95% confidence interval (CI) 323 to 725, $p < 0.001$). In the post-NRT evaluation cohorts, 68% ($n = 254/373$) of callers were mailed NRT, the majority of whom received nicotine patches ($n = 229/254$, 90%). After the introduction of NRT, the number of callers transferred to health plans for services actually increased as well (105 (61) Jan–May pre-NRT ν 235 (59) Jan–May post-NRT, difference 130 callers per month, 95% CI 43 to 218, $p = 0.009$).

The availability of NRT was likely an important motivating factor for callers. Pre-NRT, 28.6% of callers (86/301) indicated on the two-week survey that their main reason for calling was to “get medical products (like nicotine patches, nicotine gum, or Zyban [bupropion]) to help them quit”. Post-NRT, 88.3% of callers (227/257) indicated that their main reason for calling was “to get nicotine patches or gum through the Helpline”.

Caller characteristics

Callers before and after the introduction of NRT were similar in most respects (table 1). Both pre-NRT and post-NRT a substantial majority of callers served by the QUITPLAN Helpline had health insurance. Compared to the population of smokers in Minnesota, helpline callers were more likely to be female (57.6% pre-NRT callers, 54.2% post-NRT callers, 43.6% statewide), smoke more cigarettes per day (mean (SD) 24.7 (12.9) cigarettes per day pre-NRT, 25.6 (11.7) cigarettes per day post-NRT, 14.3 (9.4) cigarettes per day statewide), and were much more likely to smoke within five minutes of waking in the morning (43.3% pre-NRT, 47.8% post-NRT, 19.2% statewide).

Two significant differences in caller characteristics pre-NRT versus post-NRT are evident. Post-NRT, a greater proportion of QUITPLAN callers reported being ready to quit in the next 30 days (88% pre-NRT ν 96% post-NRT, $p < 0.001$) and a greater proportion of callers reported using cigarettes plus one or more other forms of tobacco (13% pre-NRT ν 21% post-NRT, $p = 0.034$). This compares to 12% of smokers statewide who report using more than one form of tobacco. The increase in the proportion of callers using cigarettes plus one or more other forms of tobacco pre-NRT versus post-NRT was primarily evident among male callers and callers from out-state Minnesota.

Table 1 Characteristics of QUITPLAN helpline callers before and after the introduction of nicotine replacement therapy (NRT)

	Pre-NRT		Post-NRT		p Value
	n	%	n	%	
Gender*	n=370		n=369		0.357
Female	213	57.6%	200	54.2%	
Male	157	42.4%	169	45.8%	
Age*	n=379		n=373		0.460
18–25 years	55	14.5%	66	17.7%	
26–45 years	183	48.3%	174	46.6%	
46–65 years	120	31.7%	119	31.9%	
>65 years	21	5.5%	14	3.8%	
Ethnicity*	n=363		n=363		0.141
White	320	88.2%	332	91.5%	
Other race	43	11.8%	31	8.5%	
Educational level*	n=375		n=371		0.504
High school or less	164	43.7%	172	46.4%	
Some college/vocational	155	41.3%	138	37.2%	
College graduate/post	56	14.9%	61	16.4%	
Health insurance status	n=366		n=371		0.477
Insured	247	67.5%	260	70.1%	
Uninsured	119	32.5%	111	29.9%	
Region*	n=378		n=372		0.105
Major metropolitan	122	32.3%	95	25.5%	
Metro suburbs	58	15.3%	69	18.5%	
Out-state	198	52.4%	208	55.9%	
Readiness to quit*	n=380		n=373		<0.001
Not in next 30 days	47	12.4%	14	3.8%	
In next 30 days	333	87.6%	359	96.2%	
Cigarettes per day prior year†	n=293		n=252		0.145‡
Mean (SD)	24.7 (12.9)		25.6 (11.7)		
Time to 1st am cigarette†	n=291		n=251		0.688
<5 minutes	126	43.3%	120	47.8%	
6–30 minutes	105	36.1%	80	31.9%	
31–60 minutes	33	11.3%	30	12.0%	
>60 minutes	27	9.3%	21	8.4%	
Tobacco use†	n=300		n=256		0.034
Cigarettes only	254	84.7%	198	77.3%	
Cigarettes and other tobacco	39	13.0%	54	21.1%	
Other tobacco only	7	2.3%	4	1.6%	
Quit attempts prior year†	n=290		n=252		0.167
None	142	49.0%	113	44.8%	
1	50	17.2%	44	17.5%	
2	26	9.0%	31	12.3%	
3 or more	72	24.9%	64	25.4%	

