A TWO-DIMENSIONAL MARKOV MODEL WITH DIFFERENT CYCLE LENGTHS FOR A CHRONIC CONDITION WITH SLOW IRREVERSIBLE DISEASE PROGRESSION AND RECURRENT PERIODS OF SEVERE SYMPTOMS

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OBJECTIVES: To construct a health economic model for a chronic condition with slow irreversible disease progression (slow process) and recurrent periods of severe symptoms (rapid process), processes which are dependent. We wish to study changes to either process or both simultaneously.

METHODS: The processes are dependent; more progressed patients have more frequent and worse attacks, more frequent attacks lead to accelerated progress. Estimating short-term transition probabilities for the slow process is difficult, suggesting a time-scale with long cycles. However, long cycles are irrelevant for the rapid process, thus suggesting short cycles. Denote the progress with a discrete scale of increasing progress, 1, 2, . . . , and attacks 0 = no attack, and 1 = ongoing attack.

RESULTS: We use a two-dimensional discrete time Markov model, disease progression in dimension Y and attacks in dimension X. The probability of X depends on the previous X and Y, and vice versa for Y. Hence the dependence between X and Y can be modeled. Costs and outcomes are estimated using state and transition rewards, enabling health economic analysis. Updating X more frequently (e.g. weekly) than Y (e.g. yearly) gives relevant cycle lengths. Y updates in outer cycles, and X updates in inner cycles. X’s dependence on Y is straightforward, but Y’s dependence of X makes it necessary to summarise outcomes in the inner cycle, to inform update in the outer cycles. The type of summary depends on the evaluation method, e.g. Monte Carlo simulation requires total time in X = 0 and X = 1 to estimate the progression risk since it depends on X.

CONCLUSIONS: Using cycle lengths relevant for each of the processes improves transition probability estimates in terms of predicted observed outcomes. This compensates for increased error due to different update rates. The face validity of the model may be improved by using relevant cycle lengths for the processes.

EVALUATING THE USE OF PROBABILISTIC SENSITIVITY ANALYSIS VIA MONTE CARLO SIMULATION (MCS): AN AUDIT OF THE HEALTH ECONOMIC LITERATURE

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OBJECTIVES: Probabilistic sensitivity analysis (PSA) using MCS is one method of addressing parameter uncertainty within health economic models. Although broad recommendations (e.g., from ISPOR) exist on the appropriate use of these techniques, practical guidance regarding their application remains limited. We surveyed the literature to assess how PSA has been applied, how transparent these methods have been, and to provide some guidance for their future use.

METHODS: A MEDLINE search identified articles mentioning “PSA” or “MCS AND cost” between 1966 and