Nuts and Bolts

What are Confidence Intervals?

Inés Anchondo Dr. PH, RD, LD, CSP, MPH

A Confidence Interval (CI) is a range from low to high of a result that includes the true mean of the population with a specific degree of confidence (usually 95%). Therefore, generalizations can be drawn about the overall population based on sample results. This is also means that there is a 5% chance that the range will not include the true population mean. The lower and upper values are known as the confidence limits. The assumptions are that the sample was 1) randomly chosen, 2) it is representative of the population, and 3) the observations are independent of each other.

Statistical analysis results in Confidence Intervals and P values. These two are complementary and often calculated together. There can be CI of a proportion, difference of two proportions, mean, difference of two means, odds ratio, relative risk, survival curve, correlation coefficient and linear regression line and slope.

For example, the CI of a proportion of patients (n=15) treated with a special diet. In this sample only 1 patient suffered side effects. The proportion is 0.06%, the CIs are <0.01 to 0.32. That is, with 95% confidence, the true proportion of side effects may be less than 1% or as high as 32%. The result of the example above 0.06% lies within the CIs but closer to the lower confidence limit 1%. This happened because the sample size is small, including only 15 patients.

Sample size and the value of the proportion affect the width of the CI. The larger the sample the narrower and more symmetrical the CI becomes. The closer the sample proportion is to 50% the wider the CI becomes. CI can be calculated for any degree of confidence although, 95% CI are what are presented more often.

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