*Registration information.
 †Two-week survey.
 ‡Mann-Whitney U = 34311.0.

Table 2 Tobacco cessation services before and after the introduction of NRT

	Pre-NRT		Post-NRT		Difference (95% CI)	p Value
	n	%	n	%		
Helpline service*	n=380		n=373			<0.001
One-call	291	76.6%	37	9.9%		
Multi-session programme	89	23.4%	336	90.1%	66.6 (60.8 to 71.6)	
Multi-session programme*	n=89		n=336			
Mean (SD) calls	2.49 (1.62)		2.71 (1.27)		0.22 (-0.15 to 0.59)	0.276‡
Completed ≥1 call	74	83.1%	319	94.9%	11.8 (4.3 to 21.7)	<0.001
Mean (SD) minutes	39.1 (32.2)		49.7 (28.6)		10.6 (3.7 to 17.5)	0.001§
Any pharmacotherapy†	n=216		n=219			<0.001
	101	46.8%	190	86.8%	40.0 (31.3 to 47.9)	
Any NRT†	n=216		n=219			<0.001
	71	32.9%	187	85.4%	52.5 (43.8 to 60.0)	
Bupropion SR†	n=214		n=219			<0.001
	52	24.3%	22	10.0%	-14.3 (-21.6 to -6.9)	
Used two or more meds†	n=216		n=219			0.514
	27	12.5%	23	10.5%	-2.0 (-8.4 to 4.4)	

*Helpline administrative records.

†Six-month survey.

‡Mann-Whitney U = 13860.5.

§Mann-Whitney U = 11481.5.

Tobacco treatment services

Receipt of tobacco treatment services for QUITPLAN callers is shown in table 2. Information on programme enrolment and phone counselling comes from administrative sources. Use of pharmacological therapy is based upon self-report on the six-month survey. Post-NRT, there was a substantial increase in the proportion of callers who enrolled in multi-session counselling and also in the proportion of callers who used pharmacological therapy (particularly NRT).

Tobacco cessation outcomes

Tobacco cessation outcomes are shown in table 3. Seven- and 30-day abstinence rates increased following the introduction of NRT. Post-NRT callers were also more likely to make multiple attempts to quit. Pre-NRT, 33% of callers made no serious attempt to quit in the six months following enrolment, 36% had made one attempt, 15% had made two attempts, and 16% had made three or more attempts to quit. This compares to 10%, 46%, 12%, and 32% of callers post-NRT who made none, one, two, or three or more attempts to quit ($p < 0.001$).

The results of logistic regression models examining the post-NRT versus pre-NRT odds of 30-day abstinence before and after adjustment for caller characteristics and use of cessation services are shown in table 4. No correlations between baseline characteristic variables included in the logistic models exceeded 0.40. The strongest correlation was -0.37 between number of cigarettes smoked per day and time to first morning cigarette. The unadjusted model shows an increased odds of abstinence post-NRT of 2.00 (95% CI 1.31 to 3.07, $p = 0.001$). The increased odds of quitting

remains significant (odds ratio (OR) 1.75, 95% CI 1.09 to 2.83, $p = 0.021$) after adjusting for differences in callers' baseline characteristics such as the greater readiness to quit in the next 30-days among callers post-NRT. After adjusting for baseline characteristics and use of cessation services (one call versus multi-session counselling, use of pharmacological therapy), the odds ratio for the post-NRT versus pre-NRT period is no longer significant (OR 1.44, 95% CI 0.73 to 2.82, $p = 0.285$). In this model, the only significant predictor of abstinence is use of pharmacological therapy.

