Cost-effectiveness of point-of-care biomarker assessment for suspected myocardial infarction: the Randomized Assessment of Treatment using Panel Assay of Cardiac markers (RATPAC) trial

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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.

CRD summary
This study assessed the cost-effectiveness of rapid diagnosis, using a point-of-care cardiac biomarker panel of myoglobin, troponin, and creatine kinase muscle brain isoenzymes (CK-MB), for patients presenting to the emergency department with chest pain due to suspected myocardial infarction. The authors concluded that the point-of-care panel reduced hospital admissions, but was unlikely to be cost-effective compared with the usual diagnostic strategy, without point-of-care testing. The cost-effectiveness framework was valid and the authors’ conclusions appear to be robust.

Type of economic evaluation
Cost-utility analysis

Study objective
This study analysed the cost-effectiveness of rapid diagnostic assessment, using a point-of-care cardiac biomarker panel in patients presenting to the emergency department, with chest pain due to suspected myocardial infarction.

Interventions
The point-of-care cardiac biomarker panel consisted of myoglobin, troponin, and creatine kinase muscle brain isoenzymes (CK-MB), which were measured at baseline and at 90 minutes. The comparator was conventional diagnostic assessment, without the point-of-care panel. This included laboratory troponin assays, according to local protocols.

Location/setting
UK/hospital emergency department.

Methods
Analytical approach:
The analysis was based on a study with a three-month horizon. The authors stated that it was carried out from the perspective of the UK NHS.

Effectiveness data:
The clinical data were from the published Randomized Assessment of Treatment using Panel Assay of Cardiac markers (RATPAC) trial. This was a pragmatic multicentre randomised controlled trial of 2,243 patients attending six hospitals. There were 1,118 patients (mean age 54.6 years; 56% male) in the standard care group and 1,125 patients (mean age 54.5 years; 61% male) in the point-of-care group. The primary endpoint of the analysis was the avoidance of hospital admission and follow-up was three months.

Monetary benefit and utility valuations:
The utility values were collected from those patients enrolled in the trial using the European Quality of life (EQ-5D) questionnaire. These were mailed to all trial participants at one and three months after recruitment. UK tariffs were used and missing data were imputed.

Measure of benefit:
Quality-adjusted life-years (QALYs) were the summary benefit measure.
Cost data:
The economic analysis included the costs of point-of-care testing, emergency department personnel, surgical interventions, diagnostic procedures, out-patient visits and procedures, hospital stay, and community health services (general practitioner, nurse, and social worker). For most items, the resource quantities were estimated within the clinical trial, using a micro-costing approach based on 246 patients, missing data were imputed. The unit costs were from official national tariffs. Emergency department overheads were from a previous study by the trial investigators. All costs were in UK pounds sterling (£) and US dollars ($), at 2007 to 2008 prices.

Analysis of uncertainty:
Bootstrapped estimates for the costs and QALYs were calculated and confidence intervals and cost-effectiveness acceptability curves were generated. Different elements of resource use were directly compared. Multiple imputation was used for missing data and only complete cases were analysed. Two alternative scenarios were considered; one with cheaper point-of-care tests and the other excluding intensive care costs.

Results
With imputed missing values, the mean cost per patient was £1,217.14 (SD 3,164.93) or $1,987.14 (SD 4,939.25) in the point-of-care group and £1,005.91 (SD 1,907.55) or $1,568.64 (SD 2,975.78) in the standard care group (p=0.056). The findings were similar when only complete cases were analysed.

The mean QALYs were 0.158 (SD 0.056) with point-of-care testing and 0.161 (SD 0.052) with standard care (p=0.250). Standard care was dominant over point-of-care testing, as it was more effective and less expensive. The probability of standard care being dominant was 0.888 and the probability of point-of-care testing being cost-effective at a willingness-to-pay of £20,000 per QALY was 0.004.

These results were robust to the variations in the two alternative scenarios.

Authors’ conclusions
The authors concluded that point-of-care testing reduced hospital admissions, but was unlikely to be cost-effective compared with the usual diagnostic strategy without point-of-care testing.

CRD commentary
Interventions:
The selection of the comparators was appropriate as the proposed diagnostic strategy was compared against the usual approach. No clear description of standard care was given, but the authors reported that five of the six participating hospitals followed the national guidelines for the diagnosis of these patients.

Effectiveness/benefits:
A well-conducted clinical trial was used to derive the clinical data. This trial was described in a companion paper and only the key methods and results were given in this paper. The inclusion and exclusion criteria were clearly reported, as well as the results of the power calculation to justify the sample size. In general, the randomised and multicentre nature of the trial should ensure the internal validity of the clinical data and a pragmatic trial was suitable for the economic analysis. Two methods were used to cope with missing data and these were clearly reported. QALYs were a valid benefit measure and they allow cross-disease comparisons to be made. The EQ-5D was a valid tool to elicit the preferences, which were from a relatively large subgroup of patients in the trial.

Costs:
The cost categories reflected the perspective of the NHS. The resource use was gathered alongside the clinical trial, using a micro-costing approach that should have ensured that the data were detailed. Both the resource quantities and the unit costs were reported, with their sources, which were typical of the UK. The authors stated that the trial had insufficient power to detect differences in individual resource use, so no conclusions could be drawn on single items. The costs were treated stochastically. Details, such as the price year and currency, were provided.

Analysis and results:
The results were extensively presented for both patients with complete data and the whole sample using imputed values.
The costs and benefits were not synthesised because standard care dominated the point-of-care testing. The authors provided a valid justification for the selection of the three-month time horizon. The uncertainty was satisfactorily investigated, using both bootstrapping and deterministic analyses, and the results were clearly illustrated and discussed. The pragmatic trial was externally valid, but the results should be considered to be specific to the UK.

Concluding remarks:
The cost-effectiveness framework was valid and the authors’ conclusions appear to be robust.

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