

M358K - Hypothesis testing - R lab

September 28, 2017

To each of the ‘is ... statistically significant’ question below, set up a hypothesis test. Write down

- H_0 and H_A
- What test you use in R: name of test, one-sided or two-sided
- Your chosen significance level
- Report the p -value you obtained
- Give a conclusion

The DREAM act

A random sample of registered voters from Tampa, FL were asked if they support the DREAM Act, a proposed law which would provide a path to citizenship for people brought illegally to the US as children. The survey also collected information on the political ideology of the respondents. The data is in `dream.csv` on Canvas.

Do an appropriate plot to visualize ideology vs stance. Describe what you see. Is what you see significant?

The American dream

- How many of you think that they can achieve the American dream?
(Do an anonymous vote on piazza, and be honest! It is anonymous).

- According to surveys, about 77% of young adults think they can achieve the American dream. Is the proportion in our class significantly different from this proportion?

Heart transplant and lifespan

The Stanford University Heart Transplant Study was conducted to determine whether an experimental heart transplant program increased lifespan. Each patient entering the program was designated an official heart transplant candidate, meaning that he was gravely ill and would most likely benefit from a new heart. Some patients got a transplant and some did not. The variable `transplant` indicates which group the patients were in; patients in the treatment group got a transplant and those in the control group did not. Another variable called `survived` was used to indicate whether or not the patient was alive at the end of the study.

This dataset is included in the `openintro` package. You can load this dataset in R with the following commands:

```
install.packages("openintro")
library(openintro)
data(heartTr)
```

The dataset is now in your workspace, and it is called `heartTr`. You can use commands such as

```
head(heartTr)
```

To see what the variables mean, type

```
?heartTr
```

We will do a descriptive and inferential analysis to answer the question: does heart transplant extend the life of patients?

- Which variables are of interest?
- Do an appropriate plot of `survived` vs `transplant`. Describe what you see. Is what you see significant?
- Do an appropriate plot of `survtime` vs `transplant`. Describe what you see. Is what you see significant?
- Could one explain the last result by claiming that the treatment group has younger people (and therefore are more likely to survive)? In other

words, are the people in the treatment group significantly younger than those in control?

- If you were to do a permutation test in the previous three questions, how should you permute the data?

Stents vs stroke

Media articles:

When evidence says no but doctors say yes

<https://www.theatlantic.com/health/archive/2017/02/when-evidence-says-no-but-doctors-say-yes/517368/>

A stent is a metal tube that slips into the artery and forces it open. The question is:

Does the use of stents reduce the risk of stroke?

The above news article claims the following.

In 2012, Brown (...) found that stents for stable patients prevent zero heart attacks and extend the lives of patients a grand total of not at all. In general, Brown says, nobody that's not having a heart attack needs a stent. (Brown added that stents may improve chest pain in some patients, albeit fleetingly.) Nonetheless, hundreds of thousands of stable patients receive stents annually, and one in 50 will suffer a serious complication or die as a result of the implantation procedure.

The text openintro has a dataset from a particular study consisting of 451 at-risk patients. Each volunteer patient was randomly assigned to one of two groups:

Treatment group. Patients in the treatment group received a stent and medical management. The medical management included medications, management of risk factors, and help in lifestyle modification.

Control group. Patients in the control group received the same medical management as the treatment group, but they did not receive stents.

Researchers randomly assigned 224 patients to the treatment group and 227 to the control group.

Researchers studied the effect of stents at two time points: 30 days after

enrollment and 365 days after enrollment. The results of 5 patients are summarized in the table below. Patient outcomes are recorded as stroke or no event, representing whether or not the patient had a stroke at the end of a time period.

	0-30 days		0-365 days	
	stroke	no event	stroke	no event
treatment	33	191	45	179
control	13	214	28	199
Total	46	405	73	378

Table 1.2: Descriptive statistics for the stent study.

- Create the data in R. Check that you did it correctly by producing the same table
- Do appropriate plot(s) to visualize the data. Describe what you see
- Based on this dataa, does the use of stents reduce the risk of stroke?