Programme impact

We estimate the combined effects of increased programme participation and cessation rates by determining the average number of new ex-smokers per month among callers who received QUITPLAN services. From January to May in the pre-NRT period, an average of 155 (SD 75) callers per month received QUITPLAN services. Given a 10.0% rate of 30-day abstinence during the pre-NRT period, we estimate that there were approximately 15.5 (95% CI 4.1 to 26.9) new ex-smokers per month among callers who received QUITPLAN services. From January to May in the post-NRT period, we estimate that there were approximately 123.6 (95% CI 68.2 to 179.0) new ex-smokers per month. This difference (108.1 ex-smokers per month, 95% CI 61.1 to 155.0) represents an approximately eightfold increase in the number of new ex-smokers after the introduction of NRT.

Programme costs and cost per quit

The average cost per caller receiving QUITPLAN services in the pre-NRT evaluation cohorts was \$136.17 (SD \$61.49). The

Table 3 Tobacco abstinence outcomes at six months

	Pre-NRT		Post-NRT		Difference (95% CI)	p Value
	n	%	n	%		
Among survey respondents	n=216		n=219			
Abstinent 7 days	41	19.0%	81	37.0%	18.0 (9.7 to 26.3)	<0.001
Abstinent 30 days	n=216		n=219			
	38	17.6	68	31.1%	13.5 (5.4 to 21.5)	0.001
By intention-to-treat	n=380		n=373			
Abstinent 7 days	41	10.8%	81	21.7%	10.9 (5.5 to 16.3)	<0.001
Abstinent 30 days	n=380		n=373			
	38	10.0%	68	18.2%	8.2 (3.1 to 13.4)	0.001

Table 4 Predictors of 30-day abstinence pre- and post-NRT

	Unadjusted model		Model adjusted for baseline characteristics		Model adjusted for baseline and treatment characteristics	
	n = 753		n = 521		n = 356	
	OR (95% CI)	p Value	OR (95% CI)	p Value	OR (95% CI)	p Value
<i>Phase</i>						
Pre-NRT	Ref		Ref		Ref	
Post-NRT	2.00 (1.31 to 3.07)	0.001	1.75 (1.09 to 2.83)	0.02	1.44 (0.73 to 2.82)	0.29
<i>Programme enrolment</i>						
One-call					Ref	
Multi-session					1.03 (0.51 to 2.05)	0.94
<i>Pharmacotherapy</i>						
No					Ref	
Yes					3.02 (1.56 to 5.86)	0.001
<i>Gender</i>						
Male			Ref		Ref	
Female			0.93 (0.56 to 1.54)	0.79	0.89(0.51, 1.53)	0.66
<i>Age (years)</i>			1.00 (0.98 to 1.02)	0.97	0.98(0.96 to 1.00)	0.09
<i>Education</i>						
HS or less			Ref		Ref	
Some college			1.02 (0.60 to 1.75)	0.94	0.74(0.41 to 1.33)	0.32
College grad/post			2.36 (1.24 to 4.48)	0.01	1.66 (0.82 to 3.32)	0.16
<i>Readiness to quit</i>						
Not in next 30 day			Ref		Ref	
In next 30 days			1.24 (0.49 to 3.13)	0.64	1.24 (0.47 to 3.27)	0.66
<i>Cigarettes per day</i>			1.00 (0.98 to 1.02)	0.89	0.99 (0.97 to 1.02)	0.50
<i>Other tobacco</i>						
No			Ref		Ref	
Yes			0.81 (0.41 to 1.59)	0.54	0.85 (0.40 to 1.80)	0.67
<i>First am cigarette</i>						
<5 minutes			Ref		Ref	
6–30 minutes			1.02 (0.59 to 1.78)	0.93	0.87 (0.47 to 1.58)	0.64
31–60 minutes			1.24 (0.58 to 2.66)	0.58	0.87 (0.39 to 1.97)	0.74
>60 minutes			1.03 (0.42 to 2.49)	0.96	0.84 (0.32 to 2.16)	0.71
<i>Quit attempt in past year</i>						
No			Ref		Ref	
Yes			1.32 (0.81 to 2.13)	0.26	1.31 (0.78 to 2.21)	0.31

CI, confidence interval; HS, high school; OR, odds ratio; Ref, reference.

average cost per caller receiving QUITPLAN services in the post-NRT evaluation cohorts was \$352.00 (\$109.51). The increased cost per caller post-NRT (\$215.83, 95% CI \$203.08 to \$228.56, $p < 0.001$) is due to an increase in the proportion of callers enrolling in multi-session counselling and the cost of providing free nicotine patch or gum.

