Cost-effectiveness of elderly health examination program: the example of hypertension screening


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 investigated the cost-effectiveness of hypertension screening under the Elderly Health Examination Programme (EHEP). The EHEP was a public sponsored massive health screening programme offering free health examinations, including medical history, chest X-ray, electrocardiogram, hypertension checks and laboratory tests to Taiwanese senior citizens. The EHEP was compared with a scenario in which no EHEP was provided.

Type of intervention
Screening.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised the 92,555 elderly citizens living in Kaohsiung city, Taiwan, in 1997.

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

Dates to which data relate
The prevalence and incidence data on hypertension were derived from 1996 and 1997 elderly cohorts in Kaohsiung city. Other data, such as medication compliance rates, quality of life and screening rates, were derived from studies published between 1977 and 1996. The price year was not reported.

Source of effectiveness data
The clinical and epidemiological data used in the decision tree model were:

- the incidence and prevalence of hypertension;
- the participation rate in the EHEP;
- the medication compliance rate for those diagnosed as hypertensive;
- the rate of screening for hypertension other than in the EHEP programme; and
- the probability of suffering a stroke.

Modelling
A decision analytic tree model was used to determine the cost-effectiveness of the EHEP. Two prediction models were used to estimate the economic and life impact of the EHEP. The first model used hypertension prevalence rates as the basis of estimation, while the other used the incidence rate as the basis of prediction.

**Sources searched to identify primary studies**
Hypertension prevalence, incidence rates and the EHEP participation rates were derived from the 25,174 and 24,157 elderly residents of Kaohsiung city who participated in the 1996 and 1997 EHEP. Medication compliance rates and rates of hypertension screening (other than the EHEP) were derived from anecdotal evidence from Taiwan population studies; when unavailable, these were derived from international studies. The authors made assumptions about the probability of suffering a stroke.

**Methods used to judge relevance and validity, and for extracting data**
Nurses at four Kaohsiung city hospitals measured blood pressure as part of the EHEP. The 1996 database was used for the prevalence rate, while the incidence rate was based on elders who attended both the 1996 and 1997 EHEP. The authors provided no details of the review of the literature they undertook to derive other variables used in the model. However, they did report that generally a medium value was adopted to avoid bias in their evaluation. The authors made three assumptions about the probability of suffering a stroke:

- EHEP elders still faced a probability of suffering a stroke whether or not they sought active treatment;
- the percentage identified as hypertensive for the non-EHEP group was the same as that for the EHEP group; and
- those who were not screened for hypertension might not have known their blood pressure, and consequently they would not have benefited from medical attention.

**Measure of benefits used in the economic analysis**
The measure of benefits used was the loss of active life-days due to stroke. This used information on the loss in quality-adjusted life-years (QALYs) after stroke, based on a published study (Weinstein and Stanston 1977, see ‘Other Publications of Related Interest’ for bibliographic details).

**Direct costs**
The direct costs included in the analysis appear to have been those to the health care service. Specifically, the costs of hypertension screening, hypertension outpatient treatment and the direct costs associated with stroke (including hospitalisation, home care and nursing home expenses). The direct medical costs, both of stroke and hypertension, were derived from claims data from the Bureau of National Health Insurance. The cost of hypertension screening was based on the EHEP cost, which was the payment for the workload of each blood pressure reading. The authors did not report the time period during which the costs could be incurred. However, in their list of model parameters they included a discount rate of 5% as one of them, although they did not report whether this rate applied to the outcomes, costs or both. The price year was not reported. The study reported the average total costs. The authors reported the unit cost of each resource used.

**Statistical analysis of costs**
The cost data were reported as point estimates (i.e. the data were deterministic).

**Indirect Costs**
The productivity costs were not included.

**Currency**
New Taiwan dollars (NTD).

**Sensitivity analysis**
The authors reported that sensitivity analyses were conducted to select appropriate values for each parameter used to generate cost-effectiveness estimates.

**Estimated benefits used in the economic analysis**
In both the prevalence and incidence model, the average loss of life-days was 168 in the EHEP group and 296 in the non-EHEP group.

**Cost results**
The average total cost of the EHEP group was NTD 144,154 when using the prevalence model and NTD 144,719 when using the incidence model.

