

University of California, Davis
Department of Public Health Sciences

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Survival Analysis

BST 222

David M. Rocke

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Final Project Assignment

Due December 10, 2024

The `burn` data set from `KMsurv` is from Ichida et al. (1993) which is linked on the web site. It represents a study of an attempt to improve infection control by replacing routine bathing with total body washing with an antimicrobial agent. The main outcome of interest is infection with *Staphylococcus aureus*, the time and status of which are represented by `T3` and `D3`. There are 11 ordinary covariates `Z1–Z11` and two time dependent predictors that can be constructed for surgical excision of burn tissue (`T1`, `D1`) and prophylactic antibiotic treatment (`T2`, `D2`). The input R file on the web site recodes and renames the ordinary covariates, as shown on the next page, to make interpretation easier. The cases with routine bathing are historical controls so this does not represent a single cohort study and in particular the assignment of treatment to patient is not random.

Your assignment is to analyze the data and write a report as if to the head burn surgeon in the hospital. You will be graded on the analysis and also on the quality of the communication in the presentation. Below are some possible things to look at. There may be others as well, and maybe you don't need all of these. If you make a plot or do an analysis, then explain why you did it and what the meaning of the results might be.

1. Plot the Kaplan-Meier curves for the treated and untreated patients and use `survdiff` to test for whether the curves are different.
2. Plot the cumulative hazards vs. time and the complimentary log-log survival vs. log time.
3. Construct Cox model using only the time-independent predictors, Maybe start with one using only Treatment. Decide if the burn site variables will be separately included after analysis or included or excluded as a group. Note that this is not a factor, because a patient may have burns at many sites. The respiratory tract burn site variable is different from the others since it does not focus on skin.
4. Run the usual suite of model checking methods and report any interesting findings. Possibly alter the model as a result.

5. Construct the data set with the the time-dependent covariates for surgical excision and prophylactic antibiotic treatment and find a good model which includes useful time-dependent covariates as well as useful time-independent ones.
6. Run the usual suite of model checking methods and report any interesting findings. Possibly alter the model as a result.
7. Interpret the results and comment on the implications for clinical management. Note that, from other studies, for the endpoint of survival (an outcome not included in this data set), burn percentage and burn degree (first, second, third) are quite important, but the first one may or may not be important for infection control, and information on the second factor is not included in the data set.

Burn Data Set

Var.	Definition
Obs	Observation number
Z1	Treatment: 0=routine bathing 1=Body cleansing
Z2	Gender (0=male 1=female)
Z3	Race: 0=nonwhite 1=white
Z4	Percentage of total surface area burned
Z5	Burn site indicator: head 1=yes, 0=no
Z6	Burn site indicator: buttock 1=yes, 0=no
Z7	Burn site indicator: trunk 1=yes, 0=no
Z8	Burn site indicator: upper leg 1=yes, 0=no
Z9	Burn site indicator: lower leg 1=yes, 0=no
Z10	Burn site indicator: respiratory tract 1=yes, 0=no
Z11	Type of burn: 1=chemical, 2=scald, 3=electric, 4=flame
T1	Time to excision or on study time
D1	Excision indicator: 1=yes 0=no
T2	Time to prophylactic antibiotic treatment or on study time
D2	Prophylactic antibiotic treatment: 1=yes 0=no
T3	Time to straphylococcus aureus infection or on study time
D3	Straphylococcus aureus infection: 1=yes 0=no

Recoded Burn Data Set

Var.	New Var.	Definition and Factor Levels
Obs		Observation number
Z1	Treatment	Routine/Cleansing
Z2	Gender	Male/Female
Z3	Race	Nonwhite/White
Z4	PercentBurned	Percentage of total surface area burned
Z5	SiteHead	NotBurned/Burned
Z6	SiteButtock	NotBurned/Burned
Z7	SiteTrunk	NotBurned/Burned
Z8	SiteUpperLeg	NotBurned/Burned
Z9	SiteLowerLeg	NotBurned/Burned
Z10	SiteRespTract	NotBurned/Burned
Z11	BurnType	Chemical/Scald/Electric/Flame
T1		Time to excision or on study time
D1		Excision indicator: 1=yes 0=no
T2		Time to prophylactic antibiotic treatment or on study time
D2		Prophylactic antibiotic treatment: 1=yes 0=no
T3		Time to straphylococcus aureus infection or on study time
D3		Straphylococcus aureus infection: 1=yes 0=no