



CHULABHORN  
ROYAL ACADEMY

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PIN 31

# COST PER CYTOMEGALOVIRUS-ASSOCIATED DEATH AVERTED OF GANCICLOVIR AND VALGANCICLOVIR USE FOR PRE-EMPTIVE AND TREATMENT STRATEGIES IN ALLOGENEIC POSTTRANSPLANT RECIPIENTS

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## INTRODUCTION

Thai current practice showed 74% of recipients were treated with no specific pattern of anti-cytomegalovirus (CMV) drug, while the international guideline recommended pre-emptive strategy. Moreover, oral valganciclovir could reduce the direct non-medical and indirect costs, but valganciclovir costs were higher than intravenous ganciclovir.

In Thailand, for intravenous use, ganciclovir has been on the National List of Essential Medicines (NLEMs) for patient accessibility or the national reimbursement. However, for oral use, valganciclovir has been shown a similar efficacy at equivalent dosage was proposed to an alternative choice of therapy. The researchers from HRH Princess Chulabhorn College of Medical Science were assigned from Health Economics Working Committee under the National List of Essential Medicines Development Subcommittee to study economic evaluation and budget impact analysis of valganciclovir uses proposed by the Infectious Drug and Vaccine Selection Expert Committee in bone marrow transplant recipients. There were needed some evidences to support the policy decision whether the inclusion of valganciclovir to E2 category of the NLEMs could be appropriate in term of societal value.

## OBJECTIVES

To compare the cost per cytomegalovirus-associated death averted in 100 days after allogeneic transplantation between ganciclovir and valganciclovir use as pre-emptive and treatment strategies from a societal perspective and to determine the budget impact of that alternative strategy found to be the most of cost minimization.

## MATERIAL AND METHODS

Cost-minimization using the decision tree was performed to estimate the costs and outcome. Thai costs were obtained from the survey, the national protocol and charge reimbursement. Effectiveness was estimated from literature review as the risk event. The Monte Carlo simulation, tornado diagram, and the scenario analysis was also analyzed for the parameter uncertainty. Moreover, the budget impact was conducted showing the financial change annually if implementing the particular economical alternative strategy as a national policy. The conceptual framework of this study was illustrated.

