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A Cost-effectiveness Analysis of Surgery, Endothermal Ablation, Ultrasound-guided Foam Sclerotherapy and Compression Stockings for Symptomatic Varicose Veins

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WHAT THIS PAPER ADDS

This cost-effectiveness analysis directly informed the recommendations made by NICE clinical guideline CG168, which was commissioned to reduce the uncertainty around the clinical and cost-effectiveness of these treatments. The analysis shows that interventional treatment for varicose veins is a cost-effective use of NHS resources.

Objective: The aim was to investigate the cost-effectiveness of interventional treatment for varicose veins (VV) in the UK NHS, and to inform the national clinical guideline on VV, published by the National Institute of Health and Care Excellence.

Design: An economic analysis was constructed to compare the cost-effectiveness of surgery, endothermal ablation (ETA), ultrasound-guided foam sclerotherapy (UGFS), and compression stockings (CS). The analysis was based on a Markov decision model, which was developed in consultation with members of the NICE guideline development group (GDG).

Methods: The model had a 5-year time horizon, and took the perspective of the UK National Health Service. Clinical inputs were based on a network meta-analysis (NMA), informed by a systematic review of the clinical literature. Outcomes were expressed as costs and quality-adjusted life years (QALYs).

Results: All interventional treatments were found to be cost-effective compared with CS at a cost-effectiveness threshold of £20,000 per QALY gained. ETA was found to be the most cost-effective strategy overall, with an incremental cost-effectiveness ratio of £3,161 per QALY gained compared with UGFS. Surgery and CS were dominated by ETA.

Conclusions: Interventional treatment for VV is cost-effective in the UK NHS. Specifically, based on current data, ETA is the most cost-effective treatment in people for whom it is suitable. The results of this research were used to inform recommendations within the NICE guideline on VV.

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INTRODUCTION

Visible varicose veins (VV) in the lower limbs are estimated to affect at least a third of the UK population.[1] Although in some people these veins remain asymptomatic, in others they cause symptoms such as pain, aching, or itching and can have a significant negative effect on health-related quality of life (HRQL). Symptoms may become more severe with time or complications may develop, including bleeding, thrombophlebitis, skin damage, and ulceration. One study showed that 28.6% of those who had visible VV without oedema or other complications progressed to more severe venous disease after 6.6 years.[2] A number of treatments for VV have been shown to increase HRQL[3] and are thought to slow progression of the disease. Such treatments range from compression stockings (CS), to minimally invasive (endovenous) interventional procedures (principally ultrasound-guided foam sclerotherapy, UGFS, and

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endothermal ablation, ETA), to surgery. In 2011/2012, 32,704 VV procedures were carried out in the UK NHS,[4] yet national figures suggest that the number of VV procedures undertaken in the UK is decreasing each year. In addition, the UK NHS lags significantly behind its European counterparts in terms of numbers of procedures per population; a fourfold difference can be seen between the number of procedures per million population in the UK compared with Germany.[5] Clearly there is great disparity in the way VV are treated across Europe.

Recommendations for referral were published by NICE in 2001,[6] yet the recommendations have not widely been adhered to. This has led to a "postcode lottery", and precipitated a clinical guideline on the diagnosis and management of VV, which was commissioned by the NICE.[7,8] The aim was to provide guidance on the diagnosis and management of VV in order to improve patient care and minimize regional variation across the UK. The guideline was developed through work with a multi-disciplinary Guideline Development Group (GDG), and followed the procedures set out in the guidelines manual.[9] The cost—utility analysis (CUA) outlined in this paper was developed as part of the VV guideline. Cost-effectiveness analysis is integral to the guideline process, as it allows the interventions that offer the greatest value for money to be prioritized, where clinically appropriate. Such prioritization is necessary when faced with budget constraints, as spending in one area of healthcare displaces spending elsewhere. The relevance of cost-effectiveness analysis and the implications for the treatment of VV have been discussed elsewhere.[10]

