

# STA 5364, Report 2.19

**Carson Slater** *Baylor University*

## Example 4.2: Probabilities for Relapse and Death in Remission

This example analyzes data from 38 patients with acute lymphoblastic leukemia (ALL) who underwent a transplant. We estimate probabilities for two competing risks: relapse and death in remission (TRM). The three probabilities and their standard errors are detailed below.

### *Cumulative Incidence and Confidence Interval for Relapse*

At 1 year, the cumulative incidence of relapse is estimated as:

$$\text{Cumulative Incidence for Relapse: } \hat{P}(t = 1) = 0.238,$$

with an estimated standard error of  $SE = 0.069$ . The 95% confidence interval is given by:

$$\begin{aligned} \hat{P}(t = 1) \pm 1.96 \times SE &= 0.238 \pm 1.96 \times 0.069 \\ &= (0.103, 0.373). \end{aligned}$$

### *Conditional Probability of Relapse*

The conditional probability of relapse at 1 year is estimated as:

$$\text{Conditional Probability: } \hat{P}_{\text{cond}}(t = 1) = 0.302,$$

with a standard error of  $SE = 0.087$ . The 95% confidence interval is:

$$\begin{aligned} \hat{P}_{\text{cond}}(t = 1) \pm 1.96 \times SE &= 0.302 \pm 1.96 \times 0.087 \\ &= (0.131, 0.473). \end{aligned}$$

### *Probabilities at 400 Days*

From the graph (Figure 4.14):

- Relapse probability:  $P_{\text{relapse}} = 0.2654$ .
- Death in remission probability:  $P_{\text{death in remission}} = 0.4982 - 0.2654 = 0.2328$ .
- Disease-free survival:  $1 - 0.4982 = 0.5018$ .

## R Code for Figures

Below is the R code to replicate the cumulative incidence curves:

## Comparison of Relapse Probabilities