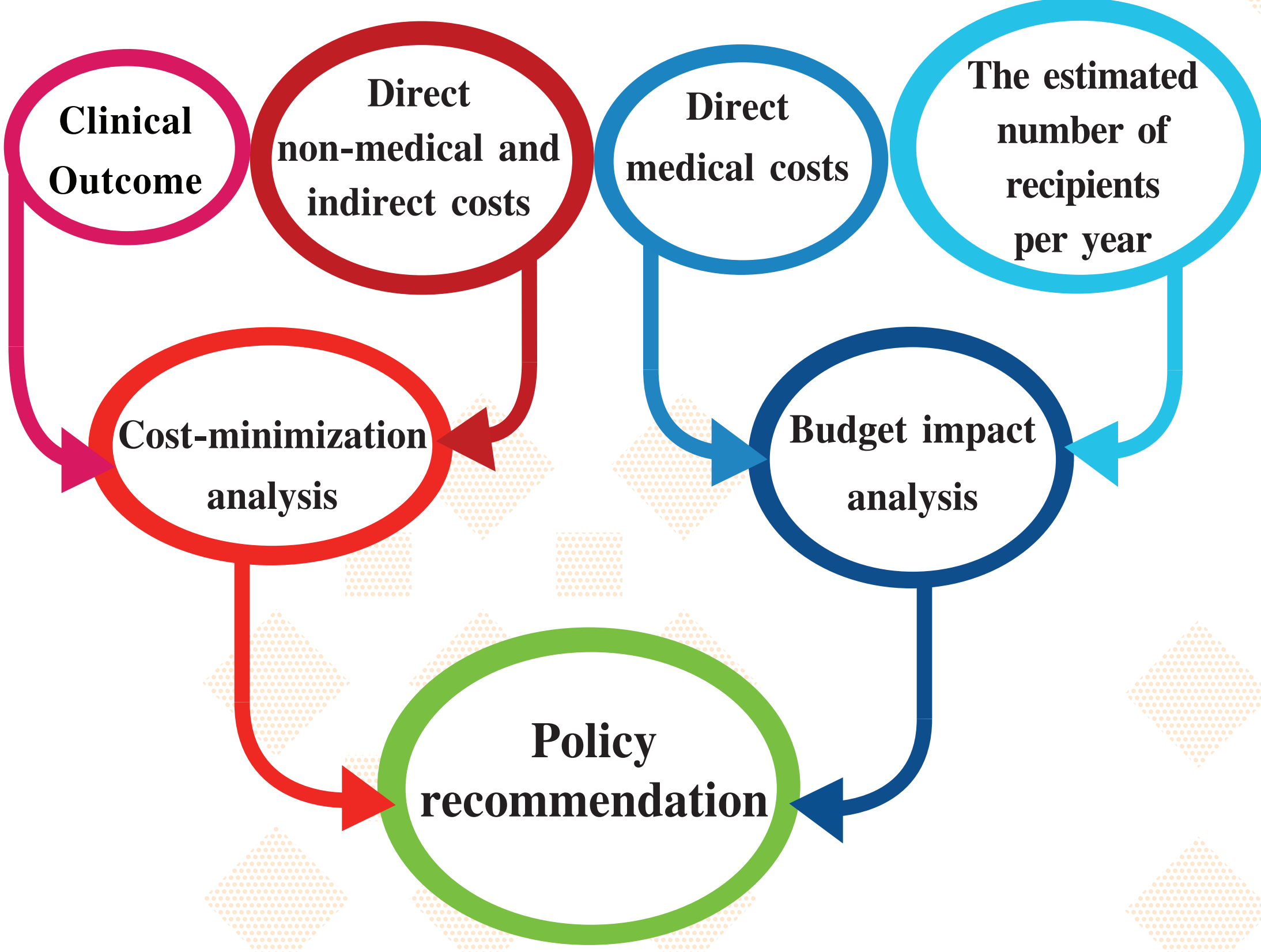


Figure 1 Conceptual framework of the study

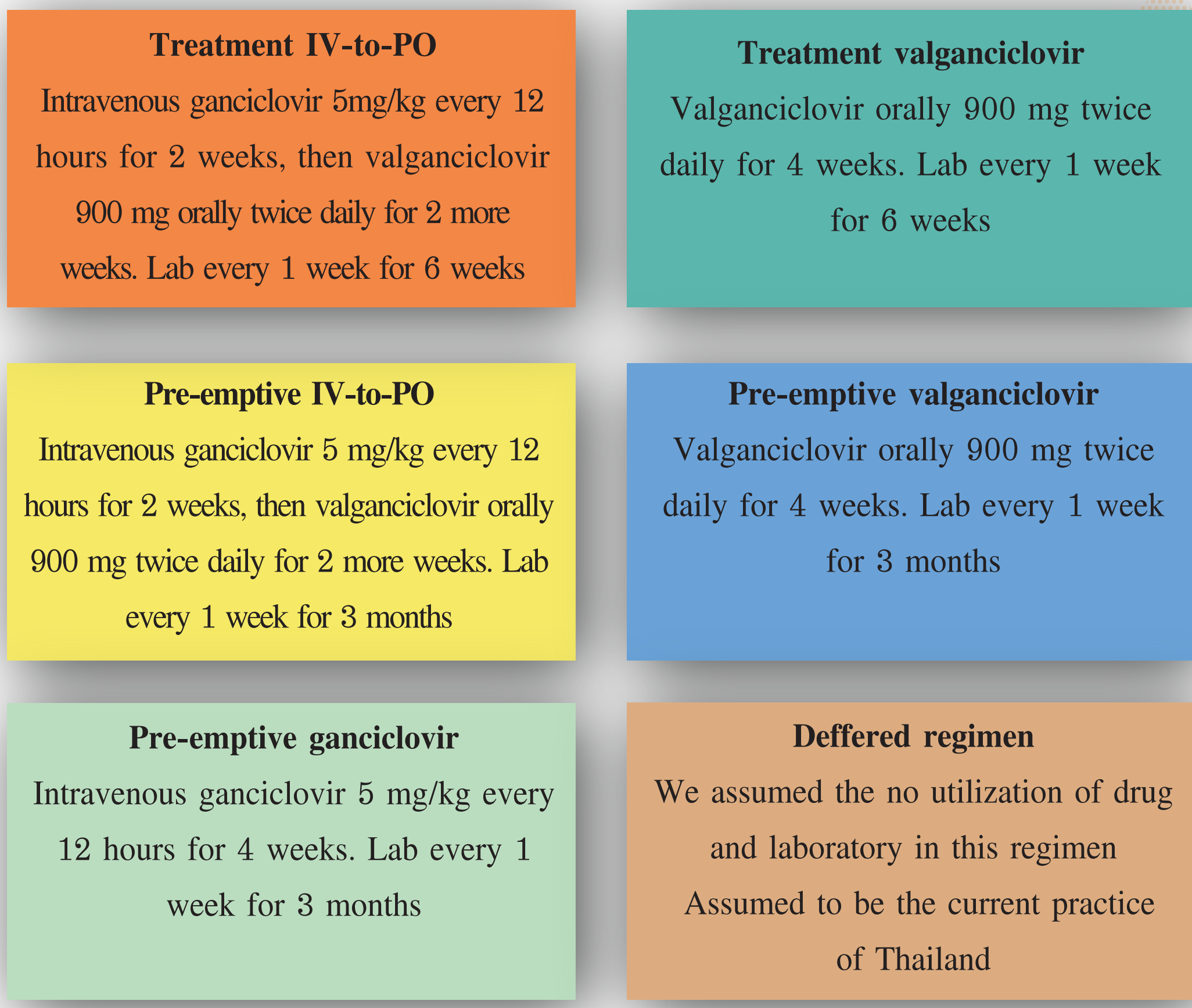


Figure 2 Utilization pattern assumed in the model

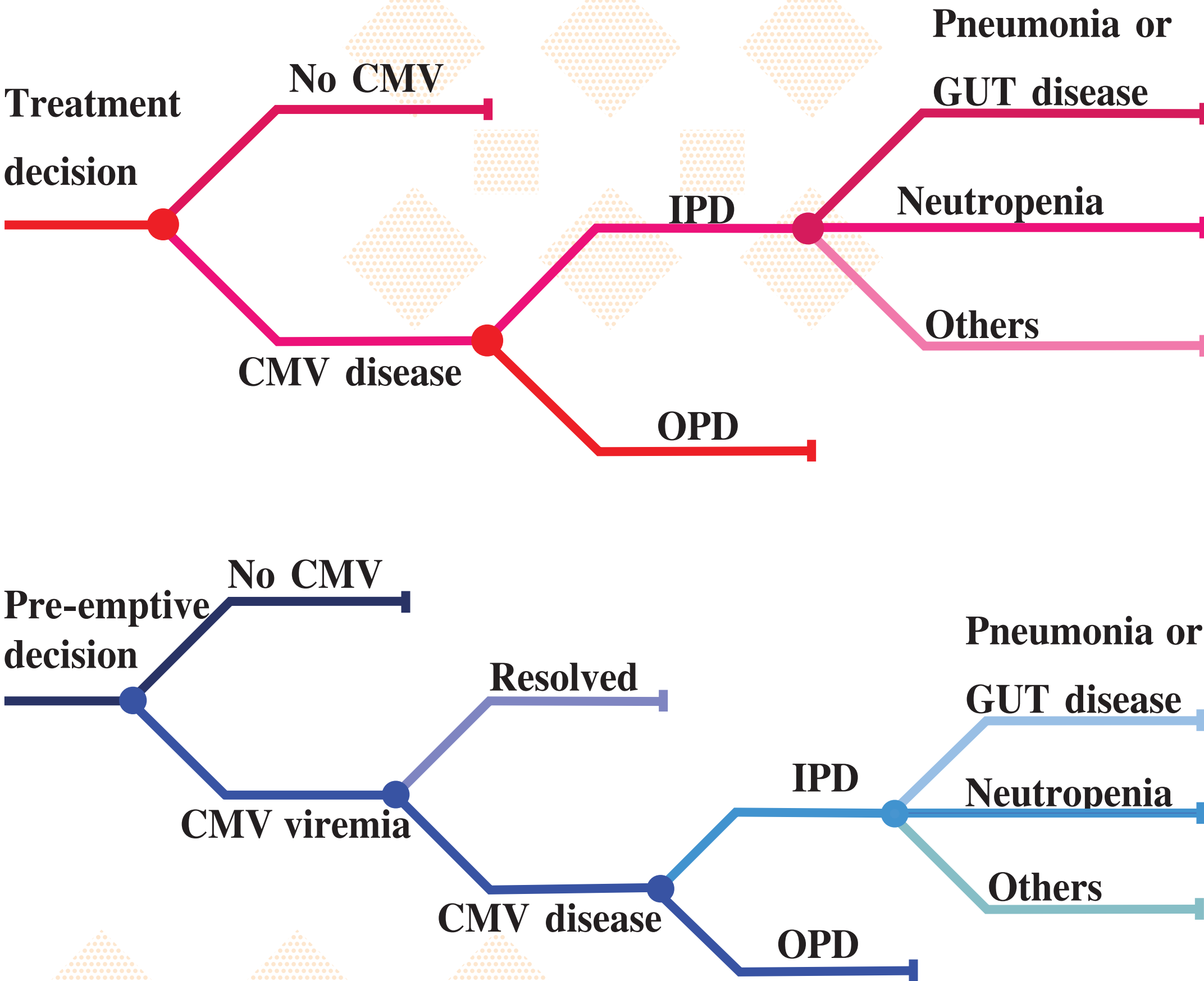


Figure 3 Decision analytic model for cost estimation

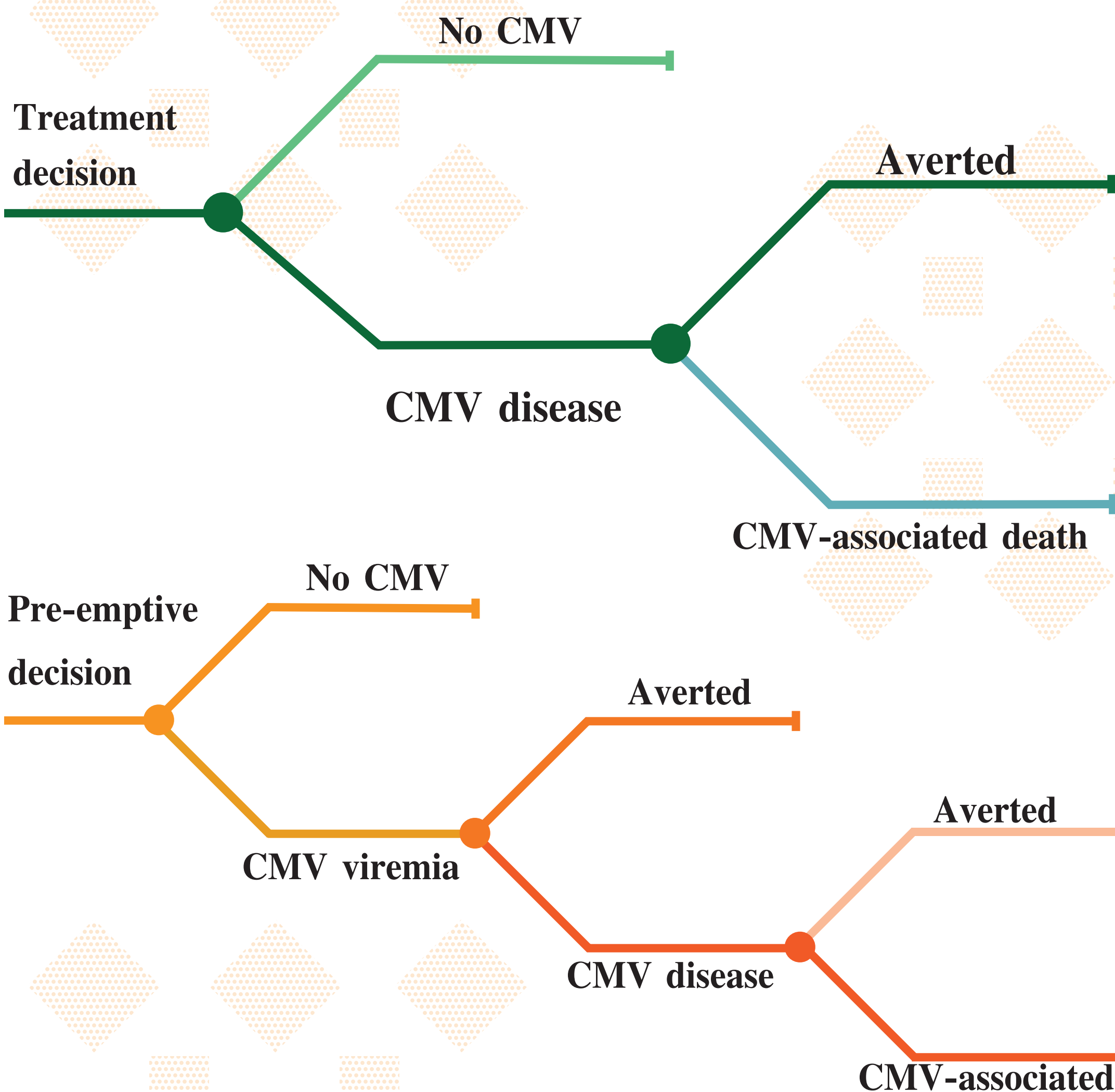


