Stochastic Process for Disease Screening

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Abstract

Disease screening has increasingly gained attention as early detection of chronic diseases and cancers has become important either in adult health check-up or population-based screening program. However, analysis of data on disease screening is rather intractable because of the following characteristics: (1) multi-state outcome (2) multi-factorial causes (3) correlation (4) censoring and truncation (5) lead-time, length-bias, and over-detection, (6) measurement errors, overdispersion, and (7) hierarchical structure. Several stochastic processes are proposed to tackle these problems. Data used for illustration were derived from hospital-based cohort, community-based cohort, and international collaborative cohort, including our Taiwanese multi-centre cancer screening program, Keelung community-based integrated screening project, Finnish population-based randomized controlled trial on prostate cancer screening, and the Swedish two-county trials. By dint of these models applied to empirical data, individually-tailored screening can be developed to facilitate the implementation of population-based screening.

Keywords: Screening, Stochastic Process, Cancer, Chronic Disease, Individually-tailored screening

Reference


