

Case Study: Using Stents to Prevent Strokes

Colby Community College

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Case Study

Many doctors have hoped that stents would have similar benefits for patients at risk of strokes.

The question researchers need to answer is:

Does the use of stents reduce the risk of stroke?

Experiment

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These patients received a stent and medical management.

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Control group (227 patients)

These patients received the same medical management, but did not receive a stent.

Data Gathering

The researchers studied the effect of stents at two time points:

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| Patient | group | 0-30 days | 0-365 days |
|---------|-----------|-----------|------------|
| 1 | treatment | no event | no event |
| 2 | treatment | stroke | stroke |
| 3 | treatment | no event | no event |
| 4 | treatment | no event | stroke |
| ⋮ | ⋮ | ⋮ | ⋮ |
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Note

Listing each patient line-by-line is very cumbersome.

Descriptive Statistics

| | 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 |

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$$\frac{\text{number of control group that had a stroke}}{\text{total size of control group}} = \frac{28}{227}$$

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What percentage of the control group had a stroke in the first year?

$$\frac{\text{number of control group that had a stroke}}{\text{total size of control group}} = \frac{28}{227} = 0.12 = 12\%$$

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Why is this important?

- 1 Many doctors expected stents to reduce the chance of a stroke.

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- 1 Many doctors expected stents to reduce the chance of a stroke.
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- 2 Does the data show a “real” difference between the groups?

Note

The second question is a real subtle one and most of the statistical tools we discuss will be used to address this question.

Significance

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Theoretically it is 50%. But if you flip a large number of coins, you rarely get exactly half heads and half tails.

| heads | | tails | | total |
|-------|-------|-------|-------|--------|
| 5,045 | 50.4% | 4,955 | 49.5% | 10,000 |
| 4,969 | 49.7% | 5,031 | 50.3% | 10,000 |
| 5,064 | 50.6% | 4,936 | 49.4% | 10,000 |
| 5,091 | 50.9% | 4,909 | 49.1% | 10,000 |
| 4,972 | 49.7% | 5,028 | 50.3% | 10,000 |
| 5,021 | 50.2% | 4,979 | 49.8% | 10,000 |
| 5,007 | 50.1% | 4,993 | 49.9% | 10,000 |
| 5,031 | 50.3% | 4,969 | 49.7% | 10,000 |
| 5,056 | 50.6% | 4,944 | 49.4% | 10,000 |
| 5,006 | 50.1% | 4,994 | 49.9% | 10,000 |

Note

The published results of the study can be summarized as:

There was compelling evidence of harm by stents in this study of stroke patients.

Chimowitz MI, Lynn MJ, Derdeyn CP, et al. 2011. Stenting versus Aggressive Medical Therapy for Intracranial Arterial Stenosis. New England Journal of Medicine 365:993-1003. <http://nejm.org/doi/full/10.1056/NEJMoa1105335>

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- This study considered patients with very specific characteristics who volunteered to be a part of the study and may not be representative of all stroke patients.
- There are many types of stents and this study only considered the self-expanding Wingspan stent.

Percentages Review

- **Percentage of:** To find a percentage of an amount, replace the % symbol with division by 100 and multiply by the amount.

Example: 6% of 1200 responses is $\frac{6}{100} \cdot 1200 = 72$

- **Decimal to Percentage:** To convert from a decimal to a percentage, multiply by 100%.

Example: $0.25 \rightarrow 0.25 \cdot 100\% = 25\%$

- **Fraction to Percentage:** To convert from a fraction to a percentage, divide the denominator into the numerator and multiply by 100%.

Example: $\frac{3}{4} = 0.75 \rightarrow 0.75 \cdot 100\% = 75\%$

- **Percentage to Decimal:** To convert from a percentage to a decimal number, replace the % by division by 100.

Example: $85\% \rightarrow \frac{85}{100} = 0.85$