Cost-effectiveness of treating nicotine dependence: the Mayo Clinic experience

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
Non-physician health care professionals in a medical setting -Nicotine Dependence Centre (NDC) - versus using other approaches (not being treated in NDC) in the treatment of nicotine dependence. The non-physician counsellor-delivered intervention services involved designing a patient-specific protocol during an initial 60-minute consultation. The treatment protocol could include follow-up counselling, nicotine replacement therapy, an inpatient programme, and a relapse-prevention programme.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
Patients 18 years of age or older with nicotine dependence.

Setting
NDC and other settings used in the treatment of nicotine dependence. The economic analysis was carried out in Rochester, USA.

Dates to which data relate
The effectiveness and resource use data related to the NDC treated patients were collected between April 1988 and December 1992. Mortality rates and sex-specific hazard ratios were obtained from reports published in 1990 and 1985, respectively. The effectiveness data related to the non-NDC-treated patients were extracted from previously published studies or reports between 1987 and 1995. The resource use data related to the non-NDC treated patients were not collected. The fiscal year was 1993.

Source of effectiveness data
Effectiveness data were derived from a single study and a review of previously published studies or reports.

Link between effectiveness and cost data
The costing for the NDC-treated patients was retrospectively performed for one year and then projected to cover the entire 5-year study period.

Study sample
Power calculations were not used to determine the sample size. The records of a total of 5,544 patients examined in the
NDC during the 5-year study period were available for analysis. The average (SD) age of the NDC cohort was 47.8 (13.2) with a range from 18 to 82 years.

**Study design**
The study was a retrospective case series, carried out in a single centre. The duration of follow-up was 1 year and loss to follow-up was reported to be 26.7%.

**Analysis of effectiveness**
The analysis of effectiveness was based on intention to treat. The main health outcome was smoking status at 6 months after treatment (including rates of abstinence, continuation of smoking, and patients lost to follow-up, who were classified as smokers) assessed by telephone interview and assumed to be the same at 1 year after treatment.

**Effectiveness results**
The abstinence rate was 22.2%, the rate of continuation of smoking was 51.2% and loss to follow-up (classified as smokers) was 26.7%.

**Clinical conclusions**
The use of non-physician health care professionals in a medical setting produced highly favourable results in terms of smoking-cessation rate.

**Modelling**
A computer simulation model was used to model the smoking behaviour beyond the first year in order to estimate the benefit (net years of life gained) for the life time up to 100 years of age using smoothed mortality estimates and smoking status profiles.

**Outcomes assessed in the review**
Effectiveness information was also derived from a review which collected the following outcomes: Year 1 cessation rate for non-NDC treated patients (three different rates were reported), late cessation rates (for year 2 and beyond), relapse rate after 1, 2, between 3 and 10, and after 10 years of abstinence, and mortality rates for current and former smokers specific to age, sex, and number of years from the time of abstinence (weighted average and analysis of variance were used to smooth the mortality rates).

**Study designs and other criteria for inclusion in the review**
Not reported.

**Sources searched to identify primary studies**
Not reported.

**Criteria used to ensure the validity of primary studies**
Not reported.

**Methods used to judge relevance and validity, and for extracting data**
Not reported.
Number of primary studies included
A total of 6 primary studies or reports were used as the references for the outcomes assessed in the review.

Methods of combining primary studies
The method of combination was not reported for all the outcomes assessed in the review (weighted average and analysis of variance were used to smooth the mortality rates).

Investigation of differences between primary studies
Not reported.

Results of the review
The year 1 cessation rate for non-NDC treated patients was 10.7% for patients referred to NDC but not seen for consultation, 7.6% for "the general population attempting to stop smoking", and 5.5% for "local community participants in an 8-week, 2-hour per week group program"; the latter two rates (7.6% and 5.5%) were also used as the late cessation rates (for year 2 and beyond). Therelapse rate after 1, 2, between 3 and 10, and after 10 years of abstinence were 21.8%, 12.2%, 1.4%, and 0%, respectively. The smoothed annual mortality rates by age, sex, and number of years from the time of abstinence were presented in the form of a graph.

Measure of benefits used in the economic analysis
Net years of life gained was used as the main benefit measure. The time horizon used in the estimation of benefit measure was up to 100 years of age.

Direct costs
Costs were not discounted since they were assumed to occur only during the first year after treatment. The resource quantities were not reported separately from the costs. The cost components were broadly reported separately. The cost calculations covered a wide range of operating costs, capital costs, and overhead costs. The costs associated with the non-NDC treated patients were not calculated because of a lack of relevant information. The perspective adopted in the cost analysis was not explicitly specified. The price date was 1993. The cost analysis did not cover direct medical care costs or savings associated with smoking cessation nor did it include the cost savings due to not purchasing tobacco products after smoking cessation. The costs saved due to avoided incidence of smoking-related disease or possibly incurred due to cessation-related sequelae arising from successful smoking cessation were not included in the study.

Indirect Costs
Not considered.

Currency
US dollars ($).

Sensitivity analysis
A one-way simple sensitivity analysis was performed by varying the discount rate.

Estimated benefits used in the economic analysis
Taking 10.7% as the one-year cessation rate and 5% as the discount rate, the NDC intervention yielded an average net years of life gained of 0.058. The corresponding values when using 7.6% and 5.5% one-year cessation rates and a 5% discount rate were 0.074 and 0.098, respectively.
Cost results
The average cost of the NDC services was $213, but when the cost of nicotine replacement therapy was added it rose to $396. The mean cost of the comparator was not calculated due to lack of appropriate information.

Synthesis of costs and benefits
Actual average cost per average net year of life gained was calculated as the synthesis measure. With 10.7% as the one-year cessation rate and 5% as the discount rate, the NDC intervention yielded an average cost per average net years of life gained of $6,828. The corresponding values taking 7.6% and 5.5% as the one-year cessation rates and 5% as the discount rate were $5,351 and $4,041, respectively.

Authors' conclusions
In comparison with the cost-effectiveness of other medical services, the cost of $6,828 per net year of life gained by treatment of nicotine dependence is relatively inexpensive. Non-physician health-care professionals can assume a key role in the provision of cost-effectiveness nicotine dependence intervention.

CRD COMMENTARY - Selection of comparators
The comparator was smoking cessation if patients had not been seen in the NDC.

Validity of estimate of measure of benefit
The internal validity of the estimates of effectiveness may be weakened by the lack of a randomised design, a comprehensive systematic literature review and a quality assessment of the primary studies included in the review (related to the comparator).

Validity of estimate of costs
Resource utilisation was not reported separately from the costs. Adequate detail of the methods of cost estimation were not given. As the authors acknowledged, the lack of cost analysis for the comparator was a serious limitation of the study. The authors assumed no costs for the comparator although they acknowledged that the cessation rate in that group was due to medications or other interventions, therefore some important costs may have been omitted and the cost-effectiveness of the intervention may have been over-estimated.

Other issues
Given the lack of key study elements (a randomised design, a comprehensive literature review and quality assessment of the primary studies included in the review, a comprehensive sensitivity analysis, statistical analysis of the costs, and a cost analysis for the comparator) the results need to be treated with some caution. The issue of generalisability to other settings or countries was not addressed.

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Bibliographic details

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