Use of the ACCES model to predict the health economic impact of celecoxib in patients with osteoarthritis or rheumatoid arthritis in Norway

Svarvar P, Aly 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 use of celecoxib for the treatment of patients with osteoarthritis (OA) or rheumatoid arthritis (RA), in Norway.

**Type of intervention**
Treatment.

**Economic study type**
Cost-effectiveness analysis.

**Study population**
The study population consisted of patients with OA or RA, living in Norway.

**Setting**
The setting was hospital. The economic study was carried out in Norway.

**Dates to which data relate**
The effectiveness data were collected from studies published between 1991 and 2000. The cost data were taken from sources published between 1998 and 2000. The price year was 1999.

**Source of effectiveness data**
The effectiveness data were derived from a literature review.

**Modelling**
A one-year decision analytical model (see Other Publications of Related Interest no.1) was used to determine the cost-effectiveness of celecoxib for the treatment of patients with OA or RA, in Norway. The estimates of absolute risk for serious gastrointestinal (GI) events in the Norwegian population with OA and RA were calculated using a modification of the Fries risk equation (see Other Publications of Related Interest no.2), which involves using the prevalence of risk factors.

**Outcomes assessed in the review**
The review assessed the following outcomes:

- the characteristics of OA and RA patients,
- the prevalence of risk factors for serious and other GI events,
the prevalence rates for OA and RA,
the ratio of total symptomatic ulcers to total serious GI events,
the ratio of anaemia to total serious GI events, and
the relative risk adjustments for each NSAID and the basket.

Study designs and other criteria for inclusion in the review
The effectiveness data were taken from the ARAMIS database, a prevalence study in the USA, hospital discharge records from Norway, celecoxib-based trials, and the MEMO database of the University of Dundee in Scotland.

Sources searched to identify primary studies
Not stated.

Criteria used to ensure the validity of primary studies
Not stated.

Methods used to judge relevance and validity, and for extracting data
Point estimates from individual studies were used.

Number of primary studies included
Seven primary studies were included.

Methods of combining primary studies
Not stated.

Investigation of differences between primary studies
Not stated.

Results of the review
The ages of the RA and OA patients were 56.2 and 61.5 years, respectively.
The proportion of patients who had a history of serious NSAID GI complications was 14% for both the RA and OA groups.
The proportion of patients who had a history of serious NSAID GI side-effects was 10% for both the RA and OA groups.
The proportion of patients who were currently using corticosteroid was 34% in the RA group, and 1% in the OA group.
The disability index scores of RA and OA patients were 1.2 and 1.0, respectively.
The absolute risk of serious GI events, based on the modified Fries risk calculator, was 13.43 for RA patients and 12.92 for OA patients.
The ratio of total symptomatic ulcers to total serious GI events was 7.16.
The ratio of anaemia to total serious GI events was 2.64.

The mortality rate was 10%.

**Methods used to derive estimates of effectiveness**
The authors made assumptions about effectiveness and used information from a personal communication.

**Estimates of effectiveness and key assumptions**
It was assumed that 80% of the RA and OA population were on active NSAID treatment and that the mortality rate was 10%. It was also assumed that the treatment duration for OA was 6 months, and for RA, 9 months. A personal communication revealed that the mortality due to serious GI events was 7 to 15%, leading the authors to choose 10%.

**Measure of benefits used in the economic analysis**
The measures of health benefit were the number of events avoided and the number of life-years gained. The benefits were discounted at an annual rate of 5%.

**Direct costs**
The direct costs were discounted at an annual rate of 5%. The resource utilisation data were estimated using questionnaires sent to 2 surgeons, 4 general practitioners and 4 rheumatologists. The quantities and costs were reported separately for the drugs only. The direct costs were the costs of drugs, hospitalisation and out-patient procedures. The quantity/cost boundary adopted was that of the health service. The costs of hospitalisation, out-patient procedures and medication were based on prices using official Norwegian sources. The price year was 1999.

**Statistical analysis of costs**
The authors reported the annual costs per patient per treatment arm, and the differences between treatment arms.

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

**Currency**
Norwegian kroner (NOK). The exchange rate was NOK 8.70 = US$100.

**Sensitivity analysis**
One-way sensitivity analyses were conducted on the relative risks for the NSAID treatment, risk scores for serious GI events, the ratios for anaemia and symptomatic ulcer, the duration of therapy, post-event switches in therapy, and the costs of adverse events.

**Estimated benefits used in the economic analysis**
All results were based on 100,000 people with OA and 40,000 with RA. The use of celecoxib resulted in a reduced number of GI events relative to NSAID alone and to the base-case.

The use of celecoxib resulted in a reduction in the number of life-years lost, relative to NSAID alone, of 877 years for OA patients and 580 years for RA patients.