Pre-NRT, one in 10 callers quit (30-day abstinence by intention-to-treat). At a cost of \$136.17 per caller, this leads to a pre-NRT cost-per quit of \$1362 (\$207). Post-NRT, approximately one in 5.5 callers quit. At a cost of \$352 per caller, this leads to a post-NRT cost per quit of \$1934 (\$215). There appears to be an increase in the cost per quit post-NRT (+\$572) although we cannot conclude this with complete certainty because the confidence interval for this difference includes zero (95% CI -\$12 to \$1157).

DISCUSSION

This is the first report of how the addition of free NRT as an ongoing part of statewide quitline services influences programme participation, abstinence rates, and programme impact. Overall, there was an eightfold increase in the number of new ex-smokers among callers registering for Minnesota QUITPLAN Helpline services. Post-NRT, a substantial majority of callers enrolled in multi-session counselling and used pharmacological therapy. This may be particularly important given the finding that helpline callers tended to smoke a substantially greater number of cigarettes per day and were more addicted to nicotine than smokers in the general population. It is also encouraging to note that abstinence rates were higher post-NRT despite an increase in the proportion of helpline callers who used more than one form of tobacco at enrolment. Total programme and average

per caller costs increase with increased delivery of services. The cost per quit may also increase, though to a lesser degree because of higher abstinence rates.

A large part of the overall increase in helpline impact comes from increased programme participation. The observed increases in call volume and enrolment in multi-session counselling are consistent with findings of prior studies that demonstrated increased participation in tobacco treatment programmes when free or low-cost NRT is offered.^{8 11 12 27} Differences in the magnitude of increased participation may be due to differences in the characteristics of associated behavioural programmes (in-person versus telephone, brief versus intensive), the convenience of obtaining NRT (pick-up versus direct mail), the level of media coverage and promotion of the free medication offer, and implementation of other tobacco control policies (such as restrictions on second hand smoke or price increases).

The rate of 30-day abstinence of 18.2% we report post-NRT is consistent with findings from community interventions and clinical trials that combined telephone counselling with provision of NRT. Among state-insured helpline callers who received coupons for free NRT, Zhu *et al* reported 12-month abstinence rates of 23.2%.²⁸ In a clinical trial of telephone counselling as an adjunct to nicotine patch, MacLeod *et al* reported an abstinence rate of 26.7% at six months.²⁹ Miller *et al* recently reported a six-month abstinence rate of 20% among New York City smokers who called their state helpline in response to a limited offer of free NRT.¹² These rates are all much higher than the anticipated 7% success rate for unassisted quit attempts and reinforce the importance of providing behavioural and pharmacological treatments to tobacco users trying to quit.²

Not surprisingly, the increase in delivery of tobacco treatment services was associated with a substantial increase in the average cost per caller and overall programme costs. Similar changes should be anticipated and budgeted for if other state or regional quitlines consider implementing these changes. The US National Action Plan suggests a possible funding strategy for these changes through the creation of a dedicated Smokers' Health Fund.¹

There was most likely an increase in the cost per quit post-NRT. The increase may be due in part to our calculation of costs from the perspective of the funding agency. In the pre-NRT period a substantial proportion of callers used (and likely benefited from) pharmacological therapy, but these non-programme costs are not included in our calculations. It is important to point out that the cost per quit post-NRT of \$1934 still represents a highly cost-effective intervention. Even assuming a later relapse rate of 50% among post-NRT callers who reported 30-day abstinence at six month follow-up,³⁰ the cost per quit post-NRT would still be comparable to the projected cost per quit of \$3779 for national implementation of clinical practice guidelines.³¹

