Modelling survival of patients with multiple cancers

With increasing number of subsequent primary cancers there is a growing concern to know how cancer patients survive with their subsequent cancer compared to those with their respective first cancer. Results of earlier studies have been conflicting and have not lead to firm conclusions. One reason for conflicting results might be a lack appropriate methodology as survival from subsequent cancer has usually not been adjusted for an extra hazard due to an underlying first cancer.

This study presents four alternative models for estimating survival of patients with multiple cancers. Models are extensions and modifications to those proposed earlier for estimating relative and cause-specific survival of patients with a single cancer. The assessment of survival from subsequent cancer raised a need for introducing new concepts, especially when survival of patients with their multiple cancers of the same site is concerned. Survival estimates from cancer are compared between the models, and between a first and subsequent tumour of the same site. The importance of adjusting survival from subsequent cancer to that from a underlying first cancer is also highlighted.

The results show that survival from cancer as a first and subsequent tumour can be reliably assessed with the newly introduced models based either on the relative and cause-specific survival. The results also show that survival from cancer as a first and subsequent tumour may be dependent on the site of cancer and whether patients’ cancers are of the same site or not. Nevertheless, survival from a subsequent cancer is not usually different from that from a respective first cancer. However, even with large population-based data, a lack of power often prevents the detection of modest differences in survival.