Chronic diseases are the leading cause of death in the United States. Optimal control of treatment for chronic diseases can prolong lives, improve quality of life, and reduce costs. In this talk we present a Markov decision process (MDP) for optimizing treatment for diabetes patients with the goal of preventing adverse events, such as heart attack and stroke. The objective of the MDP is to determine the optimal timing of multiple medications over a patient’s lifetime given uncertainty in changes to their metabolic profile over time. Numerical results from this model, calibrated with a large longitudinal dataset from the Mayo Clinic, are presented for the treatment of cholesterol and blood pressure of patients with type 2 diabetes. Two extensions of the model are presented for alternative assumptions about medication use. In the first extension we consider constraints on medication use to reduce polypharmacy, and in the second extension we consider the use of aspirin therapy.

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