Figure 4 Decision analytic model for outcome estimation

## RESULTS

The least costs per CMV-associated death averted from the deterministic analysis were the pre-emptive strategies of ganciclovir, IV-to-PO, and valganciclovir, 143,334, 168,200, and 200,413 THB, respectively. Whereas, the current practice, the treatment strategies of IV-to-PO, and valganciclovir were 1,524,851, 7,941,753, and 9,885,751 THB, respectively, but the probabilistic results showed the current practice as the most saving approach. The most influential parameters were the death of untreated CMV, viral load testing costs, and recipient wage loss. The scenario analysis of changing the untreated death probability illustrated the increasing probability of untreated death from 30% resulted in all costs per case averted of pre-emptive were less than the treatment strategies and if considering from more than 80%, the pre-emptive strategies could overcome the current practice.

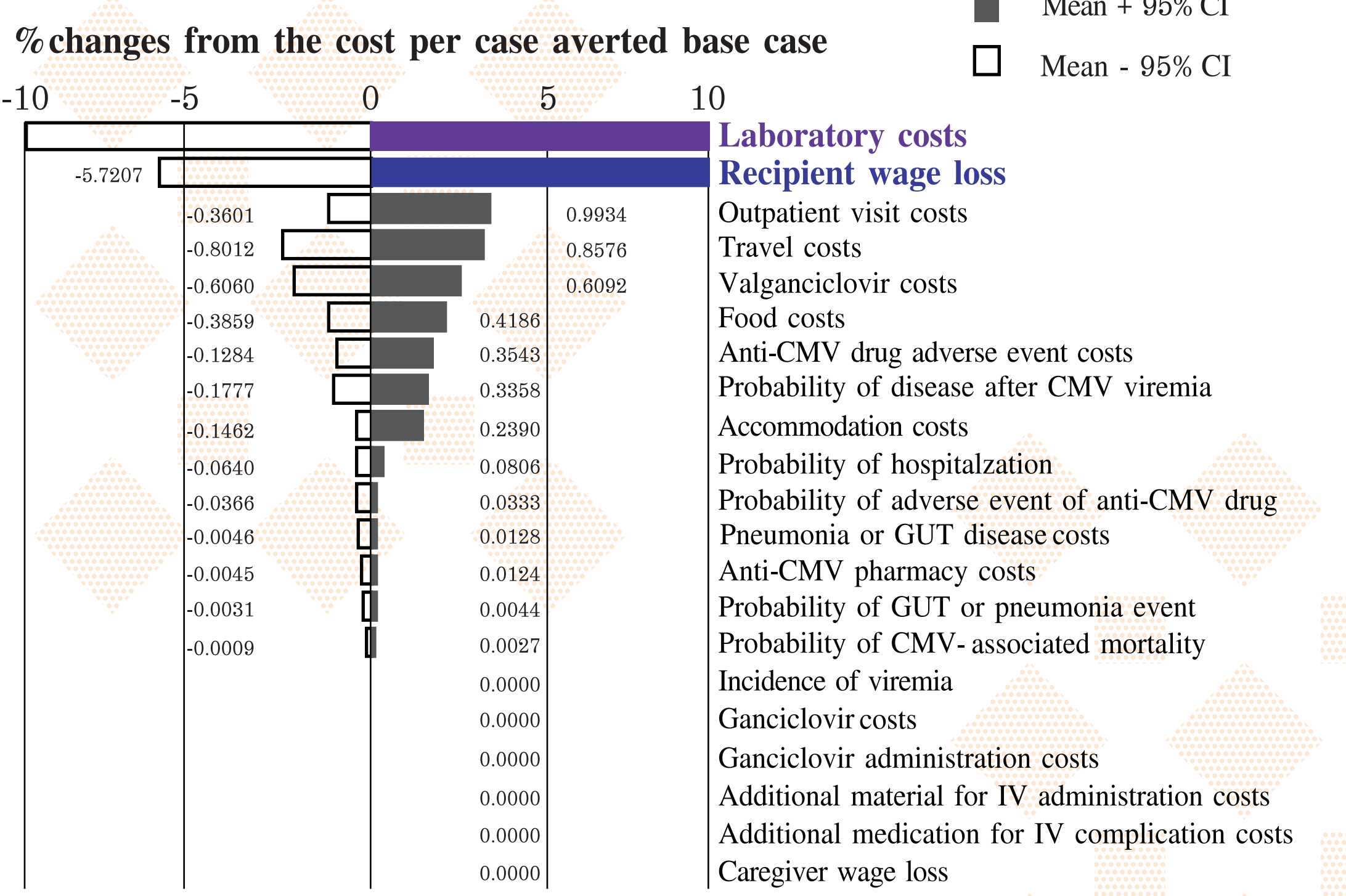
Table 1 Cost per case averted results using deterministic analysis

