Comparison of therapies with torasemide or furosemide in patients with congestive heart failure from a pharmacoeconomic viewpoint
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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 use of loop diuretics for the treatment of patients suffering from congestive heart failure (CHF). Two loop diuretics were compared, furosemide and torasemide.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised CHF patients diagnosed with New York Heart Association (NYHA) classification II or III.

Setting
The setting was secondary care. The economic study was carried out in Germany.

Dates to which data relate
The dates relating to the effectiveness evidence ranged from 1993 to 1997, with most relating to 1996. The price year was not explicitly stated, although the majority of the costs appear to have been taken from 1996.

Source of effectiveness data
The effectiveness data were derived from a single retrospective study of sample patients’ records.

Link between effectiveness and cost data
The costing was carried out retrospectively on the same sample of patients as that used to investigate effectiveness.

Study sample
No power calculations to determine the sample size were reported. Seventy-five physicians were interviewed about patients with NYHA class II or III whom they had treated with either furosemide or torasemide for at least one year. In total, 400 patients were included in the study, 200 in each treatment group.

Study design
This was an observational study. The data were obtained from interviews with 75 office-based physicians (general
practitioners and internists) throughout Germany. Information on each patient was collected for a period of one year. Loss to follow-up was irrelevant. It was not possible to blind the outcomes assessment due to the retrospective nature of the study.

**Analysis of effectiveness**

The primary health outcomes recorded included information on additional medication for CHF, the number of physician consultations, relevant hospitalisations, relevant incapacity to work, and improvement in NYHA classification.

In order to ensure comparability, the patients were selected using the statistical method of matched pairs. The matched pairs were built using the criteria of gender, age by age groups, pre-treatment with diuretics and duration of intake, the number of four concomitant diseases (hypertension, coronary heart disease, renal insufficiency, diabetes), and the daily dose of treatments.

**Effectiveness results**

The proportion of patients with additional medication was 72% in the torasemide group and 71.5% in the furosemide group.

The mean number consultations per patient was 11.9 in the torasemide group and 11.9 in the furosemide group.

The total days in hospital was 62 in the torasemide group and 324 in the furosemide group.

The total days of incapacity to work was 441 in the torasemide group and 617 in the furosemide group.

The proportion of patients with improved NYHA class was 38% in the torasemide group and 24.5% in the furosemide group.

No statistical test results were reported.

**Clinical conclusions**

The authors concluded that, compared with furosemide, torasemide improved the clinical outcome.

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

The outcome measures used in the economic analysis included the difference between the two treatments in terms of:

(a) additional medication for CHF;

(b) the number of physician consultations;

(c) relevant hospitalisations;

(d) relevant incapacity to work; and

(e) the number of patients with improved NYHA classification after one year.

The costs were applied to (a) to (d) and expressed per unit of (e).

**Direct costs**

The costs reported were from the perspective of the statutory health insurance in Germany. They included only those costs that were paid by health insurance. The costs were derived using actual data from the patients' records on items (a) to (c) (see above), and related to the years from 1993 to 1997. The price year used was not explicitly stated. However,
the majority of the costs appear to have been taken from 1996. The cost data were for medication, physician consultations and hospitalisation. Medication costs were obtained from the national formulary, less a 5% supplement for health insurance and minus patient co-payment. The cost of physician consultations were taken from reimbursement codes used by physicians. Hospitalisation costs were obtained from the mean fee per day in hospital. Discounting was not conducted, nor appropriate, as the study covered a one-year period. Only those costs that were evaluated by the clinician as being related to CHF or to the intake of either of the treatments were taken into consideration. The costs and the resource quantities were reported separately.

**Statistical analysis of costs**
No statistical analysis of the costs was carried out.

**Indirect Costs**
The authors included one element of indirect costs, the lost time in work. The total number of days of incapacity to work was calculated and then valued using 70% of the mean salary, as paid by health insurance. Discounting was not applied since the study was carried out over one year.

**Currency**
German marks (DM).

**Sensitivity analysis**
One-way sensitivity analyses were conducted by varying the assumptions used to value the hospitalisation costs. These costs were the biggest outcome difference between the two groups. The authors did not justify the ranges chosen and they reported limited information about the results obtained.

**Estimated benefits used in the economic analysis**
The main benefit measure used in the economic analysis was the number of patients with improved NYHA classification after one year of treatment.

