Cost-Effectiveness and Decision Making

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Why cost-effectiveness analyses?

Cost-effectiveness analysis is a comparative analytical framework that evaluates health outcomes and costs of interventions and reports their value for money in terms of cost for added health. The health outcome incorporates all health benefits and hazards of interventions (e.g. quality-adjusted life year, QALY); costs are evaluated from the perspective of the payer or society; and the time horizon should be long enough for the effects of interventions on all health outcomes and costs to fully emerge. Cost-effectiveness analyses are routinely used in decision making around the world (e.g. National Institute for Health and Care Excellence (NICE) in England) to maximise the population health that is achievable with available resources.

HERC work on cost-effectiveness in health

Much of the work in HERC is aimed at improving methods and developing robust cost-effectiveness analyses to inform healthcare decisions related to treatments, procedures, diagnostic methods, screening practices, healthcare delivery routes, and new technologies. We carry out economic analysis alongside clinical trials; develop modelling studies using data from a number of trials and other sources. In all this work, we are constantly examining and refining aspects of the research methodology. Here, three landmark studies are presented to illustrate our work.

Cost-effectiveness of LDL cholesterol lowering

HERC has been developing cost-effectiveness analyses of LDL-cholesterol lowering using data from the Heart Protection Study (HPS), Study of Heart and Renal Protection (SHARP) and the individual participant data meta-analysis of large statin trials (Cholesterol Treatment Collaboration) in collaboration with the Clinical Trials Service Unit. This work has shown that:

A. Statins are effective for a much wider population than previously accepted (including people at low cardiovascular risk, Figure 1) and the benefits strongly outweigh the potential hazards. *Lancet 2012; 380: 581-90*.
B. At current generic prices, statins are cost effective in a wider population than routinely treated (Table 1). *BMJ 2006;333:1145.*

Figure 1: Major vascular events avoided at different levels of risk per 1000 treated with statin over 5 years

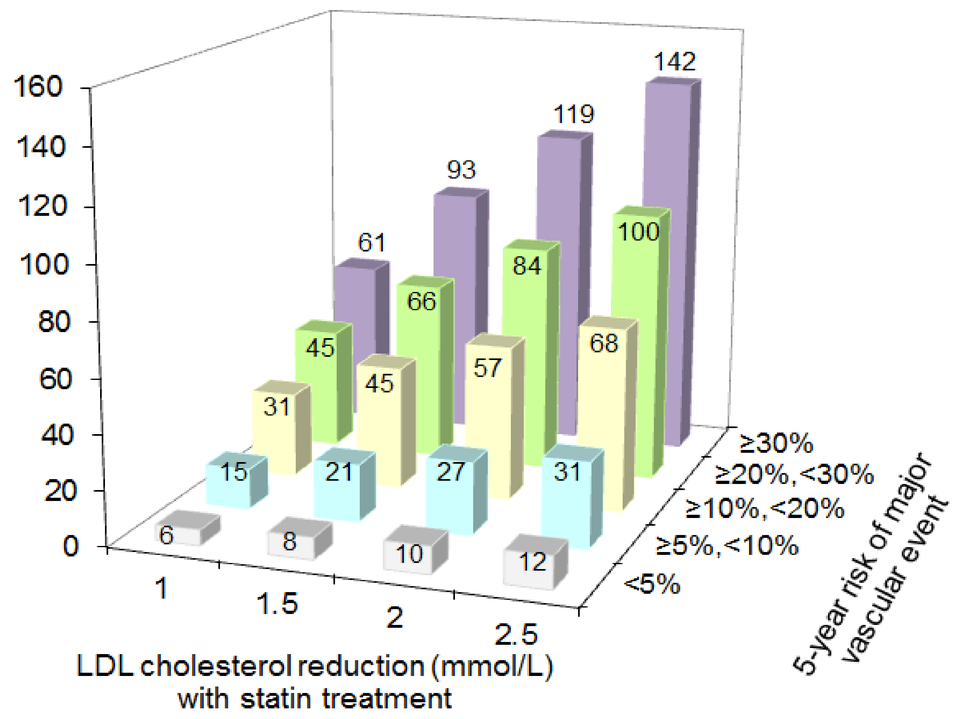


Table 1: Cost-effectiveness lifetime use of generic 40mg simvastatin daily (at £4.87 per 28-day pack)

Age (years)	Quality adjusted life years gained (QALY)[1] 5-year major vascular event risk 5%	10%	20%	40%	Cost (£) per QALY[1,2] 5%	10%	20%	40%
35	0.35	0.48	0.80	1.19	580	-460	-1370	-2060
45	0.33	0.44	0.70	1.04	430	-480	-1210	-1600
55	0.30	0.39	0.59	0.89	550	-280	-900	-1070
65	0.24	0.31	0.46	0.70	930	70	-510	-590
75	0.17	0.21	0.32	0.47	1740	650	-50	-140
85	0.09	0.12	0.18	0.26	3740	1870	690	420

[1] Discounted at 3.5% per annum [2] Negative figures indicate cost savings

Ongoing work at HERC will report lifetime benefits and cost-effectiveness of different statin therapies for people at different vascular disease risk and cost-effectiveness of LDL cholesterol lowering in chronic kidney disease.

