

The cure-death model and its application to observational studies (Harriet Sommer)

Intensive care unit patients with a ventilator-associated pneumonia (VAP) immediately receive several antimicrobial agents of which some are adequate for the treatment of this nosocomial infection. We want to model the transition from the initial state VAP to state cure in a comprehensive multistate model containing death as competing risk while we consider a patient as cured after successful extubation. If a patient dies or is reintubated, he or she leaves the extubation state.

In this illness-death model framework, we propose a direct binomial regression method for the probability of cure. The aim is to examine the impact of immediate adequate therapy in comparison to inadequate therapy on cure of patients with VAP as well as to identify potential risk factors for extubation.

Our idea is based on pseudo values from a jackknife statistic constructed from simple summary statistic estimates of the state probabilities. For every subject and every time point a pseudo value is constructed that are further used as outcome variables in the regression model. A generalised estimating equation is applied to obtain estimates of the model parameters.

The method is illustrated using the OUTCOMEREA research data, a french multicenter observational study from the OUTCOMEREA research group.