Modeling the Impact of Smoking Cessation Treatment Policies on Quit Rates

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Abstract

Background: Smoking cessation treatment policies could yield substantial increases in adult quit rates in the U.S.

Purpose: The goals of this paper are to model the effects of individual cessation treatment policies on population quit rates, and to illustrate the potential benefits of combining policies to leverage their synergistic effects.

Methods: A mathematical model is updated to examine the impact of five cessation treatment policies on quit attempts, treatment use, and treatment effectiveness. Policies include: (1) Expand cessation treatment coverage and provider reimbursement; (2) Mandate adequate funding for the use and promotion of evidence-based state-sponsored telephone quitlines; (3) Support healthcare systems changes to prompt, guide, and incentivize tobacco treatment; (4) Support and promote evidence-based treatment via the Internet; and (5) Improve individually tailored, stepped care approaches and the long-term effectiveness of evidence-based treatments.

Results: The annual baseline population quit rate is 4.3% of all current smokers. Implementing any policy in isolation is projected to make the quit rate increase to between 4.5% and 6%. By implementing all five policies in combination, the quit rate is projected to increase to 10.9%, or 2.5 times the baseline rate.

Conclusions: If fully implemented in a coordinated fashion, cessation treatment policies could reduce smoking prevalence from its current rate of 20.5% to 17.2% within 1 year. By modeling the policy impacts on the components of the population quit rate (quit attempts, treatment use, treatment effectiveness), key indicators are identified to analyze in improving the effect of cessation treatment policies.

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INTRODUCTION

Despite numerous advances in tobacco dependence treatment, U.S. adult smoking prevalence and quit rates have stalled, and too few smokers who try to quit benefit from evidence-based treatments.[1-3] Evidence-based cessation treatment policies have been underutilized, for the most part implemented and evaluated in isolation without regard to potential synergies.[1,2] If more fully implemented and better integrated, cessation treatment policies could yield substantial increases in adult quit rates and a reduction in the population prevalence of smoking.[2,3,5-8]

This paper builds on previous work by Levy and Friend[8,9] and the review by Abrams et al.[4] to estimate the potential impact of more fully utilizing cessation treatments through cessation treatment-related policy changes. Of the five policies discussed in Abrams et al.,[4] three have a strong evidence base: (1) expanded cessation treatment coverage and provider reimbursement; (2) adequate funding for the use and promotion of evidence-based state-sponsored telephone quitlines; and (3) incentives for the adoption of healthcare system supports proven to increase the delivery of evidence-based brief provider interventions. Also considered are two promising approaches that could play a critical role in enhancing the use and long-term effectiveness of evidence-based treatments: (4) identifying, supporting, and promoting effective Internet-based cessation programs, and (5) providing a more comprehensive national treatment strategy that includes tailoring of treatment, stepped care approaches, and more comprehensive care management and continuity of care strategies. The goals of this paper are to mathematically model the effects of individual tobacco cessation policies on population quit rates, and to illustrate the potential benefits of combining these policies to leverage their synergistic effects.

METHODS

The Population Quit Rate (PQR) is disaggregated into quit attempts (QA), treatment utilization (TxUse), and treatment effectiveness (TxEff), expressed as the proportion of all current smokers that make a quit attempt in the past year multiplied by the average success over all treatments of those making a quit attempt.[4] Mathematically, $PQR = QA * \Sigma_{i=1\ldots4} (TxUse_i * TxEff_i)$, where i = category of treatment.

Cessation treatments were sorted into four mutually exclusive categories: (1) no formal or no effective evidence-based treatment (NoEBT), meaning no use of an evidence-based behavioral treatment or pharmacologic treatment (may include the use of self-help materials); (2) one or more effective forms of evidence-based behavioral treatment without pharmacologic treatment, which includes a variety of evidence-based counselling interventions delivered in face-to-face group or individual counseling session or via proactive telephone quitlines; (3) one or more forms of evidence-based pharmacologic treatment without behavioral treatment, which includes seven first line medications[3] (i.e., nicotine gum, patches, lozenges, nasal spray, and inhaler; bupropion, varenicline) and two second line medications (nortriptyline, clonidine); and (4) one or more forms of evidence-based behavioral treatment combined with one or more forms of evidence-based pharmacologic treatment. Since the four categories are mutually exclusive, the proportion of smokers making a quit attempt distributed across these categories sums to 1.0.

