Modeling the cost-effectiveness of a smoking-cessation program in a community pharmacy practice

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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 health technology examined was a smoking-cessation programme conducted in a community pharmacy practice. The programme consisted of pharmacists giving individual advice to patients on gaining support, weight gain and craving control, in addition to one of four alternative smoking-cessation methods (cold turkey, nicotine patches, nicotine gums and bupropion).

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis and cost-utility analysis.

Study population
The study population comprised patients aged 21 to 70 years, who had tried (at least once) to quit smoking.

Setting
The setting was a community pharmacy practice. The economic study was conducted in Virginia, USA.

Dates to which data relate
The effectiveness evidence was gathered from a single study conducted from 1997 to 1999, and a number of studies published between 1991 and 2000. The resource use data were gathered from 1997 to 1999. No price year was explicitly reported.

Source of effectiveness data
The effectiveness data were derived from completed studies and the authors' assumptions. Most of the data for the target population came from a study carried out in Virginia, which provided information on the patients receiving the study intervention (Kennedy and Small, see Other Publications of Related Interest).

Modelling
A decision tree model was constructed to calculate the cost-effectiveness of the smoking-cessation programme (taking into account the four separate methods) in comparison with a self-directed quit attempt, again using one of the four separate methods. The time horizon of the model was one year. The model was deterministic and was populated with data derived from the literature and the main single study.

Outcomes assessed in the review
The health outcomes estimated in the review of the literature were:

the long-term success rate (defined as at least 12 months of continued abstinence) of the smoking-cessation programme and the comparator;

the proportion of patients choosing each smoking-cessation method; and

increases in both life-expectancy due to the smoking-cessation programme, and life-expectancy adjusted for quality of life, among women.

**Study designs and other criteria for inclusion in the review**
The authors did not describe the design of the primary studies identified in the literature review. However, most of the evidence came from a single case series study and data from the Centers for Disease Control and Prevention.

**Sources searched to identify primary studies**
MEDLINE was searched for primary studies, but details of the search were not reported.

**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**
The effectiveness data used in the decision model were derived from 6 primary studies.

**Methods of combining primary studies**
Not stated.

**Investigation of differences between primary studies**
Not stated.

**Results of the review**
The long-term success rate was 25% with the smoking-cessation programme and 3% with the self-directed quit attempt.

Twenty-five per cent of the patients chose cold turkey, 35% nicotine patch, 20% nicotine gum and 20% bupropion.

The increases in life expectancy due to the smoking-cessation programme were 0 years in the age class 20 - 29 years, 3.7 years in the age class 30 - 39 years, 3.8 years in the age class 40 - 49 years, and 3.6 years in the age class 50 years and over. The corresponding increases in life expectancy adjusted for quality of life were 6.60 years (age 20 - 29), 5.93 years (age 30 - 39), 4.7 years (age 40 - 49), and 3.39 years (age 50 years and over).

**Methods used to derive estimates of effectiveness**
The authors made an assumption used in the decision model.
Estimates of effectiveness and key assumptions
It was assumed that all patients enrolled in the smoking-cessation programme would complete it and those who were abstinent at one year would maintain lifelong abstinence. This assumption was made to eliminate the issues of dropouts and relapses.

Measure of benefits used in the economic analysis
The summary benefit measures used in the economic analysis were the incremental success rate obtained with the smoking-cessation programme relative to a self-directed quit attempt, the change in life expectancy, and the variation in quality-adjusted life-years (QALYs). The primary data used to calculate all benefit measures were obtained from published studies, and referred only to women. Life expectancy was discounted at an annual rate of 4% rate, while the QALYs were discounted at an annual rate of 3%.

Direct costs
No discounting was applied because the costs were incurred during one year. The unit costs were reported separately from the quantities of resources used. The health services included in the economic evaluation were cessation products and programme expenses, such as pharmacist time, technician time and paper materials for patient profiles. The programme costs did not include physician visits, start-up costs, or overheads associated with implementing the services. The cost/resource boundary adopted in the study was that of the payer. Resource use was estimated from actual data observed during the case series study conducted from 1997 to 1999 (Kennedy and Small, see Other Publications of Related Interest). The costs of smoking-cessation methods were estimated using the retail prices in Virginia. The price year was not reported.

Statistical analysis of costs
The costs were treated deterministically.

Indirect Costs
The indirect costs were not included in the economic analysis.

Currency
US dollars ($).

Sensitivity analysis
A one-way sensitivity analysis was conducted to test the uncertainty in the value used for the success rate. The authors did not justify their choice of range (15 to 40%).

