Competing Risks

https://github.com/sahirbhatnagar/comprisk

Sahir Bhatnagar

October 2, 2015

McGill Univeristy

Take home message # 1

Methods for competing risks should be used by epidemiologists, with the choice of method **guided by the scientific question**

Take home message # 2

Censored events are treated as if they could

experience the event in the future

Take home message # 3

Authors never use **failure time**

“Is time to getting a PhD a failure?” - Hanley

Take home message # 4 by Jason P Fine himself

We suggest using the Cox model and Fine-Gray model -

presenting the results side by side

Setup

1. **t**: time scale
2. **risk set**: who can still experience the event
3. **hazard** $h(t)$:
   $Prob$(experience event in the next instant given survival to t)
4. **survival** $S(t)$: $Prob$(experience event *after* time t)
5. **cumulative incidence** $F(t)$: $Prob$(experience event *before* time t)

3 Models

Standard Cox Regression

- Competing events are treated as censored
- Absolute risk may be overestimated in the presence of strong competing risks

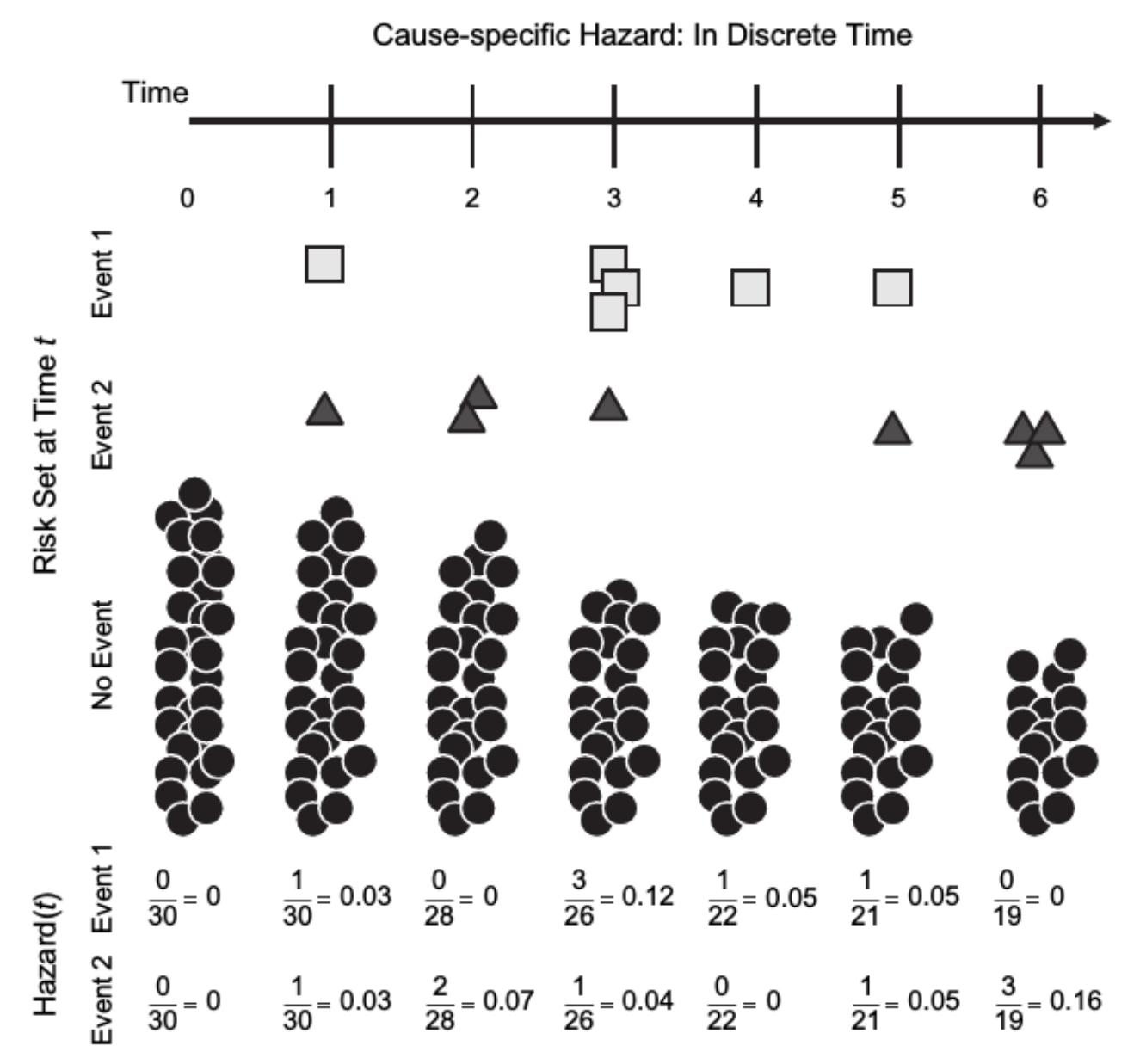
Cause-Specific Hazards

- Do cause specific Cox model
- Combine the results using a formula to get absolute risk