First, baseline values for the quit attempt, TxUse, and TxEff variables are designated, which, when inserted into the PQR equation, yield a baseline level of PQR. Next, the effect of cessation treatment policies individually on the levels of quit attempt, TxUse, and TxEff were considered.

Baseline Scenario

Rates of quit attempts and treatment use were drawn from the 2003 Tobacco Use Supplement to the Current Population Survey (TUS-CPS).[10] Varenicline use was not included in the 2003 TUS-CPS because it was not approved and released until 2006. As part of the TUS-CPS, current smokers were asked, "Have you <u>ever</u> stopped smoking for one day or longer because you were trying to quit smoking?" followed by, "During the past 12 months, have you stopped smoking for one day or longer because you were trying to quit smoking?" Individuals who answered yes to both questions were designated as having made a quit attempt in the past year. In addition, individuals who were former smokers at the time of the survey but were smoking 1 year prior were designated as having made a quit attempt. Those who had made a quit attempt in the 12 months prior to the survey were asked about treatment use in their last quit attempt.

Treatment effectiveness estimates were drawn from the 2008 Guideline[3] and from Cochrane reviews.[11-19] Based on Abrams et al.,[4] when compared to NoEBT, quit rates were estimated to increase 100% when pharmacologic treatment is used, 60% when behavioral treatment is used, and 200% when pharmacologic treatment and behavioral treatment are used. Based on previous literature,[20-22] an average annual continuous quit rate for NoEBT of 4% was selected.

To account for the effect of multiple quit attempts among those who fail at their first attempt, it was assumed that half of those that make at least one quit attempt per year go on to make at least a second attempt, and half of those make a third, and so on. It was further assumed that, while patterns of use by an individual may vary, the average pattern of use and the average effectiveness across forms of treatment for the population remain the same with successive attempts. The net result is that the quit attempt rate associated with each treatment doubles (i.e., $[1 + .5 + .25 + .125 \ldots = 2]$). Therefore, correcting for multiple quit attempts over a 12-month period yielded quit rates of 8%, 12.8%, 16%, and 24% for NoEBT, behavioral treatment, pharmacologic treatment and behavioral treatment and pharmacologic treatment, respectively.

To validate the PQR estimate derived using the data and parameters described above, the estimate was compared to a quit rate measure suggested by Burns et al.[23] Using 2003 TUS-CPS data, this population quit rate was defined as the number of ex-smokers who quit in the last year and are abstinent for at least 3 months as a percentage of those who were smokers 1 year ago.

Cessation Treatment Policies

In this section, the parameters used to examine the direct impact of five policies on quit attempt, TxUse, and TxEff are described. The policies and the policy parameters used in the model are summarized in Table 1, based on the review by Abrams et al.[4] To estimate the incremental effect of adding new policies, the extent to which a relevant policy is already in existence is assessed.[4]

1. Expand Cessation Treatment Coverage and Provider Reimbursement—Full coverage of treatment leads to relative increases of 60% in pharmacologic treatment use, 100% in behavioral treatment use, and 125% in pharmacologic treatment and behavioral treatment use among smokers who make a quit attempt (see Table 1). It is estimated that 50% of those who use pharmacologic treatment or behavioral treatment as a result of the policy make a quit attempt that would not otherwise have been made, and that full treatment coverage policies yield the same TxEff as unsubsidized use. Reasonable ranges for each of the parameters are between 50% and 150% of the effect sizes. Taking into account the percentage of smokers already with insurance coverage for smoking cessation treatment, the limits on treatments covered, and the limited awareness of coverage, 20% of smokers are estimated to be effectively

fully covered for the full range of evidence-based pharmacologic treatments and behavioral treatments.[4]

