

Specimen pooling for efficient use of biospecimens in studies of time to a common event

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Abstrak

For case-control studies that rely on expensive assays for biomarkers, specimen pooling offers a cost-effective and efficient way to estimate individual-level odds ratios. Pooling helps to conserve irreplaceable biospecimens for the future, mitigates limit-of-detection problems, and enables inclusion of individuals who have limited available volumes of biospecimen. Pooling can also allow the study of a panel of biomarkers under a fixed assay budget. Here, we extend this method for application to discrete-time survival studies. Assuming a proportional odds logistic model for risk of a common outcome, we propose a design strategy that forms pooling sets within those experiencing the outcome at the same event time. We show that the proposed design enables a cost-effective analysis to assess the association of a biomarker with the outcome. Because the standard likelihood is slightly misspecified for the proposed pooling strategy under a nonnull biomarker effect, the proposed approach produces slightly biased estimates of exposure odds ratios. We explore the extent of this bias via simulations and illustrate the method by revisiting a data set relating polychlorinated biphenyls and 1,1-dichloro-2,2-bis(p-chlorophenyl)ethylene to time to pregnancy.