Pharmacoeconomic consequences of amlodipine besylate therapy in patients undergoing PTCA
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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 administration of amlodipine besylate therapy to patients undergoing percutaneous transluminal coronary angioplasty (PTCA) was studied. The patients were given 5 mg amlodipine besylate once daily during the first week after randomisation, which occurred 2 weeks before the PTCA. After that they were given 10 mg once daily for 4 months. A comparator group of patients was given standard care, which involved PTCA without amlodipine besylate therapy.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The patients in the study were thought to be suitable for elective balloon angioplasty on major coronary arteries. They had stable angina pectoris and de-novo lesions on native coronary arteries, not totally occluded at the initial diagnostic angiography.

Setting
The setting was secondary care. The economic study was carried for the Italian health service.

Dates to which data relate
The dates of the effectiveness evidence were given in an earlier effectiveness paper (Jorgensen et al. 2000, see 'Other Publications of Related Interest' below for bibliographic details). The resource evidence was deduced from the effectiveness evidence, and thus corresponded to the same dates. A price year was not explicitly reported.

Source of effectiveness data
The effectiveness evidence was derived from a single study.

Link between effectiveness and cost data
The costing was carried out retrospectively. The same patients in Norway and Canada provided both the effectiveness evidence and the basis for the resource evidence. The prices used were taken from the Italian health system.

Study sample
No power calculations were reported. The study sample was obtained by including all patients attending the different
centres who met the inclusion criteria. Six hundred and thirty-five patients were enrolled, 318 in the amlodipine besylate group and 317 in the placebo group.

**Study design**
This was a multi-centred, double-blind, randomised controlled trial (RCT) with a follow-up of 4 months. The loss to follow-up was not reported. The method of blinding was not reported.

**Analysis of effectiveness**
The analysis was conducted on an intention to treat basis. The outcomes used were deaths, myocardial infarctions (MIs), coronary artery bypass grafts (CABGs), repeat PTCAs, and the number of patients with any of these clinical events. The outcomes were presented as the number per 1,000 patients. Comparability of the groups at baseline was not reported in this paper.

**Effectiveness results**
For every 1,000 patients, there were:

- 3.1 deaths in the amlodipine besylate group and 6.3 in the placebo group;
- 25.2 MIs in the amlodipine besylate group and 34.7 in the placebo group;
- 44.0 CABGs in the amlodipine besylate group and 56.8 in the placebo group; and
- 31.4 repeat PTCAs in the amlodipine besylate group and 72.6 in the placebo group.

There were 94.3 patients with any of the clinical events just described in the amlodipine besylate group and 145.1 in the placebo group.

**Clinical conclusions**
The authors concluded that patients taking amlodipine besylate suffered lower mortality and less morbidity than those in the placebo group.

**Measure of benefits used in the economic analysis**
No summary measure of benefit was used. The study was, in effect, a cost-consequences analysis. See the 'Analysis of Effectiveness' section for the outcomes of the clinical study.

**Direct costs**
The costs were not discounted as they were incurred during less than 1 year. The quantities and the costs were not analysed separately but the unit costs of amlodipine besylate, giving a CABG, treating an MI, and a repeat PTCA were given. The costs were broken down into hospital costs and amlodipine besylate costs. Hospital costs were further broken down into those resulting from MIs, CABGs and repeat PTCAs. The cost estimates were based on actual data. The cost of each hospital event recorded in the effectiveness evidence was calculated using cost data obtained from the Italian health system. The cost of amlodipine besylate was obtained from the Italian directory of medicines and manufacturers. A price year was not explicitly reported and no adjustment of costs to a common price year was described.

**Statistical analysis of costs**
No statistical analysis of the costs was carried out.
Indirect Costs
No indirect costs were calculated.

Currency
Euros (EUR).

