The cost effectiveness of pharmacological smoking cessation therapies in developing countries: a case study in the Seychelles
Gilbert A R, Pinget C, Bovet P, Cornuz J, Shamlaye C, Paccaud F

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 addition of five pharmacological smoking cessation therapies to physician counselling was examined. The therapies were nicotine gum (4 mg), nicotine patch (7 - 21 mg), nicotine nasal spray (10 mL), nicotine inhaler, and bupropion (150 mg).

Type of intervention
Primary and secondary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised a hypothetical cohort of male and female smokers aged 20 to 64 years.

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

Dates to which data relate
The effectiveness data were derived from studies published between 1990 and 2002. No dates for resource use were explicitly reported. The costs were estimated in 2002 and 2003, but the price year was not reported.

Source of effectiveness data
The effectiveness evidence came was derived from a synthesis of completed studies.

Modelling
A published Markov model was used to assess the clinical and economic end points in two hypothetical cohorts of individuals aged 20 to 64 years. The cohorts corresponded to those receiving cessation counselling alone from a physician, and those receiving the same counselling plus each of the five pharmacotherapies. Other details of the decision model were not reported.

Outcomes assessed in the review
The outcomes estimated from the literature were:
the natural cessation rate among smokers;
the odds ratio (OR) for continued cessation after one year, as compared with no intervention;
the proportion of smokers who stop treatment after the first or second month;
the lifetime probability of relapse after one year of abstinence;
the probability of current smokers being truly prepared to make a serious quit attempt; and
the mortality effects of smoking cessation.

Study designs and other criteria for inclusion in the review
It was not stated whether a systematic review of the literature was undertaken to identify primary studies. The design of the sources used was not provided. Some data were not available for the Seychelles, so data obtained from other countries were used instead.

Sources searched to identify primary studies
Not stated.

Criteria used to ensure the validity of primary studies
Not stated.

Methods used to judge relevance and validity, and for extracting data
Not stated.

Number of primary studies included
Fourteen primary studies provided the data.

Methods of combining primary studies
Not stated.

Investigation of differences between primary studies
Not stated.

Results of the review
The natural cessation rate among smokers was 2.5% (range: 1 - 4).

The OR for continued cessation after one year was:
1.73 (range: 1.46 - 2.03) with counselling alone, compared with no intervention;
1.66 (range: 1.52 - 1.82) with nicotine gum, compared with counselling alone;
1.80 (range: 1.61 - 2.01) with nicotine patch, compared with counselling alone;
2.35 (range: 1.63 - 3.38) with nicotine spray, compared with counselling alone;
2.14 (range: 1.44 - 3.18) with nicotine inhaler, compared with counselling alone; and
2.51 (range: 1.5 - 2) with bupropion, compared with counselling alone.

The rate of smokers who stop treatment was 50% (range: 40 - 60) after the first month and 20% (range: 15 - 25) after the second month.

The lifetime probability of relapse after one year of abstinence was 35% (range: 10 - 50).

The probability of current smokers being truly prepared to make a serious quit attempt was 25%.

The excess mortality risk declined significantly within the first years after cessation. The mortality rate of a former smoker finally rejoined that of never smokers approximately 20 years after quitting.

Measure of benefits used in the economic analysis
The summary benefit measure used was the life-years saved (LYS) with each pharmacological smoking cessation therapy in comparison with counselling alone. The LYS were derived using a modelling approach and an annual discount rate of 3% was applied.

Direct costs
Discounting was not relevant because of the short time horizon considered (treatment was assumed to last 3 months). The unit costs were presented separately from the quantities of resources used for most items. The health services included in the economic evaluation were pharmacological smoking cessation therapies and physician time for counselling and treatment. The cost/resource boundary of the third-party payer was adopted. Resource use was estimated mainly on the basis of authors' assumptions. The costs were derived from US retail prices for pharmacological smoking cessation therapies and from average monthly wages for providers' time (including allowances and benefits). The costs were estimated in 2002 and 2003, but the price year was not explicitly reported.

Statistical analysis of costs
The costs were treated deterministically.

Indirect Costs
The indirect costs were not considered.

Currency
The costs were estimated in Seychelles rupees, and then converted into US dollars ($). The conversion rate was Seychelles rupees 5 = $1.

Sensitivity analysis
A multivariate sensitivity analysis was performed. This not only examined the influence of some model inputs (e.g. discount rate, treatment costs, and provider salaries), but also extended the relevance of the results to other developing countries. The sensitivity analysis was carried out on a hypothetical 45-year-old male smoker. The alternative discount rates were 0, 5 and 10%. Treatment price lists were considered as low as 12.5% of the base-case (US) prices. Lower physician salaries were also considered.

Estimated benefits used in the economic analysis
The estimated LYS with each smoking cessation therapy were not reported.

Cost results
The total and incremental costs of each smoking therapy were not reported.

**Synthesis of costs and benefits**

Incremental cost-effectiveness ratios (ICERs), namely the incremental cost per LYS, were calculated to combine the costs and benefits of the smoking cessation therapies in comparison with counselling alone.

In men (women), the ICER for nicotine gum was $4,385 ($7,894) in the age class 20 - 34 years, $3,675 ($5,753) in the age class 35 - 49 years, and $4,870 ($6,097) in the age class 50 - 64 years.

