

MOVING WINDOW BASED METHOD FOR POPULATION SURVIVAL ESTIMATION

Tomas Pavlik¹, Ladislav Dusek¹ and Jan Muzik¹

¹*Institute of Biostatistics and Analyses, Masaryk University, Brno, Czech Republic*

Modeling number of cancer patients that would be treated in particular calendar year with anti-cancer drugs is an essential part of medical expenses estimation and planning. One of the key steps in this process is the estimation of cancer prevalence which can be solely based on cancer incidence and appropriate survival rates. The aim of this work is to propose a robust method for estimation of survival rates, applying well-known principle of moving window. The key role of survival rates in cancer prevalence estimation is in determination of the number of patients surviving from the past. Some authors prefer for cancer prevalence estimation relative survival rates (Verdecchia et al., 2002), however, as far as relative survival can be increasing in time and even greater than one, we suggest to use standard observed survival rate for modeling the number of future cancer patients. Determination of appropriate survival probabilities is not trivial as the whole cohort of patients recorded in the population-based cancer registry since its beginning represents a very heterogeneous group of data (e.g. according to treatment modalities available). On the other hand, estimation of X-years survival based on consecutive 1-year cohorts of patients can lead to substantial bias due to low sample size, especially in case of rare diagnoses and stage-specific analysis. Thus, we propose a method for X-years survival estimation based on moving window principle, i.e. patient cohorts defined with five consecutive years of diagnosis each are used to estimate corresponding survival probabilities. Every X-year survival rate is thus estimated from five "year-of-diagnosis" related and necessarily overlapping cohorts of patients. Final X-year survival estimate is then computed as the median of these five values. However, such a bio indication from epidemiological data of course requires sufficient data sources. The functionality and power of the proposed method was documented on Czech National Cancer Registry with more than 1,4 million of cases reported since 1977. Long-term history of the registry allows even 27-yrs survival estimates with mortality data separating death events due to cancer from the other reasons.