Cost-consequences analysis of natriuretic peptide assays to refute symptomatic heart failure in primary care

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.

CRD summary
This study examined the clinical and economic impact of natriuretic peptide compared with electrocardiogram for the diagnosis of symptomatic heart failure in primary care. The adoption of B-type natriuretic peptide had the potential to be cost-effective due to fewer delayed diagnoses and a small increased cost relative to electrocardiogram. The economic analysis was well conducted, but the clinical side was not described in detail and the results appear to be uncertain. Caution is required when interpreting the authors’ conclusions.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
This study examined the clinical and economic impact of using natriuretic peptide in comparison with electrocardiogram for the diagnosis of symptomatic heart failure in primary care.

Interventions
The use of point-of-care B-type natriuretic peptide (BNP) assay was compared against a diagnostic strategy using electrocardiograms (ECG) interpreted by consultants. The BNP assay provided results in about 15 minutes. All patients, who tested positive were assumed to receive hospital-based echocardiography within two months.

Location/setting
UK/primary care.

Methods
Analytical approach:
The economic evaluation was based on a decision tree model. The time horizon of the analysis was not reported, but it was the time until final diagnosis. The authors stated that the perspective of the UK National Health Service (NHS) was adopted.

Effectiveness data:
The clinical data came from the multi-centre UK Natriuretic Peptide (UKNP) study, which enrolled 306 symptomatic patients who were referred to a secondary care clinic after being triaged from primary care by the general practitioner (GP). The sample had a mean age of 74 years and 58% were female. The length of follow-up was not reported. The key clinical endpoint was the number of correct diagnoses achieved after first presentation to the GP.

Monetary benefit and utility valuations:
Not relevant.

Measure of benefit:
Health outcomes were not aggregated as a cost-consequences analysis was carried out. The primary measure of effectiveness was the number of correct diagnoses achieved after first presentation to the GP. Other clinical endpoints were also reported, for instance the true negatives determined without referral and the true positives referred to echocardiography after first presentation to the GP.
Cost data:
The economic analysis considered the following cost items: BNP assay, loop diuretic, consultant-read and GP-read ECG, GP consultation, and echocardiography. The unit costs and quantities of resources used were presented separately. The costs were derived from official NHS sources such as the British National Formulary, Personal Social Services Research Unit, and NHS reference costs. Quantities of resources were based on authors’ opinions. All costs were in UK pounds sterling (£) and the price year was 2004.

Analysis of uncertainty:
Two alternative scenarios were modelled using the full set of clinical data from the Scottish Health Technology Assessment (HTA) report and data from a study published in 2006. The impact of changes in the unit costs was also tested in a deterministic univariate sensitivity analysis.

Results
In a cohort of 1,000 eligible patients, the total costs were £70,900 with BNP and £70,280 with ECG. Thus, BNP was associated with an increase of £0.62 per patient.

The number of correct diagnoses achieved after first presentation to the GP was 744 with BNP and 671 with ECG. The true negatives determined without referral were 475 with BNP and 396 with ECG. The number of patients correctly diagnosed after re-presenting symptomatically to the GP was 71 with BNP and 65 with ECG. Thus, in general, BNP provided better diagnostic results.

When clinical data came from the Scottish HTA report, lower costs and better outcomes were associated with the BNP strategy, which was the dominant option. When using data from the 2006 study, the additional cost per patient with BNP over ECG was £22.44, which reflected the higher proportion of false-positive and fewer true-negative results.

In the base case, the BNP strategy was cost saving in the following scenarios: a reduction of £0.60 of the total BNP test cost, the cost of echocardiography above £58.80, or the cost of ECG above £31.00.

Authors’ conclusions
The authors concluded that the adoption of BNP in primary care had the potential to be cost-effective due to fewer delayed diagnoses for symptomatic patients and a very small increased cost relative to ECG.

CRD commentary
Interventions:
The authors provided a justification for their selection of the comparators. The National Institute for Health and Clinical Excellence (NICE) guidelines stated that ECG and natriuretic peptide tests might be used to help exclude heart failure, with echocardiography used only for confirmation. A potential limitation was the assumption that echocardiography was the gold standard, but this is not always the case due to the variability of technical skills.

Effectiveness/benefits:
The clinical data came from a published study and its methods were not reported. Thus, it is not possible to assess the validity of the clinical estimates. The authors considered two additional sources of data for the sensitivity analysis and these led to different results, which showed the high uncertainty in the clinical parameters. The clinical endpoints were typical of diagnostic interventions and will not be easily compared with the outcomes of other non-diagnostic procedures.

Costs:
The analysis of costs reflected the perspective stated and was extensively described in terms of the sources, unit costs, quantities of resources, price year, and various assumptions. Alternative costs were considered in the sensitivity analysis. The cost estimates were treated deterministically.

Analysis and results:
The clinical and economic outcomes were not synthesised given the cost-consequences framework. The findings were clearly reported. The assessment of uncertainty was restricted to individual variables and a comprehensive approach was
not used, but the analysis highlighted the most influential variables. The authors noted that the analysis referred mainly to a population of moderate-to-severe symptomatic patients, which might not be representative of very low prevalence situations.

Concluding remarks:
The economic analysis was well conducted, but the clinical side was not described in detail and the results appear somewhat uncertain. Thus, caution will be required when interpreting the authors’ conclusions.

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