# Cost-Effectiveness Analysis of Virtual Stent Versus Coronary Angiography in Guiding Coronary Stent Implantation in China: A Markov Model

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## INTRODUCTION

While coronary angiography is limited to providing imaging assessment of coronary artery stenosis, it remains the standard technique for guiding percutaneous coronary intervention in patients with coronary artery disease[1]. A new technology based on imaging and computational fluid dynamics modeling, known as virtual stent technology, enables the visual display and predictive assessment of the functional outcomes of stent implantation at narrowed vascular sites before actual stenting procedures[2][3].

## OBJECTIVE

**This study aimed to assess the long-term cost-effectiveness of virtual stent compared with coronary angiography in guiding coronary stent implantation in China.**

## METHOD

We build a discrete-time Markov model to compare the cost-effectiveness of virtual stent strategy versus coronary angiography strategy. In the model, a complete cycle was run 10 times to reflect a 10-year follow-up time span. Transition probabilities, costs and quality-adjusted life-years (QALYs) along the Markov chain were adopted from the published literature. We calculated incremental cost-effectiveness ratio (ICER) and observed the trend of ICER over 10 years. Sensitivity analyses were conducted to verify the robustness of the results.

## RESULTS

At the end of year 10, the virtual stent strategy gained 43,384.84 yuan in cost and 7.3451 QALYs in effectiveness. In contrast, the coronary angiography strategy gained 41,135.71 yuan in cost and 7.2733 QALYs in effectiveness. **The ICER between the two strategies over 10 years was 31,316.91 yuan/QALYs, which was lower than the proposed willingness-to-pay levels.** The ICER decreased as the number of cycle years increased, with the rate of decrease gradually slowing down. The results remained robust in all of the sensitivity analyses.

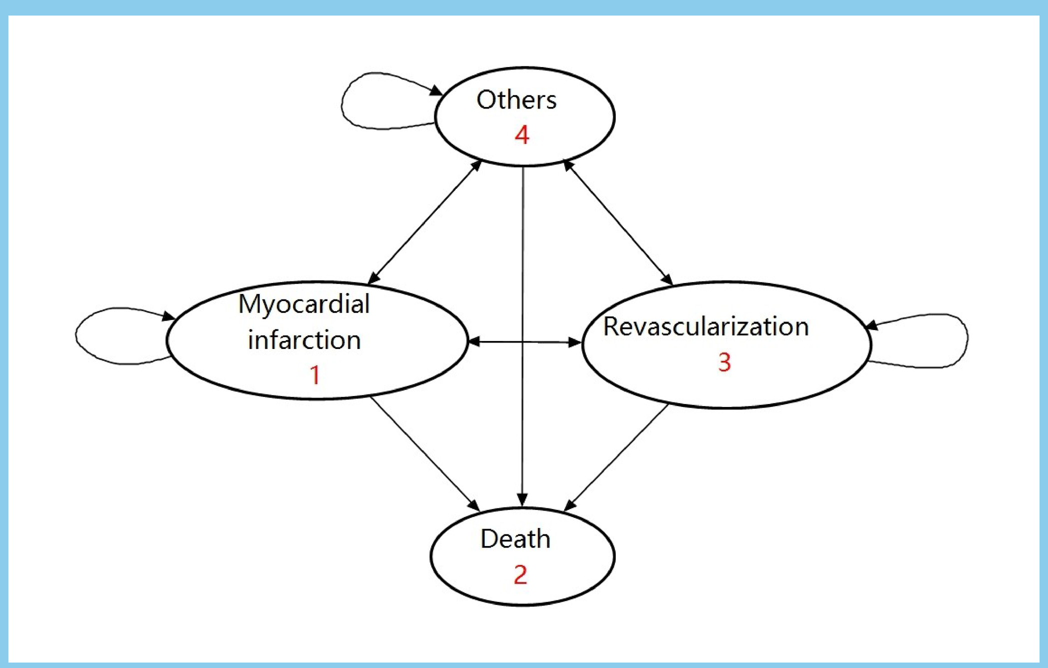


***Figure 1.*** *State transition diagram of the Markov model. Circles represent health states and arrows represent transitions between states.*