| Alternative strategy | Cost, THB  | Outcome, case averted (cases) | Cost per case averted, THB |
|----------------------|------------|-------------------------------|----------------------------|
| TX IV-to-PO          | 58,545.97  | 0.0074                        | 7,941,753.12               |
| TX VGV               | 72,876.97  | 0.0074                        | 9,885,751.26               |
| Pre-emptive IV-to-PO | 100,009.89 | 0.5946                        | 168,199.97                 |
| Pre-emptive VGV      | 119,163.16 | 0.5946                        | 200,412.60                 |
| Pre-emptive GCV      | 85,224.87  | 0.5946                        | 143,334.03                 |
| Deferred regimen     | 11,241.08  | 0.0074                        | 1,524,850.61               |

Table 2 Cost per case averted results using probabilistic analysis

| Alternative strategy | Cost, THB  | Outcome, case averted (cases) | Cost per case averted, THB |
|----------------------|------------|-------------------------------|----------------------------|
| TX IV-to-PO          | 57,826.52  | 0.007330                      | 7,888,534.84               |
| TX VGV               | 72,069.80  | 0.007330                      | 9,831,564.57               |
| Pre-emptive IV-to-PO | 98,767.41  | 0.054741                      | 1,804,275.64               |
| Pre-emptive VGV      | 117,850.72 | 0.054741                      | 2,152,888.06               |
| Pre-emptive GCV      | 84,055.74  | 0.054741                      | 1,535,524.01               |
| Deferred regimen     | 11,213.02  | 0.007330                      | 1,529,649.21               |