Possible strategies have been examined to increase cost-effectiveness. MPAAT staff have worked with health plan representatives to improve connection of insured callers to health plan services. Among those who receive QUITPLAN services, mailing split doses of NRT (that is, five-week initial supply with a three-week follow-up supply) or abbreviating treatment to a six-week course of NRT may reduce medication costs without decreasing abstinence rates. In addition, the optimal number and timing of calls for individuals using pharmacotherapy is uncertain. Miller *et al* recently reported a cost per quit of \$464 (seven-day abstinence at six months) when the mailing of free patches was accompanied by very brief phone counselling (two 3-minute calls).¹² This is consistent with the results of the logistic regression models reported here that suggest greater abstinence post-NRT was due mainly to increased use of pharmacological therapy. However, because the Minnesota offer of NRT requires callers to enrol in multi-session counselling, it is difficult in this case to isolate the separate effects of increased behavioural and pharmacological assistance. Future randomised trials examining this issue are warranted.

Even though the addition of free NRT was associated with a substantial increase in programme impact, it is important to acknowledge that the overall population impact is still low. Of the approximately 666 000 adult tobacco users in Minnesota,³² fewer than 2% registered for QUITPLAN Helpline services in the six months after the offer of free NRT. This reinforces the need for comprehensive tobacco control programmes that also address the price of tobacco, exposure to second hand smoke, and the social acceptability of tobacco use to bring about substantial reductions in the population prevalence.¹⁹

There are several limitations to consider when interpreting the results of this study. First, this is an observational study so it is not possible to conclude definitively that increases in call volume or abstinence rates are in fact due to the addition of NRT. The logistic regression models presented here suggest that the increase in abstinence rates post-NRT was due to greater use of cessation services rather than differences in caller characteristics. There also were no changes in cigarette prices, restrictions on public smoking, or the level of paid media encouraging cessation during the time period of this study. However, increased news media coverage of helpline services associated with the addition of NRT or other unmeasured factors post-NRT may have contributed to the changes reported here. Another limitation is the use of self-report of relatively short-term abstinence as an outcome measure. Minnesota QUITPLAN Helpline services do not

What this paper adds?

Tobacco users receiving behavioural and pharmacological assistance are more likely to quit. Telephone quitlines provide population access to counselling, however few offer pharmacotherapy.

The addition of free NRT to a state quitline is followed by increases in participation and abstinence rates resulting in an eightfold increase in programme impact. These findings support the addition of access to pharmacological therapy as part of quitline services.

involve face-to-face contact with callers and collection of samples for biochemical validation of tobacco use status for this statewide programme was not practical or feasible. Reviews of prior studies indicate that there is very little under-reporting of tobacco use after low contact interventions (such as telephone counselling).³³⁻³⁶ It is also true that due to later relapse the rates of prolonged abstinence (that is, of six or more months) would likely be lower than the 30-day rates reported here.³⁰⁻³⁷ Still, the substantial difference in 30-day abstinence rates at six months strongly suggests that there was a meaningful increase in cessation after the addition of NRT. Finally, the Minnesota QUITPLAN Helpline is just one of many sources of assistance for tobacco users in Minnesota. A population-based evaluation will be needed to determine if increased QUITPLAN Helpline participation represents recruitment of tobacco users who would not have otherwise used NRT and counselling or rather a shift in tobacco users' choice of services from other potential sources of assistance (that is, self-purchase of NRT, health plan services, medical clinics, etc).

Despite these limitations, this study offers important information on how the addition of access to NRT influences the reach and effectiveness of quitline services. In the case of the Minnesota QUITPLAN Helpline, the addition of NRT was associated with a substantial increase in programme participation, increased enrolment in multi-session counselling, and greater use of pharmacological therapy. These changes resulted in an increased cessation rate and a nearly eightfold increase in the number of new ex-smokers per month among programme users. These findings strongly support the addition of access to pharmacological therapy as part of quitline services.

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