2. Mandate Adequate Funding for the Use and Promotion of Evidence-Based State-Sponsored Telephone Quitlines—Unlike with studies of treatment coverage, the effects of quitline policies on usage did not appear to be related to initial levels, and were presented in terms of percentage point changes. A well-publicized, multisession proactive quitline, where at least one evidence-based medication is provided at no cost to eligible adult smokers, was estimated to attract a maximum of 4% of smokers[4] (with bounds of 2% and 6%). With 40% of smokers making a quit attempt, this estimate translates to 10% (with bounds of 5% and 15%) of those making a quit attempt. Of these, it is estimated that 50% (or 5% of those making a quit attempt) would not have otherwise made a quit attempt and 20% (or 2% of those making a quit attempt) will not use pharmacologic treatment even though offered at no cost.[4] Based on these estimates, no-cost quitlines generate a 12.5% relative increase in quit attempts, (i.e., [10% of people making a quit attempt * 50% who otherwise would not have made an attempt] / [40% of smokers who make a quit attempt each year] = 12.5%). TxEff stays at 1.6 times that of NoEBT for those who use the quit line only, and at 3 times that of NoEBT for those who use the quitline and pharmacologic treatment. It is estimated that 25% of smokers effectively have access to a quitline that is well publicized and provides no-cost pharmacologic treatment.[24]

3. Support healthcare systems changes to prompt, guide, and incentivize tobacco treatment—While an ideal clinical intervention would include all of the 5A's—Ask, Advise, Assess, Assist, and Arrange—evidence is lacking on the specific effect when all components, especially follow-up, are included. Therefore, brief clinician interventions lasting 3–10 minutes were considered, with follow-up addressed below as a promising policy strategy. Implementing training and reminders for clinicians would increase the percentage of smokers who receive advice from a healthcare provider by 20 percentage points, with ranges of 10% to 30%.[4] When brief interventions are implemented, the quit rate is estimated to increase by 60%, through a 60% increase in quit attempt (range: 40% to 100%). In the absence of other policies, it is assumed that there is no change in the proportion of TxUse and TxEff.

Estimates of the extent to which brief interventions are already delivered were derived from the 2003 CPS-TUS.[10] About 70% of smokers saw a healthcare provider in the last year but only 60% of those were actually advised to quit smoking, consistent with other estimates.[4] Thus, only 42% of smokers (60% of the 70% who saw a provider) were advised to quit in the last year. Of those, 60% were only advised to quit (e.g., less than a 3-minute intervention). It is estimated that the effectiveness of interventions administered to this group could be improved by 60% (range: 40% to 80%) if clinical practice could be improved through training and reminder systems.

4. Support and promote evidence-based treatment via the Internet—No studies of public policy featuring web-based cessation programs were found. Intuitively, uniform quality control approaches recommended for use by state quitlines could be expanded to cover online services as well. Moreover, the research community could establish and widely disseminate ratings (similar to *Consumer Reports*®) of objectively measured website effectiveness.[4] However, there are no published data regarding effectiveness of policies related to web interventions, either in terms of driving smokers to the websites, or in terms of a policy's ability to generate quit success. With levels of use at about 1.5% in 2003, it was conservatively estimated that improved web-based treatment would increase behavioral treatment use by 2.5%, and that 40% of those (1% of those making a quit attempt) would be encouraged to use pharmacologic treatment and 60% of those would not, and half of each of these groups would be smokers attempting to quit for the first time. Ranges were 50% and 150% of effect sizes.

Based on published studies of some of the more successful websites,[4] use of evidence-based websites was estimated to have a TxEff 60% higher than NoEBT, the same as for behavioral treatment. No program currently monitors the quality of online cessation programs.

