

# 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?***

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## Control group (227 patients)

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

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## Data Set

| 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     |
| ⋮       | ⋮         | ⋮         | ⋮          |
| 451     | control   | no event  | no event   |

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| 451     | control   | no event  | no event   |

## Note

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

## Descriptive Statistics

|                  | 0-30 days     |                 | 0-365 days    |                 |
|------------------|---------------|-----------------|---------------|-----------------|
|                  | <i>stroke</i> | <i>no event</i> | <i>stroke</i> | <i>no event</i> |
| <i>treatment</i> | 33            | 191             | 45            | 179             |
| <i>control</i>   | 13            | 214             | 28            | 199             |
| <i>total</i>     | 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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$$\frac{\text{number of control group that had a stroke}}{\text{total size of control group}} = \frac{28}{227} = 0.12 = 12\%$$



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## Why is this important?

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

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## Why is this important?

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## 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.*

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