METHODS

An overview of the methods for this economic evaluation are presented here; full details can be found in Appendix L to the full guideline.[7]

An economic analysis was conducted to compare the cost-effectiveness of surgery (stripping and ligation), ETA (radiofrequency ablation, RFA, and endovenous laser ablation, EVLA, considered together), UGFS, and CS, as these were the treatments considered in the guideline. Note that the decision to consider RFA and EVLA together was made by the GDG, as the basic principle of ultrasound-guided endovenous thermal ablation is shared between the techniques and the results are very similar. For a discussion on the potential differences in costs between RFA and EVLA please refer to Appendix L of the full guideline.[7] The model considered adults with primary unilateral great saphenous vein (GSV) incompetence (chosen for being a common presentation of VV), who were potentially suitable for treatment by any of the four treatment options.

A Markov model was developed (Fig. 1). All patients were assumed to have a first treatment episode, which comprised an initial treatment and top-up treatment where necessary. Following this, the treatment episode was considered to be complete. Patients could experience clinical recurrence of VV (defined as development of symptoms of VV in a treated limb), the probability of which differed by

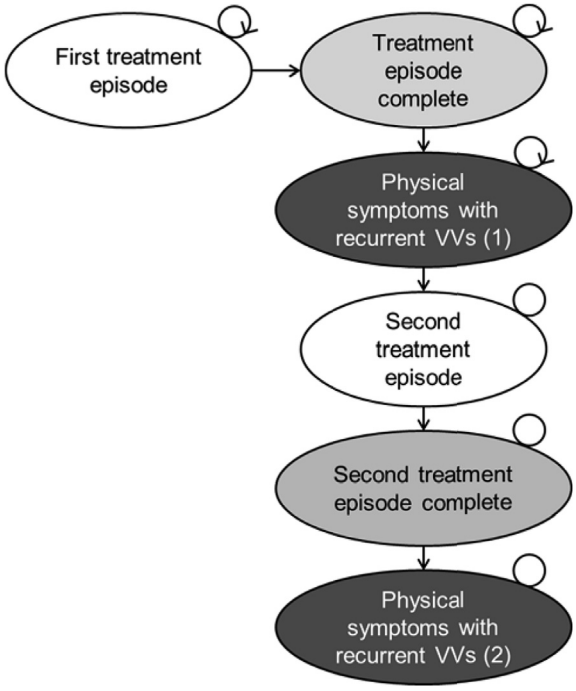

Figure 1. Model diagram. Schematic diagram of the Markov model designed to compare the cost-effectiveness of treatments for VV. The arrows denote possible transitions between states. All patients enter the model through the "First treatment episode" state. The state "Dead" was included in the model but is not shown in this diagram.

treatment option. A proportion of recurrent patients were assumed to undergo a second treatment episode (6 months after the onset of the recurrence), after which they could experience recurrence for a second time, but would not receive further treatment.

CS was modelled separately to the other three treatments, as the outcomes of completed treatment and clinical recurrence are not clinically meaningful when considering this management technique. Inputs were based on clinical evidence identified in the systematic review undertaken for the guideline, supplemented by additional data sources as required. The model cohort was assumed to be 65% female and have a starting age of 50, which was the approximate mean of all the patients from the included trials (all-cause mortality rates are age and gender specific but are unrelated to health state or treatment strategy). The model was built probabilistically to take account of the uncertainty surrounding each input parameter. Various deterministic sensitivity analyses were also undertaken to test the robustness of the model to different assumptions and data sources (deterministic sensitivity analysis involves varying the inputs of the model, in order to investigate the effect they have on the results). The model was built with a 1-month cycle length (chosen as this was deemed to be the minimum clinically meaningful time interval to detect differences between interventions), over a time horizon of 5 years in the base case. A time horizon of 5 years was chosen as clinical data were only available for a follow-up of 3 years, and the GDG did not feel