A cost-effectiveness evaluation of single and combined smoking cessation interventions in Texas

Hill A

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 study examined several smoking cessation interventions, including four nicotine replacement therapies (NRTs; gum, patch, inhaler and nasal spray) and three antidepressant medications (Zyban). Combinations of strategies were also considered. The full list of strategies was gum, patch, inhaler, nasal spray, Zyban, Zyban plus gum, Zyban plus patch, and gum plus patch. Zyban was given at a dose of 300 mg/day. Another two antidepressant drugs (clonidine 0.2 mg/day and nortriptyline 50 mg/day) were included in the analysis, but their cost-effectiveness was not fully assessed because they have significant side effects.

Type of intervention
Primary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised a hypothetical cohort of smokers.

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

Dates to which data relate
The effectiveness and resource use data were derived from studies published in 1996 and 1999. The price year appears to have been 2004.

Source of effectiveness data
The clinical end point used in the model was treatment effectiveness. This was defined as the percentage of individuals not smoking at 6 months.

Modelling
A simple decision model was constructed to evaluate the clinical and economic impact of the alternative smoking cessation interventions. The structure of the model was partially reported. The time horizon of the model was 6 months, but no other details of the model were given.

Sources searched to identify primary studies
The clinical data were derived from the Surgeon General's Report, which analysed the cost-effectiveness of alternative
smoking cessation strategies. It was unclear which sources were used in the Surgeon General's Report to estimate clinical data. Only data for the combination of Zyban and nicotine patch were derived from a published double-blinded randomised clinical trial. Data on the Zyban plus gum combination were not available, so its efficacy was based on author's assumptions.

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

The primary sources providing data on treatment success were identified selectively. No justification for their selection was reported.

**Measure of benefits used in the economic analysis**

The summary benefit measure was treatment success (percentage of individuals not smoking at 6 months). This was derived directly from the literature, as reported above.

**Direct costs**

The analysis of the costs was restricted to the costs to the Texas government. These included the costs of smoking cessation interventions, physician time and the pharmacy dispensing fee. The unit costs and the resource quantities were presented separately. Patterns of use of medications and other devices (duration and intensity) were derived from the Surgeon General's Report. The costs of pharmaceuticals came from the Drug Topics Red Book (average wholesale prices). A 15% Medicaid discount was applied. The cost of physician time was derived from the Texas Medicare reimbursement rate. Discounting was not relevant given the short time horizon of the analysis. The price year appears to have been 2004.

**Statistical analysis of costs**

No statistical analyses of the costs were performed.

**Indirect Costs**

Productivity costs were not considered.

**Currency**

US dollars ($).

**Sensitivity analysis**

Sensitivity analyses were performed to assess the robustness of the cost-effectiveness ratios to variations in the clinical estimates and some costs. Alternative values were derived from the literature. In particular, a univariate sensitivity analysis investigated the effectiveness of the combined Zyban plus gum strategy (+/- 25% of the base-case estimate). A two-way sensitivity analysis tested the impact of simultaneous variations in effectiveness and prices.

**Estimated benefits used in the economic analysis**

The proportion of quitters at 6 months was:

- 0.237 with gum,
- 0.305 with Zyban,
- 0.330 with Zyban plus gum,
- 0.177 with patch.
0.286 with gum plus patch,
0.228 with inhaler,
0.330 with Zyban plus patch, and
0.305 with nasal spray.

Cost results
The cost of each strategy was:
$77.5 with gum,
$230.6 with Zyban,
$292.2 with Zyban plus gum,
$226.6 with patch,
$398.3 with gum plus patch,
$468.7 with inhaler,
$551.4 with Zyban plus patch, and
$830.9 with nasal spray.

Synthesis of costs and benefits
Incremental cost-effectiveness ratios were calculated to combine the costs and benefits of the alternative strategies.

After excluding dominated options (those with lower benefit and higher costs than at least one other strategy), the nicotine gum was the reference strategy. The incremental cost per successful patient was $2,251 with Zyban over gum and $2,466 with Zyban plus gum over Zyban alone.

The results of the sensitivity analysis did not alter the conclusions of the base-case analysis, as the relative ranking of the interventions did not change.

Authors' conclusions
Nicotine gum appears to be the most cost-effective strategy for the general population. The value for money of Zyban was unclear due to the uncertain nature of the clinical data.

CRD COMMENTARY - Selection of comparators
The rationale for the choice of the comparators was clear in that available strategies were selected for the analysis. The interventions were described and the reasons for excluding some were explained (e.g. clonidine and nortriptyline were excluded because they were not appropriate for widespread dissemination on account of their side effects). You should decide whether they are valid comparators in your own setting.

Validity of estimate of measure of effectiveness
The effectiveness data were derived from studies that might have been identified selectively. Much of the clinical data came from a previous report, no details of which were provided. Thus, it was not possible to assess the validity of the clinical data given the information reported in the current study. Other data were derived from a clinical trial, which
would usually have a high internal validity. Assumptions were made when no clinical data were available. Few sensitivity analyses were conducted, hence the clinical results should be treated with some caution.

Validity of estimate of measure of benefit
The summary benefit measure was derived directly from the effectiveness analysis. It represents an intermediate measure that cannot be compared with the benefits of other health care interventions.

Validity of estimate of costs
The analysis of the costs was consistent with the perspective adopted. Extensive information on the unit costs and resource quantities was provided, which will assist in replicating the analysis in other settings. The sources of the costs were reported for all items, and a clear description of the cost calculation was given. Discounting was considered. The impact of variations in prices and discounts was investigated in the sensitivity analysis. The price year was implicitly stated, which will enable the analysis to be replicated in other time periods. No statistical analysis of the costs was performed.

Other issues
The author did not compare the findings with those from other studies, nor address the issue of the generalisability of the study results to other settings. Only limited sensitivity analyses were conducted, thus the external validity of the analysis was low. The author noted that the model was limited by the accuracy of the published data used. The costs and benefits of preventing smoking-related diseases were not considered and this appears to be an important limitation of the analysis, which was limited to the costs of smoking cessation interventions. The benefit measure used in the analysis meant that no firm conclusions on the cost-effectiveness of non-dominated strategies could be drawn.

Implications of the study
The study results support the endorsement of nicotine gum as a cost-effective smoking cessation intervention.

Source of funding
No funding was received.

Bibliographic details
Hill A. A cost-effectiveness evaluation of single and combined smoking cessation interventions in Texas. Texas Medicine 2006; 102(8): 50-55

PubMedID
17115560

Other publications of related interest
Because readers are likely to encounter and assess individual publications, NHS EED abstracts reflect the original publication as it is written, as a stand-alone paper. Where NHS EED abstractors are able to identify positively that a publication is significantly linked to or informed by other publications, these will be referenced in the text of the abstract and their bibliographic details recorded here for information.


Indexing Status
Subject indexing assigned by NLM

MeSH
Adrenergic alpha-Agonists /administration & dosage /economics /pharmacology; Antidepressive Agents /administration & dosage /economics /pharmacology; Bupropion /administration & dosage /economics /pharmacology; Clonidine /administration & dosage /economics /pharmacology; Cost-Benefit Analysis; Decision Trees; Drug Therapy, Combination; Health Care Costs; Humans; Nicotine /administration & dosage /economics; Nortriptyline /administration & dosage /economics /pharmacology; Smoking /drug therapy; Smoking Cessation /economics /methods; Texas; Tobacco Use Disorder /drug therapy; Treatment Outcome

AccessionNumber
22006006763

Date bibliographic record published
30/09/2007

Date abstract record published
30/09/2007