Cost effectiveness analysis of smoking cessation interventions

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Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
The authors studied technologies to aid smoking cessation. The technologies, which were used both alone and in combination, were brief advice, telephone counselling, proactive telephone counselling, nicotine replacement therapy (NRT) and bupropion.

Brief advice consisted of a stop smoking message plus information and a follow-up visit.

Proactive telephone counselling involved counsellors actively calling clients using individually tailored call-back schedules that matched clients' personal circumstances and identified peak relapse risk periods.

NRT was a 10-week treatment comprising one prescription of 21-mg patches for 6 weeks, a second prescription of 14-mg patches for 2 weeks, and a final prescription of 7-mg patches for 2 weeks.

Bupropion was a 9-week course comprising an initial prescription of 30 tablets (150 mg) and a repeated prescription of 90 tablets.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised individuals who smoked, but no further details were provided.

Setting
The setting was primary care. The economic study was carried out in Australia.

Dates to which data relate
The effectiveness and resource use evidence related to studies published between 1993 and 2004. The price year was 2003.

Source of effectiveness data
The effectiveness data were derived from a review and synthesis of published studies.

Modelling
A modelling approach was used to estimate the cost-effectiveness. It encompassed a stepwise approach to compare the incremental costs and effects of each treatment alternative.
Outcomes assessed in the review

The primary outcomes assessed were the percentage quit rate and the odds ratio (OR) of the quit rate in relation to the comparator of interest. The outcomes were based on either self-reported point prevalence or the continuous quit rate at 6 months.

Study designs and other criteria for inclusion in the review

The authors searched for studies using the terms "smoking cessation", "nicotine", "bupropion", "smok*", "tobacco" and "nicotine replacement therapy". The results were then limited to randomised controlled trials, systematic reviews, meta-analyses or economic evaluations published in English in peer-reviewed journals.

Sources searched to identify primary studies

The search covered the MEDLINE, EconLit, EMBASE and PsycINFO online databases. It was carried out in 2003.

Criteria used to ensure the validity of primary studies

Inclusion was limited to randomised controlled trials, systematic reviews, meta-analyses or economic evaluations.

Methods used to judge relevance and validity, and for extracting data

Not reported.

Number of primary studies included

Nine studies were included in the review, although many of these were meta-analyses and systematic reviews that encompassed other analyses.

Methods of combining primary studies

As many estimates were obtained from meta-analyses, the authors appear not to have combined the studies further.

Investigation of differences between primary studies

The authors provided a useful discussion of differences between the primary studies and how this has led to some uncertainty as to the most cost-effective alternatives.

Results of the review

No intervention had a quit rate of 4% (range: 3 to 5).

Brief advice had a quit rate of 6% (range: 5 to 7) and an OR in comparison with no intervention of 1.69 (95% confidence interval, CI: 1.45 to 1.98).

Telephone counselling had a quit rate of 9% (range: 8 to 10) and an OR in comparison with brief advice of 1.56 (95% CI: 1.38 to 1.77).

NRT plus counselling had a quit rate of 17% (range: 16 to 18) and an OR in comparison with counselling of 1.74 (95% CI: 1.64 to 1.86).

NRT plus proactive telephone counselling had a quit rate of 27% (range: 20 to 37) and an OR in comparison with NRT plus counselling of 1.6 (95% CI: 1.16 to 2.21).

Bupropion plus counselling had a quit rate of 19% (range: 16 to 23) and an OR in comparison with placebo plus
counselling of 1.97 (95% CI: 1.67 to 2.34).

Bupropion plus proactive telephone counselling had a quit rate of 32% (range: 31 to 33) and an OR in comparison with bupropion plus counselling of 1.47 (95% CI: 1.41 to 1.53).

Bupropion plus NRT with counselling had a quit rate of 19% (range: 18 to 20) and an OR in comparison with no intervention of 1.36 (95% CI: 1.26 to 1.47).

Methods used to derive estimates of effectiveness
The authors used an assumption to support their analysis.

Estimates of effectiveness and key assumptions
The authors assumed a 100% compliance rate. This assumption was tested in the sensitivity analysis.

Measure of benefits used in the economic analysis
The summary measure of health benefit was the quit rate. This information was taken directly from the review of effectiveness evidence.

Direct costs
Resource use was identified from up to 10 of the largest studies identified during the review of effectiveness evidence and was supplemented with Australian treatment guidelines. Local prices were applied to the resource use identified (taken from the Pharmaceutical Benefits Schedule and Medical Benefits Schedule). The authors stated that a government perspective was adopted. The hourly cost of telephone counselling was based on initial consultation fees for social workers and it included an estimate of salaries, benefits and infrastructure costs. The prices were reflated to 2003 prices using the Consumer Price Index. The costs were estimated over a 6-month period in line with the outcomes and discounting was not, therefore, required.

Statistical analysis of costs
The costs were treated deterministically.

Indirect Costs
The indirect costs were not relevant to the perspective of the study.

Currency
Australian dollars (AUD).