Cost-effectiveness of policies to control indoor radon

Epidemiological data on risks from indoor radon and from smoking, vital statistics on deaths from lung cancer, survey information on effectiveness and costs of radon prevention and remediation have been used in an evaluative framework to determine the number of deaths from lung cancer related to radon in the home and to explore the cost effectiveness of policies to control indoor radon. The analyses show that policies requiring basic preventive measures against radon in all new homes throughout the UK would be cost effective. Policies involving remedial work on existing homes with high radon levels cannot prevent most radon related deaths, as these are caused by moderate exposure in many homes and are not cost-effective (Table 2). *BMJ 2009;338:a3110.*

Table 2: Cost-effectiveness of policies to control radon in England

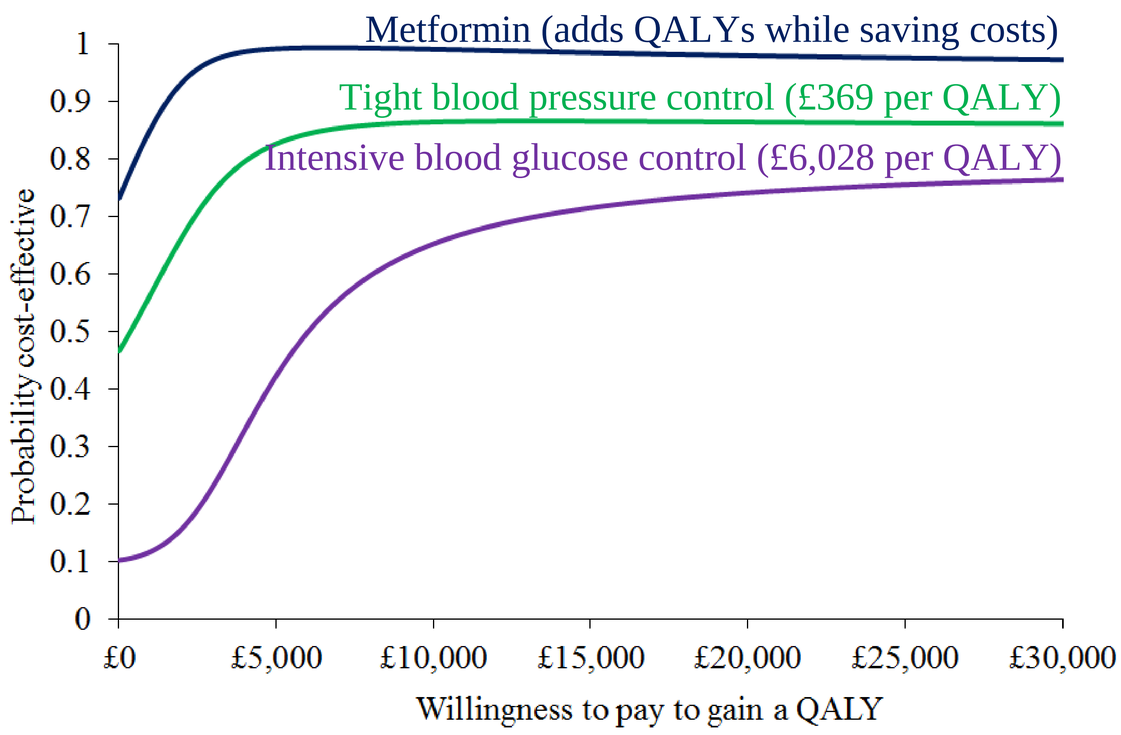
Policy	Cost per QALY
Current government policy to control radon in England: preventive measures in homes in areas where 3% of homes have measured radon> 200 Bq/m³	
New homes:	£7,950
Existing homes:	£36,830
A policy requiring basic measures to prevent radon in new homes	£11,400 across UK (£6,600 to £21,400 across ranges of mean indoor radon concentrations from 90Bq/m³ to 10 Bq/m³)
A policy requiring remediation work in existing homes if measurement as above action level	£29,900 to £17,840,700 across targeted area and action level

At present HERC is extending this work to the whole of the European Union to aid review of existing EU radon prevention and remediation strategies.

Cost-effectiveness analyses in Diabetes UK prospective diabetes study and beyond

Over the past 15 years HERC has been developing a body of work on the consequences of diabetes and the cost-effectiveness of interventions in people with diabetes using the UK prospective diabetes study (UKPDS). The cost-effectiveness analyses of tight vs. less tight blood pressure control, intensive vs. less conventional blood glucose control and metformin showed that each was highly cost-effective (Figure 2) and that all could be provided at modest total costs. These analyses have been instrumental in informing guidelines and standards of care and the analytical framework is widely used externally for valuations of long-term effects and cost-effectiveness of interventions in diabetes. *Diabetologia 2005; 48: 868-877.*

Figure 2: Cost-effectiveness of tight blood pressure, intensive blood glucose control and metformin interventions in diabetes



Ongoing HERC studies aim to use and extend the developed frameworks to evaluate cost-effectiveness of acarbose (in the Acarbose Cardiovascular Evaluation study), exenatide (in the EXenatide Study of Cardiovascular Event Lowering) and Sitagliptin (in the Trial Evaluating Cardiovascular Outcomes with Sitagliptin) in patients with diabetes.