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ORIGINAL PAPER

Modeling the costs and long-term health benefits of screening the general population for risks of cardiovascular disease: a review of methods used in the literature

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Abstract
Background Strategies for screening and intervening to reduce the risk of cardiovascular disease (CVD) in primary care settings need to be assessed in terms of both their costs and long-term health effects. We undertook a literature review to investigate the methodologies used.
Methods In a framework of developing a new health-economic model for evaluating different screening strategies for primary prevention of CVD in Europe (EPIC-CVD project), we identified seven key modeling issues and reviewed papers published between 2000 and 2013 to assess how they were addressed.
Results We found 13 relevant health-economic modeling studies of screening to prevent CVD in primary care. The models varied in their degree of complexity, with between two and 33 health states. Programmes that screen the whole population by a fixed cut-off (e.g., predicted 10-year CVD risk >20 %) identify predominantly elderly people, who may not be those most likely to benefit from long-term treatment. Uncertainty and model validation were generally poorly addressed. Few studies considered the disutility of taking drugs in otherwise healthy individuals or the budget impact of the programme.
Conclusions Model validation, incorporation of parameter uncertainty, and sensitivity analyses for assumptions made are all important components of model building and reporting, and deserve more attention. Complex models may not necessarily give more accurate predictions. Availability of a large enough source dataset to reliably estimate all relevant input parameters is crucial for achieving credible results. Decision criteria should consider budget impact and the medicalization of the population as well as cost-effectiveness thresholds.

Keywords Cost-effectiveness analysis · Screening · Cardiovascular disease · Primary prevention · Statins · Literature review

JEL Classification I180 · H510

Introduction

Cardiovascular disease (CVD) is a major public health problem with a huge impact on health service budgets in European countries [1]. Current guidelines for primary prevention of CVD generally involve a combination of advice for lifestyle change and/or pharmacological intervention (e.g., statins or anti-hypertensives) in those assessed to be at sufficiently high-risk [2–5]. The parameters of such programmes vary greatly between countries. Most countries use opportunistic case finding, although the UK has recently launched a national screening programme [6]. National guidelines recommend initiating statin therapy when the 10-year risk of CVD exceeds 7.5 % in the USA [2], 10 % in the UK [7], and 20 % in other countries [8]. An explicit comparison of the costs and benefits of CVD risk assessment and treatment informs some guidelines [7],

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