Statistical Interpretation of 95% Confidence Intervals (95% CI)

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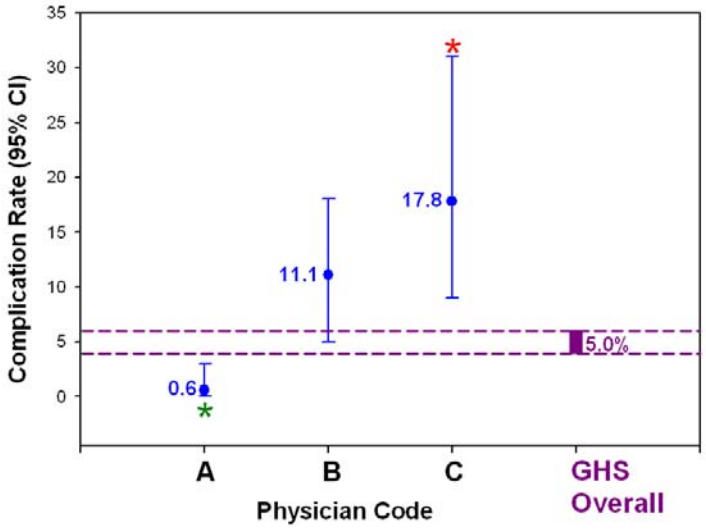
Estimation is one of the main purposes of statistics. The basic idea is that we take a *sample of data* and use it to make inferences about the *population of interest.* Estimation involves the calculation of *confidence intervals* for some statistic (For ex. a proportion or an average)

Example I: What is the complication rate of thoracoscopy at GHS?
Using 3 years of data from GHS there were 52 patients who had a thoracoscopy; of these, 4 pts. had a complication → 7.7% complication rate (95% *Confidence Interval* = 2.5%, 17.5%)

Interpretation of 95% confidence interval: Based on our sample data, we are 95% confident that the "true" complication rate at GHS is between 2.5% and 17.5%. Another interpretation: if we were to take 100 additional samples, 95 times out of 100, the complication rate would fall between 2.5% and 17.5%.

Advantages of using confidence intervals: (1) Confidence intervals remind us that study estimates have *variability (i.e. the width of the CI).* (2) Confidence intervals provide the same information as a statistical test and more. *(i.e. are the differences statistically significant?)*
(3) Confidence intervals show clearly the role that sample size (i.e. case volume) plays in the estimation. Large sample size → Narrow confidence limits
Small sample size → Wide confidence limits

EXAMPLE II: Complication Rates (95% CI) by Physician



GRAPH INTERPRETATION:
Physician A has a ***significantly lower*** complication rate than the GHS overall rate (blue CI does not overlap either of the purple GHS lines) and has the highest volume of cases (narrowest confidence interval). **Physician B's** rate is ***not significantly different*** than the GHS overall rate (blue CI overlaps upper GHS line). **Physician C** has a ***significantly higher*** complication rate than the GHS overall rate and has the lowest volume of cases (widest confidence interval).