Comparison of mass and targeted screening strategies for cardiovascular risk: simulation of the effectiveness, cost-effectiveness and coverage using a cross-sectional survey of 3921 people

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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 examined the cost-effectiveness of mass versus targeted screening strategies for the primary prevention of cardiovascular events in the general population aged 40 to 74 years. Targeted screening was more cost-effective. The best strategy was to screen individuals with a family history of premature cardiovascular disease and those living in deprived communities. The authors’ conclusions appear to be robust, given the limitations of their methods.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
This study examined the cost-effectiveness of mass versus targeted screening strategies for the primary prevention of cardiovascular events in the general population aged 40 to 74 years.

Interventions
The interventions were mass screening of the whole population aged 40 to 74 years; targeted screening of individuals living in deprived communities; targeted screening of individuals with a family history of premature cardiovascular disease; screening of individuals who either lived in deprived communities or had a family history of premature cardiovascular disease; and screening of individuals who both lived in deprived communities and had a family history of premature cardiovascular disease. A strategy of no screening was also considered.

Location/setting
UK/primary care.

Methods
Analytical approach:
The analysis was based on a single source of evidence and simulation models were run for two different populations, which were everyone aged 40 to 74 years who was at risk of cardiovascular disease, and men aged 40 to 54 years and women aged 40 to 64 years who were at risk of premature cardiovascular disease. A short time horizon was used, equivalent to the period of screening and follow-up for the screening results. The authors did not explicitly report the perspective adopted.

Effectiveness data:
All the clinical data were from the Scottish Health Survey, which was undertaken in 1998 and 2003. After excluding individuals with cardiovascular disease and those with missing data, the survey included 3,921 participants aged between 40 and 74 years, and 2,486 participants at risk of premature cardiovascular disease. The survey used multi-stage, stratified sampling to provide a representative sample of the Scottish population, and included face-to-face interviews and physical measurements. The risk factors for cardiovascular disease were the key endpoints. High risk was defined as an ASSIGN risk score of 20 or more, based on age, sex, systolic blood pressure, cigarette consumption, family history, and socio-economic status.

Monetary benefit and utility valuations:
Not considered.
Measure of benefit:
The measure of benefit was the number-needed-to-screen to detect one person at high risk of cardiovascular disease.

Cost data:
The economic analysis included only the costs of screening, such as contacting people and arranging appointments, a screening appointment undertaken by a practice nurse, the laboratory assaying of cholesterol and glucose concentrations, and a follow-up appointment to receive the results. The unit costs were from official listings by the Department of Health for England and Wales. All costs were in UK pounds sterling (£) and the price year was 2008.

Analysis of uncertainty:
A deterministic sensitivity analysis was undertaken using alternative estimates for the unit costs and screening uptake rate.

Results
In the population of individuals at risk of cardiovascular disease, the number-needed-to-screen to detect one person at high risk of cardiovascular disease was 2.3 for those with a family history in deprived communities; 3.0 for all those in deprived communities; 3.2 for all with a family history; 3.3 for those with a family history or in deprived communities; and 4.9 with mass screening. The mean cost per high-risk case detected was £53 for family members in deprived communities; £69 for all in deprived communities; £75 for all family members; £76 for family members or deprived communities; and £113 for mass screening.

After excluding the dominated strategies, the additional cost for every additional high-risk person identified compared with the next more effective strategy was £53 (range 31 to 75) for family members in deprived communities (over no screening); £80 (range 46 to 114) for all family members; £91 (range 52 to 129) for family members or deprived communities; and £119 (range 115 to 283) for mass screening.

In the population at risk of premature cardiovascular disease, the incremental cost for every additional high-risk person identified was £75 (range 43 to 107) for family members in deprived communities (over no screening); £215 (range 124 to 306) for family members or deprived communities; and £1,358 (range 784 to 1,931) for mass screening.

The base-case findings remained unaltered in the sensitivity analyses.

Authors' conclusions
The authors concluded that targeted screening strategies were more cost-effective than mass screening. The best strategy to identify those at high risk of cardiovascular disease was to screen individuals with a family history of premature cardiovascular disease. The best strategy to identify those at high risk of premature cardiovascular disease was to screen those with a family history and those living in deprived communities.

CRD commentary
Interventions:
The selection of the comparators was appropriate as mass screening (complete coverage) was compared with strategies with more limited coverage and no screening.

Effectiveness/benefits:
The survey that provided the epidemiological data was representative of the Scottish population. A number of participants had to be excluded, but the authors noted that the included and excluded participants were comparable in their potential confounding factors, such as deprivation, smoking, family history, and gender. The two surveys were combined to increase the power of the study, but the surveys did not provide all the information required to determine the risk level and so the ability to detect cases, using the targeted strategies, might have been underestimated. The benefit measure was typical and appropriate for screening or test strategies, but it will not permit comparisons to be made with other disease areas.

Costs:
The perspective was not explicitly reported, but appears to have been that of the health service, as suggested by both the
categories of costs and their sources. The unit costs of some items were reported, as well as the price year, which enhances the possibility of replicating the analysis in other settings and time periods. The sources for the resource use data were not clearly reported. Alternative estimates for the unit costs were used in the sensitivity analyses and these showed that the base-case results were robust.

Analysis and results:
The results were clearly reported and were appropriately synthesised, but the reasons for choosing one strategy over another were not completely clear, as a threshold for the incremental cost per case detected was not given. The issue of uncertainty was only partly investigated, using a deterministic approach. Limited information on the simulation models was reported. The results of this study should be considered to be UK specific and cannot be easily transferred to other settings.

Concluding remarks:
The authors’ conclusions appear to be robust, given the limitations of their methods.

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