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MULTISTATE TRANSITION MODELING: AN APPLICATION USING HYPERTENSION DATA

Awol Seid

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Abstract

Multistate models are systems of multivariate survival data where individuals move through a series of distinct states following certain paths of possible transitions. Such models provide a relevant tool for studying observations of a continuous time process at arbitrary times. In this article, the application of multistate modeling using hypertension data is demonstrated. The aim was to model the transitions from a healthy (hypertension free) state to an illness (hypertension) state of a hypertensive patient under treatment. Hospital data were obtained for a cohort of 353 patients from Jimma University Hospital, Ethiopia. Three states of the Markov process are defined based on the WHO guideline of high blood pressure. These are: State 1 $(BP < 120/80 mmHg)$, State 2 $(BP \geq 120/80 mmHg)$ and State 3 (dropout). The first state is termed as a healthy state, the second an illness state and the third one is an absorbing state. Initially, the state transition intensities and state occupation probabilities are estimated with no covariate. Then, the effect of gender and hypertension history on the state transition intensities are evaluated separately and jointly using a proportional intensities model. The study indicates that hypertension history has a significant effect on the transition intensities but not gender.

Keywords and phrases: hypertension, multistate modeling, Markov process.