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VI. Basic Data Layout for Understanding Analysis

Ordered failure times $t_{(f)}$	# of failures	# censored in $[t_{(f)}, t_{(f+1)})$	Risk set $R(t_{(f)})$
$t_{(0)} = 0$	$m_0 = 0$	q_0	$R(t_{(0)})$
$t_{(1)}$	m_1	q_1	$R(t_{(1)})$
⋮	⋮	⋮	⋮
$t_{(k)}$	m_k	q_k	$R(t_{(k)})$

1) Remove censored observations from original data
2) Order the remaining failure times, counting ties only once

$t_{(f)}$: Ordered failure times
m_f: # failures at time $t_{(f)}$
q_f: # censored in $[t_{(f)}, t_{(f+1)})$
$R(t_{(f)})$: the risk set; the collection of individuals who have survived at least until time $t_{(f)}$.

You leave the risk set if you're censored or if you fail.

VII. Descriptive Measures of Survival Experience

$\bar{T}$: average survival time (ignoring censored observations)

$\bar{h}$: average hazard rate; $\boxed{\bar{h} = \frac{\#\text{ failures}}{\sum_{i=1}^{n} t_i}}$

- As $\bar{h} \nearrow$, the probability of survival in the group $\searrow$
- $\bar{T}$ and $\bar{h}$ are overall measures, not measures over time.
- To compare over time, you can compare Kaplan-Meier curves
- Can get median survivor time from KM curves.

VIII. Example: Extended Remission Data

- Confounding variables (What exactly is confounding? I'll have to back track).
- Interaction: The effect of the treatment may be different depending on the value of another variable.

So in this example, the problem is:
Compare two groups after adjusting for confounding and interaction.

Some analyses that account for the other variables are
1) To stratify on the other variables and compare survival curves for different strata; or
2) To use proportional hazards or some other survival model

IX. Multivariable Example

Analagous to multiple regression

Example
13-year follow-up of fixed cohort
from Evan's County, GA
n=170 white males (60+)
T= years until death
Event = death
Explanatory variables:
- exposure variable — Social Network Index (SNI)
- confounders } AGE, systolic blood pressure, chronic disease,
- interaction variables } Quetelet's body size index, social class

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11/24/22

X. Math Models in Survival Analysis

Describe relationship between exposure variable and outcome variable