5. Improve individually tailored, stepped care approaches and the long-term effectiveness of evidence-based treatments—Coordinated treatment models to reduce post-treatment relapse and improve long-term treatment effectiveness might include those that extend treatment and ensure continuity of care over time, coordinate multiple types and modalities of treatment using tailoring or stepped care algorithms, or offer timely or sustained follow-up tailored to the unique needs of smokers who relapse. The effects of this kind of policy are largely speculative given the lack of currently available evidence. It was conservatively estimated that extended treatment would double the effectiveness rate of existing treatments, more specifically reducing the relapse rate (and or recycling) in the first year through a 100% increase in the effectiveness of pharmacologic treatment, behavioral treatment, and combined pharmacologic treatment and behavioral treatment relative to NoEBT (PT effectiveness$_{new}$ = PT effectiveness$_{old}$ +100%* (PT effectiveness$_{old}$ − NoEBTeffectiveness). Sensitivity analysis was conducted at 50% and 150%.

6. Interacting effects of policies implemented in tandem—When quitlines offering additional free pharmacologic treatment are implemented in conjunction with treatment coverage policies, the two policies may overlap, cancelling out the beneficial effects of one since both provide cost-free behavioral treatment and pharmacologic treatment. However, some smokers may prefer the format of a free quitline to behavioural treatment through the healthcare system, and some smokers calling quitlines may not be covered by any type of insurance. When both policies are implemented, the percentage increase in treatment use from quitlines and treatment coverage policy was assumed to be reduced by 25% to account for this overlapping effect. When clinician interventions are added to treatment coverage, web-based policies, and quitline policies, the increase in quit attempts from the clinician interventions was also reduced by 25% to account for the potentially overlapping effect on new quit attempts of the three policies. No overlap was assumed with the effect of web policies and the effect of either quitline or treatment coverage policies, although conceivably they could act either as a complement or as a substitute for each of those policies.

When quitline and treatment coverage policies are combined with healthcare system supports for brief clinician interventions, they may create synergies through better coordination of care. With the removal of financial, informational, and convenience barriers to smoking cessation treatment for patients, healthcare providers are more likely to encourage treatment use. While evidence is lacking on these effects, it was conservatively estimated that TxUse increases by 10% (with ranges of 0% to 20%) when multiple cessation treatment policies are implemented in tandem. Improvements in treatment effectiveness through improved continuity of care can also be expected to have a synergistic effect with policies encouraging evidence-based treatment. Consequently, the improved effectiveness was applied to the new treatment uses as well as previous users, assuming that all those using evidence-based treatment are affected.

RESULTS

Baseline Scenario

Data for the baseline scenario are presented in Table 2. Based on the 2003 TUS-CPS data, 40.5% of smokers aged ≥25 years were found to make at least one quit attempt in any given year. Of those, 68.6% were quit attempts with NoEBT, 27.8% of quitters use one or more forms of pharmacologic treatment, 1.2% use one or more forms of behavioral treatment, and 2.3% use combined pharmacologic treatment and behavioral treatment. Using these estimates for

the "baseline scenario", the PQR is computed as 4.3% per year. This PQR is comparable to the 4.2% estimated annual 2003 quit rate suggested by Burns et al.,[23] thereby providing validity for the model.

1. Expand Cessation Treatment Coverage and Provider Reimbursement—The effects on treatment coverage were directly on treatment use, taking into account that 20% of smokers are already effectively covered by a treatment coverage policy. As shown in Table 2, the model projected that a well-publicized policy that provides full coverage for evidence-based behavioral treatments and pharmacologic treatments would increase pharmacologic treatment use to 41.2% (with a range of 34.5%–47.8%), behavioral treatment use to 2.2% (1.7%–2.7%), and pharmacologic treatment and behavioral treatment use to 4.7% (3.5%–5.9%). quit attempts were projected to increase by half the increase in treatment use to 48.8% (42.6%–59.3%) with the PQR projected to increase to 5.9% (4.9%–7.6%).

Without current policies in place, the percentage increase was estimated to be 20% greater for TxUse, yielding a PQR of 6.4%, a 50% increase over the baseline (not shown). To validate the model, this increase without current policies in place was compared to results from studies that examine treatment coverage relative to a control. The 50% relative increase in PQR projected by the model is very close to the results in controlled studies,[5,25,26] lending confidence to the predictions.