The use of celecoxib resulted in a reduction in the number of life-years lost, relative to the base-case, of 615 years for OA patients and 357 years for RA patients.
The use of celecoxib also resulted in a reduction in the number of events and life-years lost relative to the alternative treatment options, i.e. NSAID plus proton-pump inhibitor, NSAID plus H2-receptor antagonist, NSAID plus misoprostol, and arthrotec.

**Cost results**
The expected yearly drug cost differences per patient between celecoxib and NSAID monotherapy were NOK 176 and 719 for OA and RA patients, respectively.

The expected yearly cost difference per patient between celecoxib and rofecoxib was NOK -333 for OA patients.

The expected yearly cost differences per patient between celecoxib and the base-case were NOK -573 and -716 for OA and RA patients, respectively.

The expected yearly event cost differences per patient between celecoxib and NSAID monotherapy were NOK -759 and -1,233 for OA and RA patients, respectively.

The expected yearly event cost difference per patient between celecoxib and rofecoxib was NOK 0 for OA patients.

The expected yearly event cost differences per patient between celecoxib and the base-case were NOK -525 and -747 for OA and RA patients, respectively.

The expected yearly net cost differences per patient between celecoxib and NSAID monotherapy were NOK -580 and -514 for OA and RA patients, respectively.

The expected yearly net cost differences per patient between celecoxib and rofecoxib was NOK -334 for OA patients.

The expected yearly net cost differences per patient between celecoxib and the base-case were NOK -1,098 and -1,462 for OA and RA patients, respectively.

**Synthesis of costs and benefits**
The use of celecoxib dominated NSAID alone and the base-case in both OA and RA patients. For OA, celecoxib dominated NSAID alone and the base-case in all sensitivity analyses, except for a reduction in NSAID dosage against monotherapy. Compared with rofecoxib, celecoxib provided cost-savings for the treatment of OA. In the case of RA, celecoxib dominated the base-case in all sensitivity analyses. The model was sensitive to several variables in terms of the cost-effectiveness of celecoxib against NSAID monotherapy, although celecoxib was still highly cost-effective: the worst case was NOK 15,584/life-year gained for RA with a 30% reduction in Fries score.

**Authors' conclusions**
"The introduction of celecoxib into the Norwegian NSAID market, and its use as a first-line agent will provide societal benefits by improving health care at reduced cost in patients with OA and RA".

**CRD COMMENTARY - Selection of comparators**
The comparators were justified on the basis that they were currently employed treatment alternatives. You, as a user of the database, should decide if these health technologies are relevant to your setting.

**Validity of estimate of measure of effectiveness**
The authors' literature review to derive effectiveness estimates seemed appropriate, although there was no indication whether or not it was a systematic review. The resource use estimates were, appropriately, based on expert opinion. The validity of the results was enhanced by sensitivity analyses to account for variability in the estimates. The authors used data from observational databases and derived effectiveness rather than efficacy estimates, thus increasing the validity of the model.
Validity of estimate of measure of benefit
The estimation of benefits was appropriate, although accounting for quality of life or individual preferences might have been useful; in particular, since the drugs are intended to improve quality of life and their side-effects include mortality.

Validity of estimate of costs
The authors reported costs per treatment arm and cost differences between treatment arms. The cost analysis had several good features: all relevant direct cost categories were included; and the validity of cost results was enhanced by appropriate sensitivity analyses. The quantities and costs were reported separately for drug use only, and were based on assumptions and opinion rather than the actual data; this decreased the generalisability of the results. The price year was reported, thus enabling reflation exercises in other settings. However, charges were used to estimate costs since the breakdown in terms of resource use was unknown.

Other issues
The authors made appropriate comparisons of their findings with those from other studies, and addressed the issue of generalisability to other settings via the sensitivity analysis. The authors did not present their results selectively. The study considered OA and RA patients and this was reflected in the authors’ conclusions, although there could be considerable difference with the populations in other countries.

Implications of the study
The authors suggest that the introduction of celecoxib into the Norwegian NSAID market, and its use as a first-line agent will provide societal benefits by improving health care at reduced cost for patients with OA and RA. Generalisability to other economic settings will depend on their similarity to Norway.

Source of funding
None stated.

Bibliographic details

PubMedID
11276802

Other publications of related interest


Indexing Status
Subject indexing assigned by NLM

MeSH
Anti-Inflammatory Agents, Non-Steroidal /economics /therapeutic use; Arthritis, Rheumatoid /drug therapy /economics; Celecoxib; Cost of Illness; Cost-Benefit Analysis; Economics, Pharmaceutical; Forecasting; Humans; Middle Aged; Models, Economic; Norway; Osteoarthritis /drug therapy /economics; Pyrazoles; Sulfonamides
/economics /therapeutic use; Treatment Outcome

**AccessionNumber**
22001000781

**Date bibliographic record published**
28/02/2002

**Date abstract record published**
28/02/2002