**Cost results**
The costs results for the two groups were as follows.

The medication costs were DM 804 for torasemide and DM 377 for furosemide.

The hospitalisation costs were DM 166 with torasemide and DM 868 with furosemide.

The working incapacity costs were DM 180 with torasemide and DM 272 with furosemide.

The total costs were DM 1,502 with torasemide and DM 1,863 with furosemide.

No statistical results of the cost differences were reported.

**Synthesis of costs and benefits**
The costs and benefits were synthesised by expressing the total costs per patient with improved NYHA classification after one year.

The costs per patient with improved NYHA were DM 3,954 with torasemide and DM 7,605 with furosemide.

The incremental cost per NYHA improved patient with furosemide treatment over torasemide treatment was DM 3,651. The sensitivity analyses showed that, when the hospital costs were reduced from DM 536.11 per day to DM
431.14 per day, torasemide treatment still showed lower costs and greater cost-effectiveness. In the second sensitivity analysis, the average duration of hospital stay of 19.1 days was applied for both groups, as against 15.5 for the torasemide group and 29.5 for the furosemide group. Again, the torasemide treatment continued to be more cost-effective.

Authors’ conclusions
Compared with furosemide, treatment with torasemide improved clinical outcome and reduced the overall costs in congestive heart failure (CHF) patients, and was therefore most cost-effective.

CRD COMMENTARY - Selection of comparators
The choice of the comparators in the study was justified. The authors stated that they were the mainstay in diuretic pharmacotherapy for symptomatic treatment of CHF. You should decide if the use of these technologies is a valid comparator in your setting.

Validity of estimate of measure of effectiveness
The analysis used an observational study, which was appropriate given the study question posed. The sample was representative of patients presenting with NYHA classification II or III. However, patients were only included if they had been treated with either treatment for at least one year. Consequently, this might have biased the study in favour of a particular type of patient. The analysis was based on comparisons between statistically matched pairs of patients receiving one of the two alternative treatments studied. The matching should have ensured baseline comparability. However, the authors commented that the selection of patients who had been receiving the treatments for at least one year probably led to pre-selection of the less severe cases. No statistical results were presented to indicate whether the differences found in effectiveness were statistically significant.

Validity of estimate of measure of benefit
The estimate of benefit was derived directly from the effectiveness analysis. The measure used in the analysis was the annual cost per patient with improved NYHA class. Due to the retrospective nature of the study, the patients well-being and/or quality of life could not be taken into account. However, the use of NYHA allowed some inferences about quality of life to be implied.

Validity of estimate of costs
All the categories of costs relevant to the perspective adopted were included in the analysis. The cost reported related to the health insurance costs and not the full economic costs. The authors stated that similar results were obtained in the cost analysis from the societal perspective, which presumably looked at the full economic costs and not only health insurance costs. It would have been helpful if the cost results from the societal perspective had been presented within the paper. The costs and the quantities were reported separately.

The resource use quantities were taken from the study itself. No statistical analysis of the resource quantities was conducted. The prices were based on those applicable to the statutory health insurance in Germany. This underestimated the full costs since insurance payments were a proportion of the total costs and excluded patient co-payments.

Other issues
The authors made limited comparisons of their findings with those from other studies. However, this may have been due to a lack of studies within the same area. The results appear to have been reported comprehensively, although the authors failed to report any of the cost analyses conducted from the societal perspective. Within the limitations of the study, the conclusions reached by the authors seem justified.

The authors noted that the hospitalisation rates in the study seemed low compared with those documented in clinical...
trials. This is explained by the fact that only patients with NYHA classification II and III were included in the study. Class IV patients who are said to be hospitalised more frequently were not included in the study. On the other hand, the authors suggested that their observational study might be more generalisable to a 'real-life' setting than clinical trials.

The authors recognised that the lack of blinding to treatment or outcome was a weakness of the study. However, they argued that it is unlikely that physicians influenced the study by selecting particular patients for one group or the other, because of the complex nature of the matching procedure for which there were nine demographic and medical criteria.

**Implications of the study**
The authors suggest that, compared with furosemide treatment, torasemide represents an annual saving of DM 361 per patient in the overall (direct and indirect) costs. They conclude that the purchase price should not be the only factor considered when choosing a drug, since it is often not the major determinant of the overall cost of therapy. Decisions on drugs should, therefore, be based on a comprehensive cost analysis of the type described.

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