2. Mandate Adequate Funding for the Use and Promotion of Evidence-Based Telephone Quitlines—Taking into account that 25% of smokers already have access to a quitline, the model projected that a well-publicized quitline with free NRT would increase behavioral treatment use by 1.5 percentage points from 1.2% to 2.7% (2.0%–3.5%), and pharmacologic treatment and behavioral treatment use from 2.3% to 8.1% (5.3%–11.3%). Quit attempts are projected to increase from 40.5% to 44.1% (41.4%–48.9%) and the PQR is projected to increase from 4.3% to 5.1% (4.6%–6.0%). When the quitline and coverage policy are both implemented (with pre-existing policies), the PQR was projected to increase to 6.2% (5.3%–7.6%).

3. Support healthcare systems changes to prompt, guide, and incentivize tobacco treatment—Taking into account that 42% of smokers were advised to quit, 60% of whom could have effectiveness improved by 60% through improved clinical practice, education and reminders for clinicians to deliver brief interventions was estimated to increase quit attempts by almost 40% from 40.5% to 56.4% (45.3%–71.7%) with the proportion using each form of treatment unchanged. The PQR increased from 4.3% to 6.0% (4.8%–7.6%), a 39% relative increase.

4. Support and promote evidence-based treatment via the Internet—A policy to support and promote the use of effective websites was estimated to more than double behavioral treatment use from 1.2% to 2.7% (2.0%–3.5%) and combined behavioral treatment and pharmacologic treatment use from 2.3% to 3.3% (2.8%–3.8%). Implementation of the policy was projected to increase quit attempt from 40.5% to 41.8% (41.1%–42.4%) and to increase the PQR from 4.3% to 4.5% (4.4%–4.7%).

5. Improve individually tailored, stepped care approaches and the long-term effectiveness of evidence-based treatments—The model was also used to consider the impact of a policy that would enact comprehensive, coordinated changes in the delivery of cessation treatment to promote cessation and prevent relapse. This policy scenario yielded estimates of the effectiveness of evidence-based treatments that were twice that of the baseline levels relative to NoEBT. Under such a scenario, the PQR is anticipated to increase from 4.3% to 5.4% (4.9%–6.5%), a 26% increase over the baseline scenario.

6. Interacting Effects of Policies Implemented in Tandem—Taking into account the policies already in place for the U.S. smoking population, including all the policies discussed above and allowing for synergies as well as offsetting effects, the model estimated that quit attempt increase from 40.5% per annum for the population to 60.5% (48.6%–77.6%). TxUse increased from 27.8% to 39.9% (34.5%–53.2%) for pharmacologic treatment alone, from 1.2% to 4.8% (2.8%–6.7%) for behavioral treatment use alone, and from 2.3% to 10.0% (5.5%– 13.0%) for pharmacologic treatment and behavioral treatment. The PQR increased from 4.3% to 10.9% (6.6%–21.7%), or 2.5 times above the baseline scenario. In the absence of policies already in place, the complete set of policies was projected to increase the PQR to 12.9% (7.5%–27.4%), or three times above the baseline scenario. In the absence of the two policies without a solid evidence base (web-based programs, tailored/stepped care approaches), the PQR was still estimated to increase from 4.3% to 7.6% (5.6%–11.0%) with current policies in place and to 8.9% (6.3%–13.6%) in the absence of currently implemented policies.

CONCLUSION

Simulation modeling was used to examine the impact of five cessation treatment policies on population quit rates. When all five policies are implemented in tandem, the annual population quit rate was projected to double from 4.3% to 7.6%. Taking into consideration the effects of existing policies already in place, smoking prevalence would fall by 3.3 percentage points below what it would have been in the absence of the new comprehensive policy. This translates into a 19% relative reduction in adult smoking prevalence in the U.S. from its current level of 20.5%[27] to 17.2%. Without existing cessation policies, smoking prevalence is expected to fall by 4.6% to 15.9%, or 29% in relative terms. Similar absolute reductions have been observed in some real-world settings that have applied a combination of cessation treatment strategies.[7]

In addition to modeling the impact of policies with a strong evidence base, two "promising policies" were also considered related to evidence-based computerized treatment via the Internet and individually tailored, stepped care approaches to increase the long-term effectiveness of evidence-based treatments. While the parameters used to model the impact of these promising policies are not yet strongly supported by empirical studies, modeling illustrates the potential impact of these policies and substantiates previous calls for additional research in both areas.