Sensitivity analysis
One-way and multi-way sensitivity analyses were used to examine the impact of uncertainty in resource use, prices and outcomes on the costs of treatment. The review of the literature was used to determine the ranges used within the sensitivity analysis. The assumption of complete compliance was also tested during the sensitivity analysis.

Estimated benefits used in the economic analysis
All quit rates are cited after adjustment for the 4% natural quit rate.

Brief physician advice had a quit rate of 2%. 
Telephone counselling had a quit rate of 5%.
NRT with counselling had a quit rate of 13%.
NRT with proactive telephone counselling had a quit rate of 23%.
Bupropion with counselling had a quit rate of 15%.
Bupropion with proactive telephone counselling had a quit rate of 28%.
NRT plus bupropion with counselling had a quit rate of 15%.

Cost results
The costs are reported per 100 individuals treated.
Brief physician advice cost AUD 3,820 per treatment.
Telephone counselling cost AUD 3,029 per treatment.
NRT with counselling cost AUD 41,163 per treatment.
NRT with proactive telephone counselling cost AUD 42,668 per treatment.
Bupropion with counselling cost AUD 35,278 per treatment.
Bupropion with proactive telephone counselling cost AUD 36,783 per treatment.
NRT plus bupropion with counselling cost AUD 69,842 per treatment.

Synthesis of costs and benefits
The incremental cost per quitter (incremental cost divided by the quit rate multiplied by 100) was AUD 4,767 for NRT with counselling versus telephone counselling alone, AUD 151 for NRT with proactive counselling versus NRT with counselling, and AUD 14,340 for NRT plus bupropion with counselling versus NRT with counselling.

Telephone counselling was shown to dominate (better outcomes at a reduced cost) brief physician advice.

The incremental cost per quitter was AUD 3,225 for bupropion with counselling versus telephone counselling alone, and AUD 116 for bupropion plus proactive telephone counselling versus bupropion with counselling. NRT plus bupropion with counselling was shown to dominate bupropion plus counselling.

The sensitivity analyses revealed that telephone counselling remained cost-effective across most scenarios and that bupropion was more cost-effective than NRT across most scenarios.

Authors’ conclusions
"Telephone counselling appeared to be the most cost-effective smoking cessation intervention as a first-line approach although it may not be effective for all smokers wanting to quit.”

CRD COMMENTARY - Selection of comparators
The authors chose effective technologies that encompassed the two main ways (behavioural and pharmacological) of aiding smoking cessation. Readers will need to assess whether these comparators are relevant to their own setting.
Validity of estimate of measure of effectiveness
The authors carried out a systematic review of the smoking and smoking cessation related literature. They clearly identified the outcomes that informed their search, the search terms and sources. Quit rates were adjusted to correct for the natural rate of cessation, a potential confounding factor. Meta-analysis results were used when possible and the authors provided a clear report of which estimates had come from which sources. More information could have been provided about the study population and sample, for instance were individuals known to smoke targeted to receive help or did individuals self select by presenting to primary care with an expressed wish to give up smoking. This factor might have influenced the effectiveness results. Finally, an interesting statistic would have been the number of times that individuals had tried to quit, as this might also have been a potential confounding factor; this factor was highlighted in the authors’ discussion.

Validity of estimate of measure of benefit
The quit rate was used as the summary measure of health benefit. This provides a measure that is easily comparable with other technologies used to assess smoking cessation or the cessation of other health impacting activities.

Validity of estimate of costs
The cost analysis was carried out from the perspective of the government and elements relative to this perspective were included. For instance, the authors explicitly reported excluding co-payments by individuals and including the costs of training, salaries, benefits and infrastructure cost. The authors could have been more explicit about the time horizon of the study as this may have a significant impact on the results. Extensive sensitivity analyses demonstrated the robustness of the results to changes in costs.

Other issues
The authors did not make specific comparisons of their results with other studies although, during their background discussion, they did highlight the uncertainties surrounding cost-effectiveness due to conflicting results from previous work. The issue of generalisability was not explicitly addressed, although this was greatly improved by the use of extensive sensitivity analysis and including resource use from a range of studies. The methods of the review and associated results were clearly set out and were transparent. The conclusions were an accurate reflection of both the results presented and the scope of the study. A number of limitations were discussed. For example, the assumption that all smokers are a homogeneous treatment population and the use of single studies to inform some effectiveness estimates where limited evidence was available.

Implications of the study
The authors discussed the relative merits for funding efforts of smoking cessation efforts and reported that investment in proactive telephone counselling would be a cost-effective strategy. Further work on comprehensive economic evaluations of all approaches to smoking cessation is recommended. Future work could also consider the individual patient perspective.

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Bibliographic details

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17073223

Other publications of related interest
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**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
Antidepressive Agents, Second-Generation /therapeutic use; Bupropion /therapeutic use; Cost-Benefit Analysis; Counseling /economics; Health Promotion /economics /methods; Humans; New South Wales; Nicotine /therapeutic use; Nicotinic Agonists /therapeutic use; Program Evaluation; Smoking Cessation /economics /methods

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