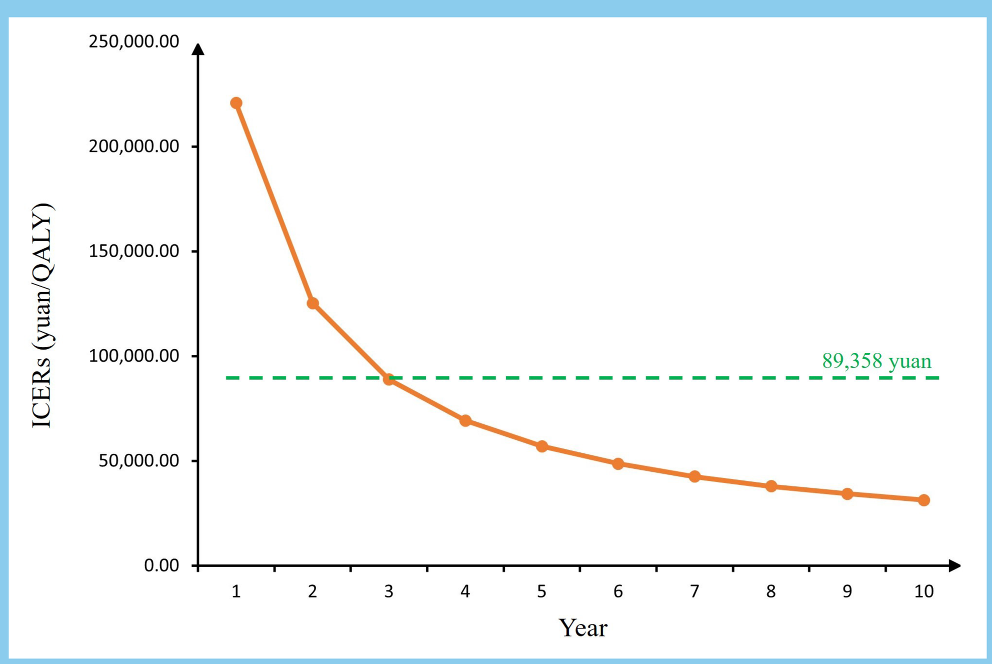


***Figure 2.*** *The line graph presents the trend of ICER changes over 1 to 10 years of cycling periods. The green dashed line represents once the GDP per capita.*

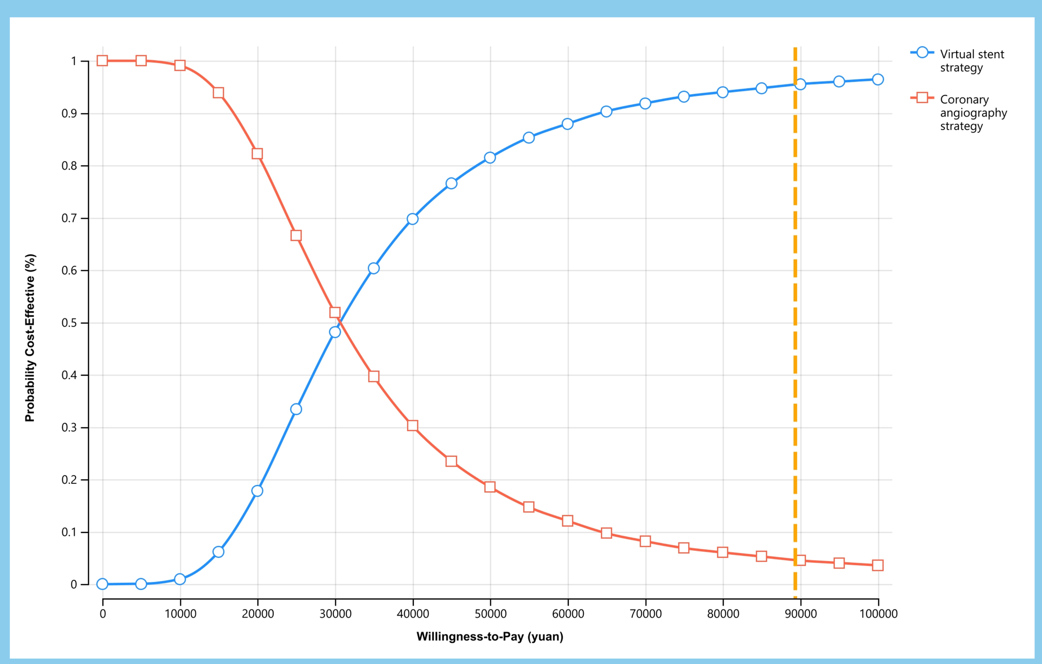


***Figure 3.*** *Cost-effectiveness acceptability curve. This figure represents the probability of cost-effectiveness over a range of willingness-to-pay thresholds per quality-adjusted life-year (QALY) gained. The orange dashed line represents once the GDP per capita.*

## CONCLUSIONS

**This cost-effectiveness analysis indicates that virtual stent strategy has a relative superiority compared to coronary angiography surgery, suggesting that virtual stent technology should be considered when guiding coronary stent implantation.** And we look forward to more large-scale randomized controlled trials on virtual stent in the future to further validate our findings.

## REFERENCES

[1] *European Heart Journal*. 2019;40(2):87-165.

[2] *EuroIntervention*. 2020;16(7):591-599.

[3] *JACC Cardiovasc Interv*. 2013;6(2):149-157.

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