**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).