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Management of Unruptured Intracranial Aneurysms in the Elderly: a Cost-Effectiveness Analysis

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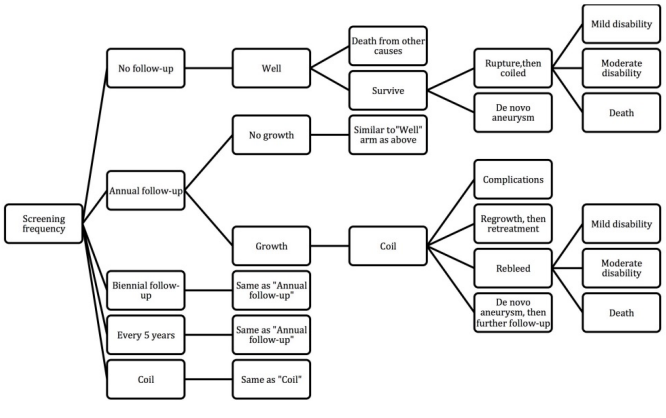
Introduction

Unruptured intracranial aneurysms (UIAs) are relatively common, with a significant proportion in patients above 65 years of age. This study evaluates the cost-effectiveness of five different management strategies for UIAs in elderly patients - annual magnetic resonance angiography (MRA) screening, biennial MRA screening, MRA screening every 5 years, coiling and follow-up and, no treatment or preventive follow-up.

Methods

A decision-analytic model-based cost-effectiveness analysis was done using inputs from the medical literature. A Markov decision model was constructed from a societal perspective starting with patients 65 -year-old on average, with incidental detections of UIA and no prior history of subarachnoid hemorrhage. Probabilistic, one-way, and two-way sensitivity analyses were performed.

Figure 1. Decision tree structure.



Results

The base-case calculation shows no preventive follow-up to be the most cost-effective strategy (cost: $10,838, health benefit: 14.01 QALYs), showing lower costs and higher effectiveness. Among the imaging follow-ups, MRA every 5 years is the most cost effective. The conclusion remains robust in probabilistic and one-way sensitivity analyses. No routine follow-up remains the optimal strategy when the annual growth rate and rupture risk of growing aneurysms are varied. When the annual rupture risk of non-growing UIAs is 5.3%, coiling should be performed directly.

Figure 2. One-way sensitivity analysis varying the annual growth rate of aneurysms.

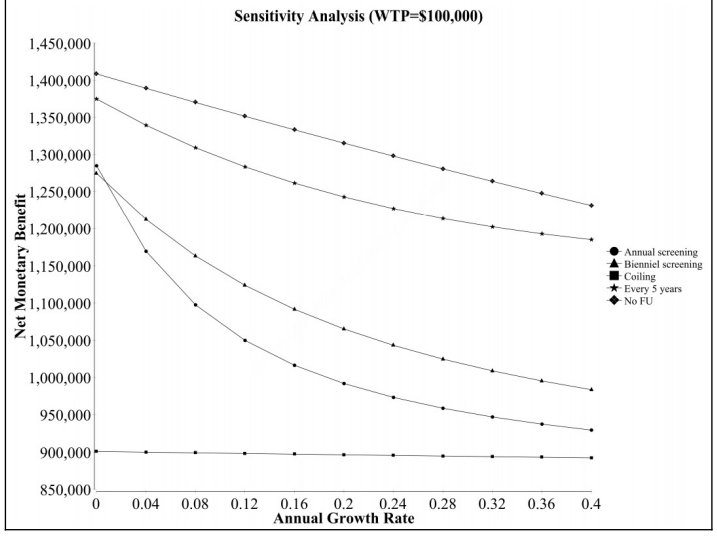
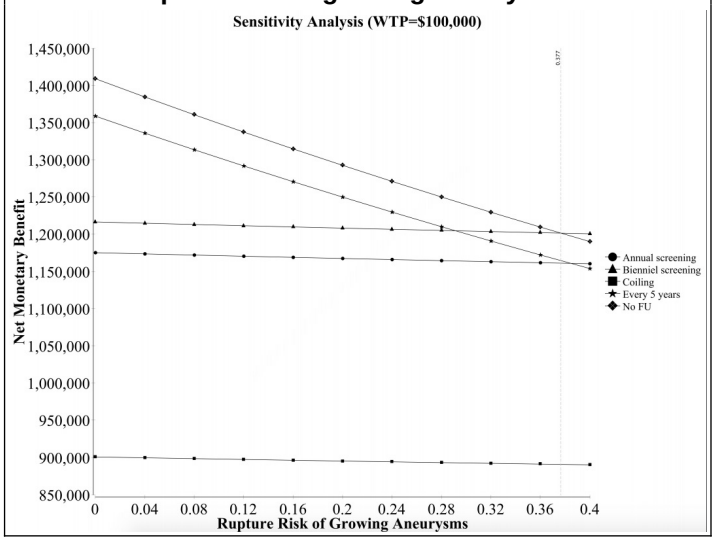


Figure 3. One-way sensitivity analysis varying the rupture risk of growing aneurysms.



Conclusions

Given the current literature, routine preventive treatment or periodic, close imaging follow-up is not a cost-effective strategy in all elderly patients with unruptured intracranial aneurysms. More aggressive management strategies might be more appropriate in selected patients at high risk for rupture.

References

1. Brinjikji W et al. Effect of age on outcomes of treatment of unruptured cerebral aneurysms: a study of the National

Inpatient Sample 2001-2008. Stroke 42:1320-1324;2011.

2. Sturiale CL et al. Endovascular treatment of intracranial aneurysms in elderly patients: a systematic review and meta-analysis. Stroke 44:1897-1902;2013.

Learning Objectives

To evaluate different management strategies for unruptured intracranial aneurysms in the elderly using a decision-analytic model-based cost-effectiveness analysis.