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Monitoring time to event in registry data using CUSUMs based on excess risk models

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In health registries, like cancer registries, patient outcomes are registered over time. It is then often of interest to monitor whether the distribution of the time to an event of interest changes over time –for instance if the survival time of cancer patients changes over time. A common challenge in monitoring survival times based on registry data is that time to death, but not cause of death is registered. To quantify the burden of disease in such cases, excess risk methods can be used. With excess risk models the total risk is modelled as the population risk plus the excess risk due to the disease. The population risk is found from national life tables.

We propose a CUSUM procedure for monitoring for changes in the time to event distribution in such cases where use of excess risk models is relevant. The procedure is based on a survival loglikelihood ratio, and extends previously suggested methods for monitoring of time to event to the excess risk setting. The procedure takes into account changes in the population risk over time, as well as changes in the excess risk which is explained by observed covariates. Properties, challenges and an application to cancer registry data will be presented.

Keywords

CUSUM, excess risk, time to event

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