Simulation modeling is also valuable in illustrating potential synergies and interactions among policies, especially given the limited evidence from in vivo studies on combined policies and the challenges of conducting real-world studies where counterfactual situations are not possible to implement. Synergies were considered from clinician intervention and increased access to treatments, implying that the effects of those policies are enhanced when combined. However, the effects of well promoted quitlines with no-cost NRT and expanded treatment coverage are considered duplicative, implying that the effects of these two policies partially cancel each other out.

The validity of any model depends on the veracity of its assumptions and the data used to estimate key parameters. The strength of evidence varies across the policies examined and across studies. Interventions delivered by clinicians, quitline services, and treatment coverage policies have a relatively strong evidence base. However, the validity of the predictions depends on whether the policies can be implemented in broader, real-world settings. In particular, clinician interventions will require that incentives and training can be provided to ensure faithful adoption of the "5 As". Further, the level of treatment effectiveness may be lower in real-world settings. While evidence of policy effectiveness was based on studies of those policies where available, there is controversy regarding the effectiveness of

pharmacotherapy in the general population.[28,29] In addition, the estimates of the initial levels of treatment use and quit attempts were limited by the lack of published studies or data sets to examine treatment use for individuals making multiple quit attempts, even for a single year. Limitations are discussed in more detail in Abrams et. al.[4]

The analysis focused on the first year following the implementation of the policies considered. Future reductions in smoking rates might be expected if policies are maintained.[30] However, the magnitude of the policy effects may be somewhat dampened over time since smokers—especially those motivated to quit—are more likely to participate in the first year and the proportion of smokers who have previously failed in treatment grows over time. However, relapse rates after the first year may also be reduced as a result of changes in the healthcare delivery system.

In sum, results from the simulation modeling demonstrate that cessation treatment policies could have a major impact on smoking rates, reducing smoking prevalence from its current rate of 20.5% to 17.2% in the first year with continued reductions in future years. For policies to be optimally effective, they must support a comprehensive, seamless system of care management at every level of societal structure (e.g., government, private sector, state and local public health, health plans, and healthcare settings). Smokers are often unaware of available cessation treatments, and there are widespread misconceptions about the safety and efficacy of NRT among smokers.[31] In addition to the policies discussed above, the number of smokers reached by a policy or intervention can be increased by deploying novel, persistent cues to action; by designing media campaigns to increase consumer awareness of the range of best practices available for cessation; by increasing consumers' ability to identify which programs meet best-practice guidelines; and by helping smokers to understand the cessation process.

Acknowledgments

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Table 1

Effect sizes for cessation treatment policies (lower, upper bounds)

POLICY	% of population previously implemented	NoEBT use	PT use only	BT use only	Both PT and BT use	% of new users making a new quit attempt	NoEBT Effectiveness[a]	PT Effectiveness[a]	BT Effectiveness[a]	PT w/BT Effectiveness[a]	Quit attempts
Baseline scenario		68.6%	27.8%	1.2%	2.3%		8.0%	16.0%	12.8%	24.0%	42.0%
Treatment coverage[b]	20.0%	—	160% (130%, 190%)	200% (100%, 300%)	225% (112%, 337%)	50.0% (25%, 75%)	NC	NC	NC	NC	NC
Proactive quitlines with no-cost NRT[c]	25.0%	—	NC	2PP (1PP, 3PP)	8PP (4PP, 12PP)	50.0% (25%, 75%)	NC	NC	NC	NC	NC
Web support[c]	0.0%	NC	NC	1.5PP (0.5PP, 1.5PP)	1PP (0.5PP, 1.5PP)	50.0% (25%, 75%)	NC	NC	NC	NC	NC
Healthcare provider intervention[b]	60.0%	NC	NC	NC	NC	NC	NC	NC	NC	NC	160.0%
Relapse prevention[d]	NA	NC	NC	NC	NC	NC	NC	100.0% (50%, 150%)	100.0% (50%, 150%)	100.0% (50%, 150%)	NC