The pre-emptive valganciclovir strategy



The treatment IV-to-PO

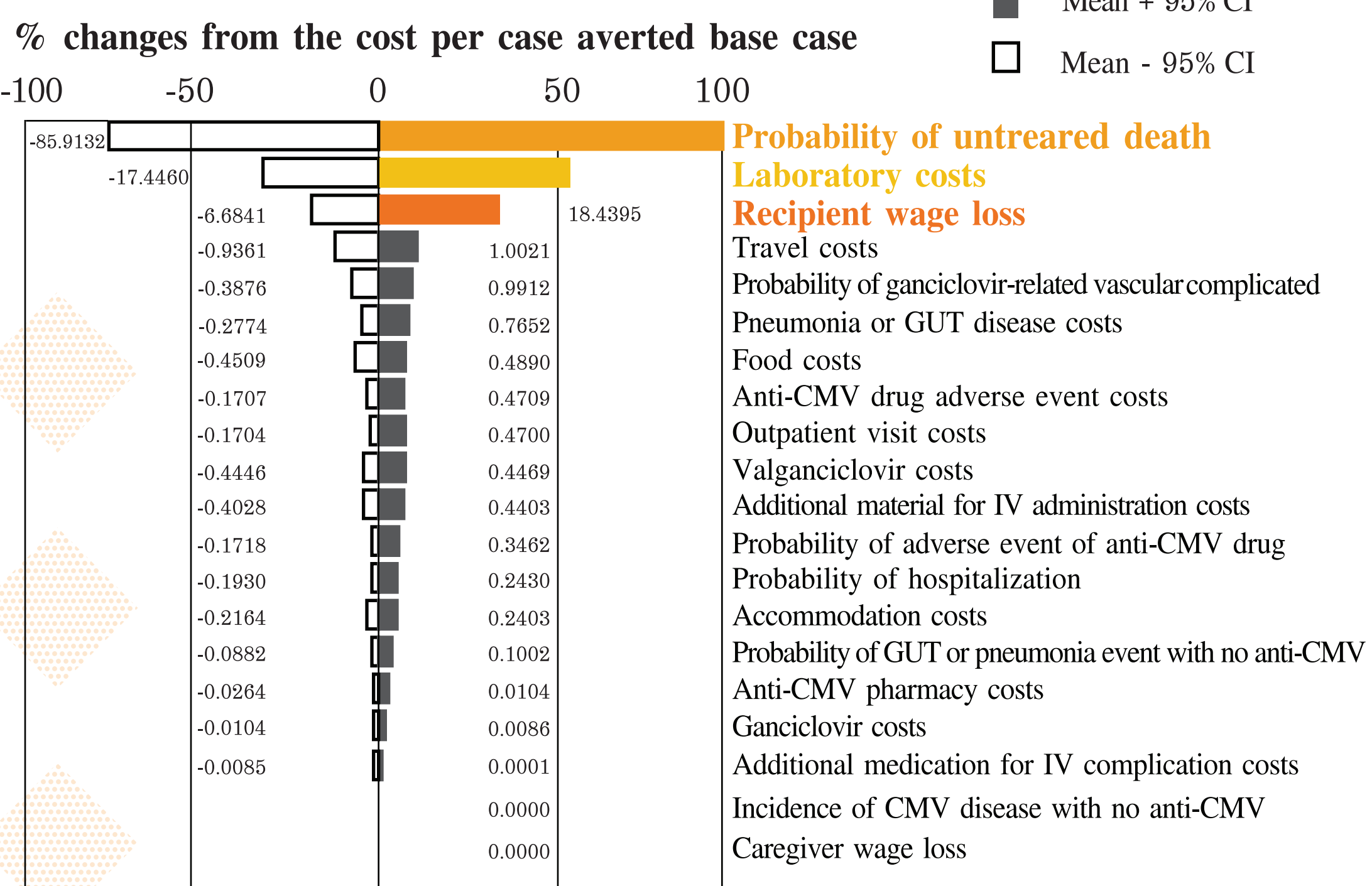


Figure 5 Tornado diagram illustrating the one-way sensitivity analysis of all parameters