Estimated benefits used in the economic analysis
The incremental change in the success rate with the smoking-cessation programme, relative to a self-directed quit attempt, was 0.22 for all four treatment options.

The incremental gain in life expectancy and QALYs were reported in the 'Results of the Review' section.

Cost results
The total costs were $138 with no programme, $190 with cold turkey, $344 with nicotine patch, $409 with nicotine gum, and $391 with bupropion.

Synthesis of costs and benefits
The authors combined the costs and benefits by calculating both the average and incremental cost-effectiveness ratios of each smoking-cessation method, relative to the self-directed quit attempt.

The average cost per individual who successfully quit smoking was $4,597 with no programme and $1,312 with the programme. The individual cost of each of the four cessation methods without the programme was $0 with cold turkey, $5,133 with nicotine patch, $6,700 with nicotine gum, and $7,300 with bupropion. The individual cost of each of the four cessation methods with the programme was $760 with cold turkey, $1,376 with nicotine patch, $1,564 with nicotine gum, and $1,636 with bupropion.

The incremental cost per individual who successfully quit smoking using the pharmacological approach versus a self-quit attempt was $236 with cold turkey, $936 with nicotine patch, $1,232 with nicotine gum, and $1,150 with bupropion.

When the programme success rate was lowered to 15%, the range for the expected incremental cost/quit was $433 to $2,258. When the programme success rate was increased to 40%, the range for the expected incremental cost/quit was $141 to $732.

The discounted cost per life-year saved was $0 in the age class 20 - 29 years, $1,418 in the age class 30 - 39 years, $965 in the age class 40 - 49 years, and $720 in the age class 50 years and over.

The discounted cost per QALY saved was $482 in the age class 20 - 29 years, $450 in the age class 30 - 39 years, $475 in the age class 40 - 49 years, and $578 in the age class 50 years and over.

**Authors' conclusions**
The implementation of a smoking-cessation programme among adults was more cost-effective than a self-directed quit attempt from the perspective of the payer in the USA. The cost per quitter appears to have been comparable to those of other vaccination and childhood safety programmes.

**CRD COMMENTARY - Selection of comparators**
The rationale for the choice of the comparator was clear. A self-directed quit attempt was selected as the basic comparator because the authors considered it the conventional approach for those who attempt to stop smoking. All the approaches in which an “aid” was used were considered as interventions. You should decide whether it represents a valid comparator in your own setting.

**Validity of estimate of measure of effectiveness**
The analysis of effectiveness used a review of primary studies. However, the methods and conduct of the review were not reported and the design of the primary studies was not described. The authors only mentioned one primary study, which was based on a case series and did not represent a comparative study. Thus, it was not possible to evaluate the validity of the evidence used in the decision model. The authors did not state how the primary estimates were combined and no details of the study samples were provided. An assumption was also made to simplify the calculations used in the analysis. However, sensitivity analyses were conducted only on one model input (the success rate) and the overall issue of uncertainty was not addressed.

**Validity of estimate of measure of benefit**
Several summary benefit measures were used in the economic analysis. Some were related to the intervention (i.e. success rate), while others were more generalisable (survival and QALYs). However, the benefits were calculated using the results of other studies and then combined with the cost data estimated in the present study. Future benefits were appropriately discounted.

**Validity of estimate of costs**
The perspective adopted in the study was explicitly stated. It appears that all the relevant categories of costs have been included in the analysis, although the authors noted that some costs related to the smoking-cessation programme were not included. The costs and the quantities were reported separately, but the price year was not provided. This makes reflation exercises in other settings difficult. The cost estimates were specific to the study setting and no sensitivity analyses were conducted. The costs were treated deterministically.

**Other issues**

The authors made some comparisons of their findings with those of other studies that evaluated the impact of smoking-cessation programmes in other settings. They also stated that the issue of the generalisability of the study results to other settings was addressed by conducting sensitivity analyses. It is worth noting that only one parameter was varied. Hence, uncertainty still remains on the other model inputs, which may differ in other settings. The authors pointed out two main limitations of their study. First, the effectiveness evidence for the smoking-cessation programme came mainly from a single study that had a very small sample and no control group. Second, the costs of the programme were likely to have been underestimated, although some overestimation in the patients’ costs may have occurred.

**Implications of the study**

The study results suggested that a smoking-cessation programme might represent a very cost-effective intervention when compared with self-directed quit attempts. However, some caution is required when interpreting the study results due to the limitations of the analysis. The authors noted that future studies should be conducted to support their findings.

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**Other publications of related interest**


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