

1. Estimate the counterfactual survival function $S_T^{\text{IPCW}}(t)$:

- (a) fit an extended Cox model for transplantation,
- (b) predict probability of transplant in order to construct IPCW weights,
- (c) estimate the survival function with Kaplan-Meier, using IPCW weights.

2. Construct pseudo-observations:

For every status update, reported by patient i at time t , construct pseudo-observations PO_{it} for the log restricted remaining survival time, i.e. for

$$\log(T_{it}^*) = \log(\min(T_{it}, \tau)),$$

where T_{it} is defined as the remaining survival time of candidate i at time t . The pseudo-observations PO_{it} can be computed solely based on $\hat{S}_T^{\text{IPCW}}(t)$, using formula (2) that appears in Tayob and Murray (2017).

3. Estimate a model for the log remaining survival time:

With pseudo-observations PO_{it} as the outcome, fit the model

$$\mathbb{E}[\log(T_{it}^*)|Z_i(t)] = \beta^\top Z_i(t),$$

where each status update is paired with the covariate vector $Z_i(t)$, i.e. the covariates of patient i at time t . To account for within-patient correlations, β is estimated with Quasi-Least Squares using a Markov correlation matrix. This yields estimates $\hat{\beta}^{\text{PO}}$.

4. For every transplant recipient i 's last status update:**4.1. construct a risk set R_i of comparable patients, who**

- (a) who have a later censoring time than patient i ,^a
- (b) have similar predicted expected log survival as patient i , i.e.

$$|\hat{\beta}^{\text{PO}^\top} Z_k(C_i) - \hat{\beta}^{\text{PO}^\top} Z_i(C_i)| < \epsilon$$

for some ϵ , where $Z_k(C_i)$ are covariates of patient k at i 's censoring time C_i ,

- (c) match with candidate i on a set of pre-determined characteristics.

4.2. Within candidate's i risk set R_i , estimate a risk-set-specific conditional counterfactual survival curve $S^{\text{IPCW}}(t|R_i)$. Use inverse transform sampling from this function to match candidate i to a specific candidate $k \in R_i$.**4.3. Copy over the future statuses of matched patient k to candidate i .****4.4. Repeat steps 4.1 to 4.3 until candidate's i spell ends with a waiting list removal or waiting list death.**

^aThis requirement is relaxed when very few such candidates exist