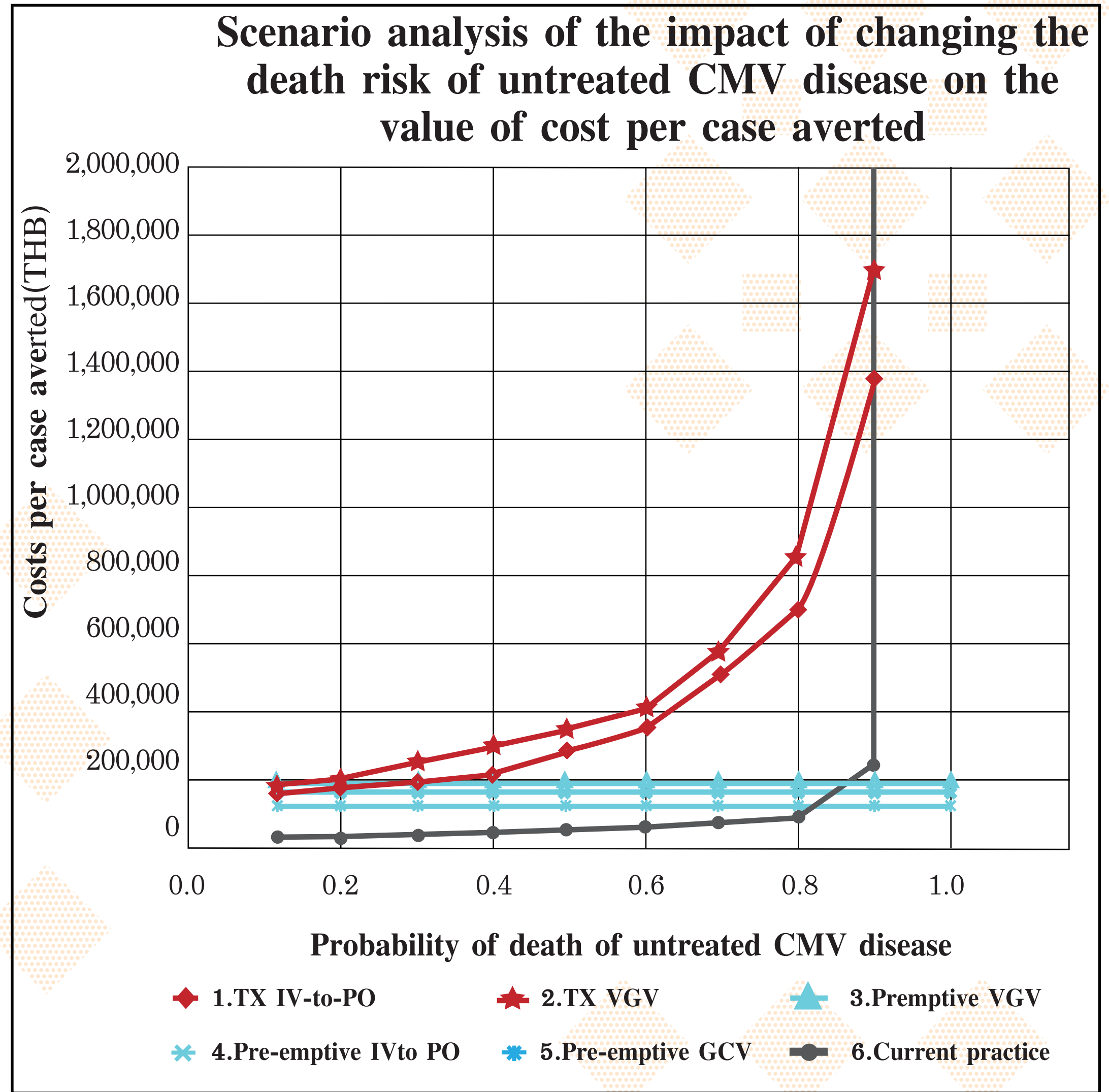


Figure 6 Scenario analysis for the untreated death parameter

Table 3 The budget impact analysis of pre-emptive strategies

| Strategy             | Direct medical costs (THB) | Incremental* costs (THB) | The budget impact (THB) | Million baht |
|----------------------|----------------------------|--------------------------|-------------------------|--------------|
| Pre-emptive IV-to-PO | 79,310.51                  | 68,549.36                | 13,709,872.00           | 13.71        |
| Pre-emptive VGV      | 98,463.79                  | 87,702.64                | 17,540,528.00           | 17.54        |
| Pre-emptive GCV      | 60,447.99                  | 49,686.84                | 9,937,368.00            | 9.94         |

\*The direct medical costs of deferred regimen were equal to 10,761.15 THB.

## CONCLUSIONS AND POLICY RECOMMENDATION

Pre-emptive strategies with ganciclovir or valganciclovir generated the most minimized costs in term of cost per CMV averted in 100 days after transplantation. Although, using valganciclovir did not minimize the overall costs and the drug costs were not sensitive. Using pre-emptive valganciclovir or following IV after hospital discharge (IV-to-PO) strategies should be proposed for additional alternatives to be included into the NLEMs policy because of the uncertainty of the untreated death parameter, the underestimation of deferred regimen utilization assumed in the model, the affordable budget impact, and the aspect of increasing patient convenience during hospital follow up visit after transplantation. Moreover, the costs of PCR or the particular laboratory monitoring should be concerned and negotiated for the more cost-saving option of using pre-emptive strategy.