A cost-effectiveness analysis of superficial femoral artery endovascular interventions.

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Objectives

Peripheral arterial disease (PAD) can lead to reduced health-related quality of life for individuals and increased costs for healthcare systems. Results from a systematic review and cost-effectiveness analysis were published in 2013 (Kearns, 2013); this considered alternatives to percutaneous transluminal angioplasty (PTA) as treatment for PAD. In the preceding years additional evidence on alternatives to PTA have arisen. In particular, a new class of bare metal stent – the biomimetic stent – is now available.

The objective of this work was to update the cost-effectiveness analysis to incorporate the latest clinical effectiveness evidence. Both UK and German healthcare perspectives were considered.

What is a cost-effectiveness analysis?

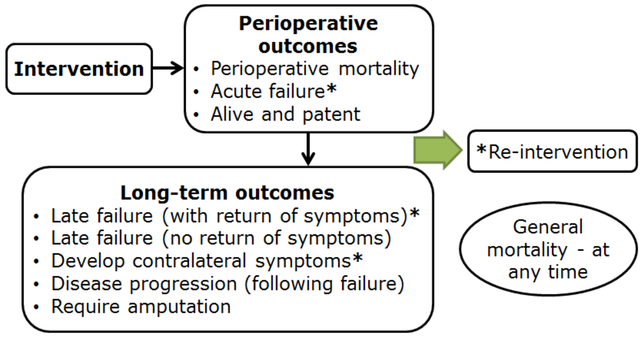
For a health technology (such as a stent), a cost-effectiveness analysis considers as outputs both the lifetime costs incurred by the healthcare system and also the impact on a patient's length of and quality of life. For PAD costs relate to the cost of the initial treatment, along with the management and treatment of PAD (including re-interventions) if symptoms return. For patients, quality of life is reduced if they experience a return of symptoms or if their disease progresses. Length of life will be reduced if a patient dies during a re-intervention.

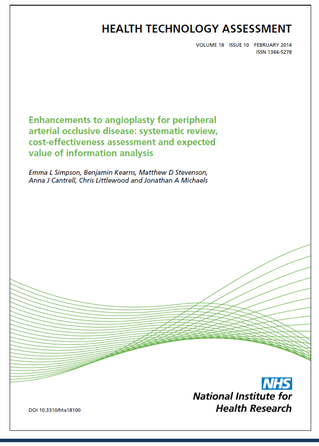
Cost-effectiveness analyses attempt to help answer the question 'does a health technology represent value for money?'. This is important because healthcare systems cannot pay for all clinically effective technologies, so a framework is needed to inform decisions about what to pay for.

Methods

The mathematical model from the previous cost-effectiveness analysis was used. This model simulates outcomes and costs associated with the use of PTA or an alternative intervention. Outcomes include mortality (due to the intervention other causes), rates of acute or late failure, return of symptoms, disease progression and rates of amputation. A model schematic is provided in Figure 1. For more details see Simpson *et al* (2014).

Figure 1: Model; schematic.

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Enhancements to angioplasty for peripheral arterial occlusive disease: systematic review, cost-effectiveness assessment and expected value of information analysis

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Inputs

Clinical effectiveness data were taken from the systematic review and meta-analysis of Jens *et al* (2014). The main clinical outcome was return of symptoms, defined as the need for clinically-driven target lesion revascularization. Evidence for biomimetic stents was taken from The Mimics study: a multi-centre randomised controlled trial of the BioMimics 3D stent compared to a bare metal (nitinol) stent (*Zeller T, unpublished data*).

UK costs were based on a mixture of NHS reference costs, company prices, hospital prices and expert opinion. German costs were supplied by German purchasing organisations, providing 3 different German cost estimates.

Data on health-related quality of life came from the previous cost-effectiveness analysis.

Five interventions were considered; these are summarised in Table 1.

Table 1: Interventions considered	Relative risk; return of symptoms	Cost estimates (2013/14)			
		UK £	€ (set 1)	€ (set 2)	€ (set 3)
PTA with bail-out bare metal stents	1	£3,248	€ 3,898	€ 3,898	€ 3,898
Bare metal stents	0.7261	£3,848	€ 4,354	€ 4,498	€ 4,282
Drug eluting stents	0.5458	£4,208	€ 4,678	€ 5,053	€ 5,038
Drug eluting balloons (DEB)	0.2739	£4,604	€ 4,848	€ 4,888	€ 5,360
Biomimetic (BioMimics 3D) stent	0.2711	£3,968	€ 4,618	€ 4,618	€ 4,618

Results

Use of a biomimetic stent, BioMimics 3D, was estimated to dominate the other interventions as it was associated with both lower lifetime costs and greater effectiveness. This result held for both UK and German healthcare perspectives, for all the cost estimates, and for different re-intervention strategies (PTA or DEB).

Of the remaining interventions, drug eluting balloons were always the most effective, and PTA the least effective. There was uncertainty in the cost-effectiveness results, with key drivers being the costs and effectiveness of the biomimetic stent along with the costs of drug eluting balloons.

Conclusions

The four alternatives to PTA were all estimated to be clinically more effective over a patients lifetime, with the biomimetic stent being the most cost-effective. As there was uncertainty in the results, the interventions have different mechanisms of action, all four should be considered as potential alternatives to PTA.

References

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