R gives $T_{LR}^2 = 17.7 \Rightarrow |T_{LR}| = \sqrt{17.7} = 4.21$

Is $T_{LR} = 4.21$ or is $T_{LR} = -4.21$?

Note Observed deaths for Trt 1 = 172 and under H_0, Expected deaths for Trt 1 = 136.

Since $172 - 136 > 0$, then $T_{LR} > 0$.

The p-value is near 0. And $4.21 > 1.645$.

Reject H_0, and conclude that Trt 2 has a better survival function.

Sampling Distribution of T_{LR}

- Consider our 2×2 table and assume the marginal counts are fixed:

	Trt 1	Trt 2	Total
# Deaths	$d_1(u)$		$d(u)$
# Alive			$n(u) - d(u)$
Total	$n_1(u)$	$n_2(u)$	$n(u)$

- Conditional on the marginal counts, the r.v. $d_1(u)$ has a hypergeometric distribution with:

$$P[d_1(u) = d] = \frac{\binom{n_1(u)}{d}\binom{n_2(u)}{d(u)-d}}{\binom{n(u)}{d(u)}}$$

- From our hypergeometric formulas, the conditional mean of $d_1(u)$ is

$$\frac{d(u)\, n_1(u)}{n(u)}$$

and its conditional variance is

$$\frac{n_1(u)\, n_2(u)\, d(u)\,[n(u)-d(u)]}{[n(u)]^2\,[n(u)-1]}$$

- It can be shown that T^* is the sum of uncorrelated terms, so that under H_0,

$$E[T^*] = E\left\{\sum_{A(u)} \left[d_1(u) - \frac{d(u)\, n_1(u)}{n(u)}\right]\right\} = 0$$

and

$$V[T^*] = \sum_{A(u)} \frac{n_1(u)\, n_2(u)\, d(u)\,[n(u)-d(u)]}{[n(u)]^2\,[n(u)-1]}$$

and it can be shown that, by a specialized version of the CLT:

$$T_{LR} = \frac{T^*}{\sqrt{V[T^*]}} \mathrel{\dot\sim} N(0,1)$$

for large n.