The average total cost of the non-EHEP group was NTD 179,044 when using the prevalence model and NTD 179,289 when using the incidence model.

**Synthesis of costs and benefits**
The costs and benefits were not combined as the EHEP hypertension screening programme was both more effective and less costly than a non-EHEP programme when using both the prevalence and the incidence models.

The authors did not report the results of their sensitivity analysis in detail. However, in the abstract of the article, the authors reported that the sensitivity and values of selected parameters could modify the results of the cost-effectiveness analysis.

**Authors’ conclusions**
The Elderly Health Examination Programme (EHEP) was a cost-effective programme with health and social welfare policy implications.

**CRD COMMENTARY - Selection of comparators**
A justification was given for using a non-EHEP programme as the comparator, namely that 73.5% of elderly Kaohsiung residents did not participate in the study. You should consider whether the comparator used represents current practice in your own setting.

**Validity of estimate of measure of effectiveness**
The parameters were derived from a cohort study based on EHEP data (in the case of incidence and prevalence of hypertension), the authors’ own assumptions (probability of suffering a stroke), and published research. The authors reported that medium values from the published research were used in order to avoid bias in the evaluation. They did not, however, report any search methods or inclusion criteria. Further, the outcomes post stroke (i.e. QALYs) was derived from a study published in 1977, which may not be applicable today because of improvements in health care and living standards. Since the reporting of the methods was limited, it is not plausible to assess the level of bias present in the estimates.

**Validity of estimate of measure of benefit**
The estimation of health benefit (active loss of life-days) was derived from a decision tree model, which was appropriate for the study question. The authors did not report the time period during which the outcomes occurred, and it was unclear if discounting was applied or not. The authors only included in their measure of benefit the active loss of life-days due to stroke, but hypertension is a risk factor for other diseases such as coronary heart disease (CHD) that
could have been prevented under the EHEP. Consequently, the measure of benefit used was too narrow to capture the full impact of the EHEP on health outcomes.

Validity of estimate of costs
The authors did not explicitly report the perspective adopted in the economic analysis. However, from their analysis, it would appear that the perspective of a health care service was adopted. Given this perspective it appears that not all of the relevant costs have been included. For example, the authors only included the costs of stroke treatment and did not include other costs/savings that could have been incurred by treating other diseases, such as CHD, that have hypertension as one of their risk factors and which could have been prevented. These omissions would bias the results against the EHEP. The costs were derived from the authors’ settings (i.e. screening cost) and from published studies (i.e. costs of treatment). The time period during which the costs could be incurred was not stipulated, but the authors included a discount rate of 5% in their list of model parameters, although they did not report if this rate applied to the outcomes, costs or both.

The authors reported that they had performed a sensitivity analysis, but did not report the results of this analysis. In addition, there was some suggestion in the methods reported that some of the analysis might have been conducted to ascertain model inputs and not to ascertain the impact of parameter variation on the outcomes. The price year was not reported, which will hamper any future inflation exercises.

Other issues
The authors reported that other studies had also found that hypertension screening and treatment programmes reduced costs and were effective. However, they did not address the issue of the generalisability of their results to other settings. The results were reported in full, but it would appear that they did not include other health benefits and costs associated with hypertension screening, such as the effect of the intervention on CHD. The authors presented a number of further limitations to their study. First, participants in the cohort study used to derive prevalence and incidence estimates were volunteers, therefore the sample might not have been representative of the study population. Second, several variables were derived from studies conducted in other countries that might not be comparable to Taiwanese settings. Finally, the one-time measure of blood pressure might not have been sufficiently reliable.

Implications of the study
The authors report that their results should be treated with caution.

Source of funding
Supported by a grant from the National Health Research Institutes, Taiwan.

Bibliographic details

PubMedID
17282981

DOI
10.1016/S1607-551X(09)70369-9

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

MeSH
Aged; Aged, 80 and over; Cost-Benefit Analysis; Humans; Hypertension /epidemiology; Incidence; Physical Examination /economics; Prevalence

AccessionNumber
22007000350

Date bibliographic record published
31/08/2007

Date abstract record published
31/08/2007