Sensitivity analysis
The parameters varied were the price of amlodipine (changed by 10%) and the risk difference of events requiring hospitalisation between the two groups (changed by 10%). Both variables were then changed simultaneously. The price of amlodipine besylate at which the costs in both groups would be equal was also calculated.

Estimated benefits used in the economic analysis
See the 'Effectiveness Results' section.

Cost results
The costs per 1,000 patients were EUR 949,732.83 in the amlodipine besylate group and EUR 1,165,621.89 in the placebo group.

The costs were estimated for 4 months after the initial PTCA.

The costs of the adverse effects used in the effectiveness analysis were dealt with in the costing.

When the cost of amlodipine besylate was varied by 10%, the cost-difference between the two groups ranged from EUR 228,343.35 to EUR 203,434.

When the difference in the frequency of clinical events between the two groups was varied by 10%, the cost-difference ranged from EUR 179,246.74 to EUR 252,531.40.

When both variables were varied simultaneously, the cost-difference ranged from EUR 166,792.45 to EUR 264,985.68.

The price of amlodipine besylate at which the two patient groups had equal costs was EUR 2.84 per 10 mg, almost three times the price in Italy at the time the paper was written.

Synthesis of costs and benefits
The costs and benefits were not combined as the study was a cost-consequences analysis.

Authors' conclusions
The administration of amlodipine besylate to patients undergoing percutaneous transluminal coronary angioplasty (PTCA) reduced deaths, improved morbidity and resulted in lower costs. It was therefore a dominant treatment.

CRD COMMENTARY - Selection of comparators
The choice of the comparator (PTCA without amlodipine besylate) was implicitly justified by it having represented current practice in the past. You should decide if the comparator represents current practice in your own setting.

Validity of estimate of measure of effectiveness
The source of the effectiveness data was a single study. The study design, an RCT, was appropriate for the hypothesis. There was insufficient information in the paper to be able to determine whether the study sample was representative of...
the study population. The patient groups were not shown to have been comparable in this paper. The analysis of effectiveness appears to have been handled credibly but no results of the statistical tests were given. There were no other sources of effectiveness data.

Validity of estimate of measure of benefit
The authors did not derive a summary measure of health benefit. The health benefits are therefore those associated with the effectiveness outcomes.

Validity of estimate of costs
It was unclear whether all the relevant categories of costs were included, as the authors only included the costs of the particular clinical events recorded (MI, CABG and repeat PTCA) and no other costs apart from amlodipine besylate. There was no detailed breakdown of the costs. The authors did not include the costs of the initial PTCA; perhaps they assumed that it would be the same in both groups. It was not clear whether the authors’ conclusions about the costs would be affected by these omissions. The authors pointed out that there may occasionally have been double-counting of the cost of amlodipine besylate, leading to an overestimate of the treatment costs in the amlodipine besylate group and, therefore, to an underestimate of its cost-advantage. The costs and the quantities were not reported separately. The resource use quantities were taken from a single study, while the unit costs were taken from the authors’ setting. A sensitivity analysis of the prices, but not quantities, was carried out. No statistical analysis of the prices was undertaken. The price year was not explicitly reported.

Other issues
The authors made appropriate comparisons of their results with those from other studies. The issue of generalisability to other settings was not addressed. Although the authors acknowledged that their study used effectiveness data from a trial in Canada and Norway and used Italian costs, they stated that there was no reason why the effectiveness data would not be valid for Italy or why the costs would be very different. The authors did not present their results selectively but their conclusions do not entirely reflect the scope of the analysis. The authors acknowledged that not all costs were included, such as rehabilitation costs and nursing outpatient costs, but they considered that this would have little effect on the results. However, a more complete and detailed costing would be useful given the scope of the analysis. The authors stated that by not considering the indirect costs they have understated the cost-advantage of amlodipine besylate, as these patients would have required less time off work. However, such costs were not required for the chosen perspective.

Implications of the study
The authors suggested that a study with a longer term follow-up would be useful.

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None stated.

Bibliographic details

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Other publications of related interest
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