BT, behavioral therapy; NA, not applicable; NC, no change; NoEBT, no evidence-based treatment; PT, pharmacotherapy

[a] Adjusted to take into account multiple quit attempts (see text)

[b] Effect size is in terms of percentage changes from the baseline scenario in relative terms

[c] Effect size is in terms of percentage point changes from the baseline scenario

[d] Effect size is in terms of percentage change in treatment effectiveness relative to NoEBT

Table 2

The effect of cessation treatment policies on treatment use, treatment effectiveness, quit attempts and the population quit rate

	NoEBT (%)	PT (%)	BT (%)	PT+BT (%)	Average quit Success[a] (%)	Quit attempts[b] (%)	PQR (%)	% change in PQR from baseline scenario[c]
Baseline scenario[a]								
Treatment use	68.6	27.8	1.2	2.3	10.7	40.5	4.3	
Individual policies								
1. Treatment coverage	52.0	41.2	2.2	4.7	12.1	48.8	5.9	37.4
Lower bound	60.3	34.5	1.7	3.5	11.4	42.6	4.9	12.5
Upper bound	43.6	47.8	2.7	5.9	12.9	59.3	7.6	77.0
2. Quitlines with free NRT	61.4	27.8	2.7	8.1	11.7	44.1	5.1	19.1
Lower bound	64.9	27.8	2.0	5.3	11.2	41.4	4.6	7.3
Upper bound	57.4	27.8	3.5	11.3	12.2	48.9	6.0	38.4
3. Clinician intervention	68.6	27.8	1.2	2.3	10.7	56.4	6.0	39.2
Lower bound	68.6	27.8	1.2	2.3	10.7	45.3	4.8	11.9
Upper bound	68.6	27.8	1.2	2.3	10.7	71.7	7.6	77.0
4. Web support	66.1	27.8	2.7	3.3	10.9	41.8	4.5	5.3
Lower bound	67.4	27.8	2.0	2.8	10.8	41.1	4.4	2.1
Upper bound	64.9	27.8	3.5	3.8	11.0	42.4	4.7	8.0
5. Relapse prevention	68.6	27.8	1.2	2.3	13.3	40.5	5.4	24.9
Lower bound	68.6	27.8	1.2	2.3	12.0	40.5	4.9	12.5
Upper bound	68.6	27.8	1.2	2.3	16.0	40.5	6.5	49.9
Combined policies								
1+2+3	47.9	40.0	3.2	8.9	20.7	59.5	7.6	76.1
Lower bound	58.5	34.5	2.1	5.0	10.1	48.1	5.6	29.8
Upper bound	29.3	54.7	4.3	11.7	39.3	76.1	11.0	154.8

	NoEBT (%)	PT (%)	BT (%)	PT+BT (%)	Average quit Success[a] (%)	Quit attempts[b]	PQR (%)	% change in PQR from baseline scenario[c]
All policies	45.3	39.9	4.8	10.0	18.0	60.5	10.9	152.8
Lower bound	57.2	34.5	2.8	5.5	13.7	48.6	6.6	53.6
Upper bound	27.1	53.2	6.7	13.0	28.0	77.6	21.7	403.0

BT, behavioral therapy; NA, not applicable; NC, no change; NoEBT, no evidence-based treatment PQR, population quit rate; PT, pharmacotherapy

[a] Quit success is defined as the percentage of the smoking population making a quit attempt who maintain abstinence for at least 6 months, including those who make more than one quit attempt.

[b] Quit attempts refers to the percentage of the smoking population, on an annual basis, who intentionally abstain from smoking for at least 24 hours. Included in this figure are people who make more than one attempt.

[c] Status quo refers to the quit rate with current policies in effect