In men (women), the ICER for nicotine patch was $2,341 ($4,214) in the age class 20 - 34 years, $1,962 ($3,071) in the age class 35 - 49 years, and $2,600 ($3,255) in the age class 50 - 64 years.

In men (women), the ICER for nicotine spray was $5,430 ($9,777) in the age class 20 - 34 years, $4,551 ($7,124) in the age class 35 - 49 years, and $6,032 ($7,551) in the age class 50 - 64 years.

In men (women), the ICER for nicotine inhaler was $5,069 ($9,125) in the age class 20 - 34 years, $4,248 ($6,650) in the age class 35 - 49 years, and $5,630 ($7,048) in the age class 50 - 64 years.

In men (women), the ICER for bupropion was $1,564 ($2,817) in the age class 20 - 34 years, $1,311 ($2,052) in the age class 35 - 49 years, and $1,738 ($2,175) in the age class 50 - 64 years.

Therefore, the pharmacological smoking cessation therapies were more effective in men than in women, and bupropion was the most cost-effective option. The ICER was lowest for men and women in the age class 35 - 49 years.

The multivariate sensitivity analysis showed that treatment price and discount rate had the greatest impact on the results. For example, assuming the wages of a Seychelles general practitioner (GP) and a 3% discount rate, the cost per LYS with nicotine gum was over six times higher at 100% US treatment prices than at 12.5% treatment prices ($3,712 versus $599).

Based on these same assumptions, the cost per LYS for bupropion was 8.6 times higher at 100% versus 12.5% US prices ($1,952 versus $227). Assuming the wages of a Seychelles GP and 50% treatment prices, the cost per LYS with the nicotine patch was 11.4 times higher when applying a 10% discount rate than when applying a 0% discount rate ($5,219 versus $458).

**Authors’ conclusions**

Pharmacological smoking cessation therapies, particularly bupropion, nicotine patch and nicotine gum, were cost-effective in comparison with physician counselling alone in the Seychelles. However, the authors stressed that affordability represents a key issue in developing countries.

**CRD COMMENTARY - Selection of comparators**

The selection of the comparators was appropriate because physician counselling represented the standard approach for enhancing smoking cessation. The five interventions under evaluation represent commonly used pharmacological smoking cessation therapies. You should decide whether they are valid comparators in your own setting.

**Validity of estimate of measure of effectiveness**

The effectiveness evidence came from published studies. However, it was unclear whether a systematic review of the literature was undertaken. In fact, it appears that the primary studies have been identified selectively. No information on the design of the primary sources was provided, and some data came from studies that did not reflect the Seychelles setting. Therefore, it is not possible to assess the validity of the primary studies. The methods used to extract and then combine the primary estimates were not explicitly reported. In some cases, conservative assumptions were made. The issue of uncertainty in the clinical data was not explicitly addressed in the sensitivity analysis, but the authors stated that the wide OR associated with some treatments (e.g. nicotine spray and inhaler) could result in changes in the ICER.
Validity of estimate of measure of benefit
The summary benefit measure was expected survival. This was appropriate as it represented the most relevant
dimension of health for individuals who quit smoking. Life-years are also comparable with the benefits of other health
care interventions. An appropriate discount rate was applied and its impact on health benefits was investigated in the
sensitivity analysis.

Validity of estimate of costs
The perspective adopted in the study was explicitly reported. As such, all the costs associated with the smoking
cessation therapies were included in the analysis. A breakdown of the cost items was provided, and the costs were
presented separately from the quantities of resources used. This enhances the possibility of replicating the study results.
The authors justified the choice of some cost estimates, which were not available in their own setting. Moreover,
detailed information on the sources used to derive the economic data was provided. Statistical analyses of the costs were
not performed, but the cost estimates were varied widely in the sensitivity analysis. Although the costs were estimated
in December 2002 and April 2003, the price year was not explicitly reported. Resource consumption was mainly based
on authors’ assumptions, which were likely to reflect treatment patterns in the authors’ setting. Overall, the cost analysis
was carried out satisfactorily.

Other issues
The authors reported the results of other economic evaluations of smoking cessation therapies that demonstrated the
cost-effectiveness of such interventions in other settings. The issue of the generalisability of the study results to other
settings was addressed in the sensitivity analyses, where different ranges of prices and discount rates were considered.
The authors noted some limitations of their study. First, there was a lack of data for the Seychelles and other developing
countries, thus requiring the use of data from developed countries. Second, the health benefits to others of a smoker
quitting were not taken into consideration.

Implications of the study
The study results suggested that pharmacological smoking cessation therapies represent good value for money in
developing countries. However, owing to a problem of affordability, health care systems in developing countries can
only finance such interventions if they are made available for purchase at significantly reduced prices. The authors
stated that further research, including formal cessation monitoring, should be carried out to better understand smoking
cessation behaviours in developing countries, as well as motivation to start and stop smoking.

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Bibliographic details
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cessation therapies in developing countries: a case study in the Seychelles. Tobacco Control 2004; 13: 190-195

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Other publications of related interest

Woolacott NF, Jones L, Forbes CA, et al. The clinical effectiveness and cost effectiveness of bupropion and nicotine
replacement therapy for smoking cessation: a systematic review and economic evaluation. Health Technology
Assessment 2002;6(16):1-245.

**Indexing Status**
Subject indexing assigned by NLM

**MeSH**
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