BAYESIAN MULTI-STATE MODELS FOR PREDICTION OF DIABETES COMPLICATIONS

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In epidemiologic studies, it is common practice to explore determinants of diseases and develop prognostic models or risk scores for assessment of future risks given patient's characteristics. For this purpose, multi-state models is useful to predict a complex course of diabetes complications; nephropathy, retinopathy, and cardiovascular disease. To estimate parameters in the multi-state prognostic models, Bayesian methodology seems to reduce imprecision in estimates due to incorporating multiple risk factors into the model. In this paper, we will show a Bayesian approach to the multi-state prognostic models for diabetes complications. The model is specified with five states: the initial state, nephropathy, early-stage retinopathy (non-proliferative), late-stage retinopathy (non-proliferative), and cardiovascular disease. Transition rates between states are modelled hierarchically. At 1st stage, associations between transition rates and risk factors are modelled by Cox regression models. At 2nd stage, we assume a linear structure in regression coefficients reflecting the disease process and prior information about relative risks. Our methodology is illustrated by a real example from the Japanese Diabetes Complication Study.