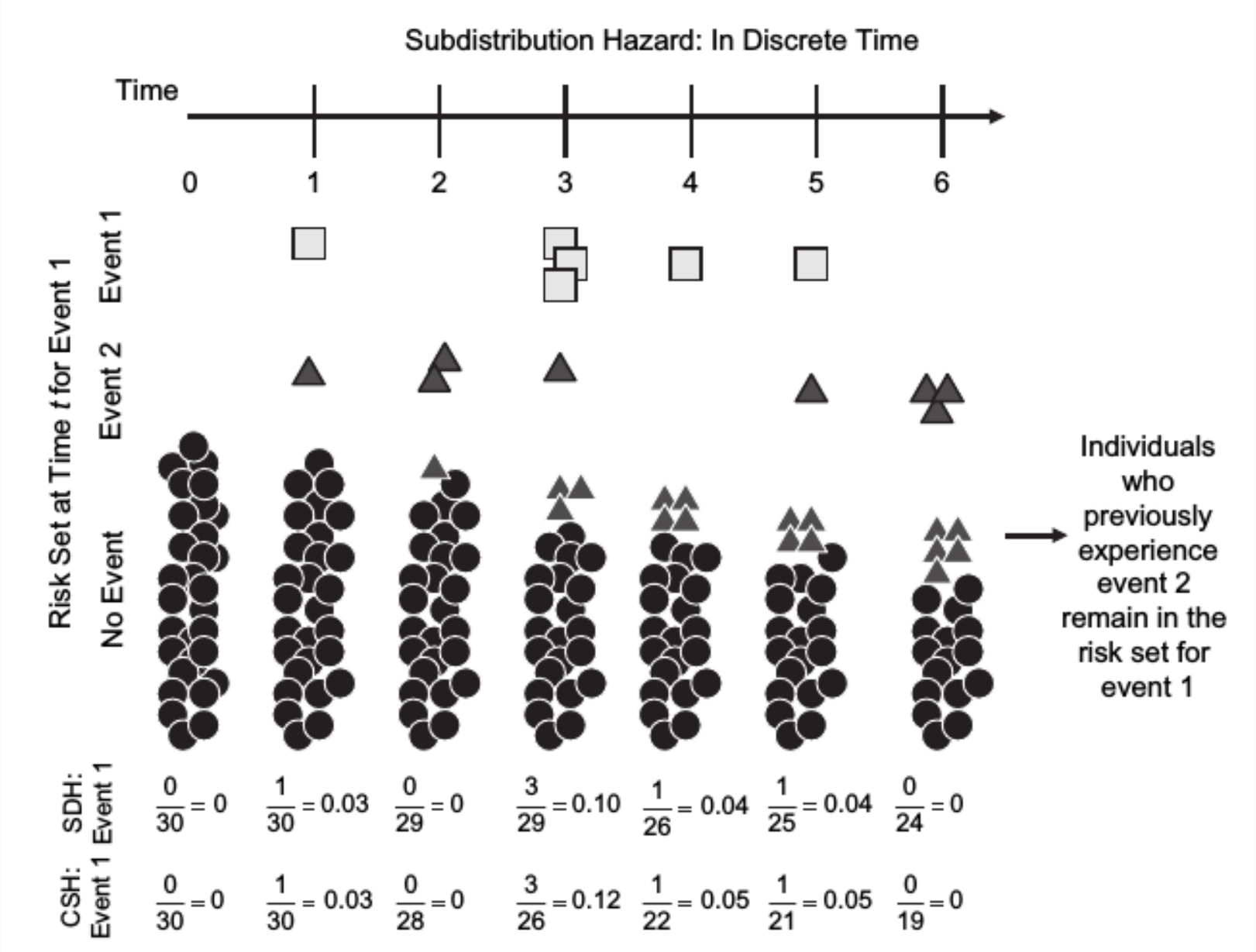
Fine and Gray Subdistribution

- Probability of an event given survival to time t or has had competing event prior to t
- *If you didn't die of a heart attack, you're still alive to me*

Cause Specific: Denominators are the same



Subdistribution Hazard



Two competing questions

The use of abacavir has recently been associated with increased risk of MI . . .

Is the use of abacavir directly associated with MI?

Cox Model or Cause Specific Hazard

etiology of disease

Are abacavir users more likely to experience an MI?

Sub-distribution Hazard (e.g. Fine and Gray)

predicting individual risk