

# Case Study 1

## Understanding Group Comparison

### 1. Case Presentation:

Several nurses have engaged in a debate about infection control and dressing change protocol. A physician has suggested that they should stop using their current protocol and switch to a revised protocol. Moreover, he handed them an article from a prestigious journal which describes the results of a study using the new dressing change protocol. Knowing that the nurses do not have a lot of free time, he highlighted the following sentence in the results section of the study.

“There were 23 complications in 255 patients randomized to the revised protocol (intervention group). There were 41 complications in 255 patients randomized to current practice (control group). The mean rate of complications in the intervention group was significantly lower than the mean rate of complications in the control group (9.0% vs 16.1% respectively;  $p < 0.05$ ). “

#### Discussion 1a:

Based only on the information provided above, what can you conclude?

**Answer:**

#### Discussion 1b:

What is the “n” for each group?

**Answer:**

#### Discussion 1c:

Which value above describes the probability that an observed effect occurred only by chance?

**Answer:**

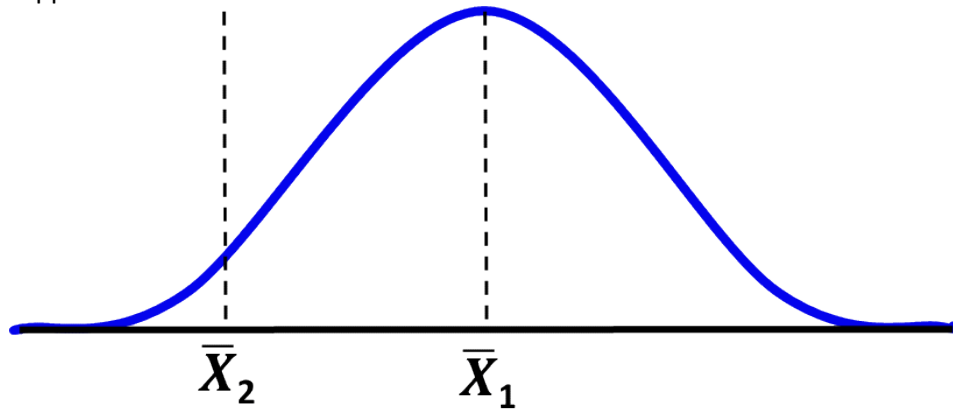
## 2 Digging deeper (methods):

Recall from the previous page:

“There were 23 complications in 255 patients randomized to the revised protocol (intervention group).

There were 41 complications in 255 patients randomized to current practice (control group). The mean rate of complications in the intervention group was significantly lower than the mean rate of complications in the control group (9.0% vs 16.1% respectively;  $p < 0.05$ ). “

The figure below appears in the methods section.



The figure above depicts how the hypothesis could be described visually.

This tests the hypothesis that the intervention group ( $\bar{X}_2$ ) mean is less than the control group ( $\bar{X}_1$ ) mean.

$$H_0: \bar{X}_2 = \bar{X}_1$$

$$H_A: \bar{X}_2 < \bar{X}_1$$

### Discussion 2a:

In the figure above, what do the symbols  $H_0$  and  $H_A$  represent?

**Answer:**

### Discussion 2b:

In the figure above, what do the symbols  $\bar{X}_2$  and  $\bar{X}_1$  represent?

**Answer:**

### Discussion 2c:

What numerical value is assigned to  $\bar{X}_2$  and  $\bar{X}_1$  ?

**Answer:**

### Digging deeper (Results):

One of the nurses finds the following data in Table 2. She asks why the maximum is so high for the control group. This leads the nurses to examine the methods section of the paper which states “the number of complications for each subject was summed...”

**Table 2.** Control and Intervention Group Results

	Current protocol Control Group	Revised protocol Intervention Group
Mean	0.1607	0.0902
Standard deviation	0.6161	0.2870
Patients experiencing complications	18	23
Complications per patient (range)	2 - 5	1
Total number of complications	41	23

#### Discussion 3a:

Knowing that the **total number of complications** is not the same as the **number of patients experiencing a complication**, Does this change your interpretation of the intervention? If so, How?

**Answer:**

#### Discussion 3b:

Which group had the highest overall number of complications?

**Answer:**

#### Discussion 3c:

Which group had the highest number of patients experiencing at least one complication?

**Answer:**

## Coming to consensus

Later in the manuscript, the nurses see the following table with results listed below the table.

**Table 3.** Complications by Subject

	Intervention	Control	Total
Complication	23	18	41
NO complication	232	237	469
	255	255	510

( $X^2 = 1.31$ ; 95%CI = 0.686-2.483)

### Discussion 4a:

What does the symbol  $X^2$  represent?

**Answer:**

### Discussion 4b:

What does the symbol **95%CI** represent?

**Answer:**

### One of the nurses summarizes the manuscript by making two statements

1. We don't know if the new dressing change protocol really made a difference.
2. There were more patients who had complications in the intervention group and although the odds ratio implies that patients who get the new dressing change protocol are 31% more likely to have a complication... we really don't know that this is true because the 95% confidence interval ranges from about 0.7 to 2.5. So it could be that the odds ratio is 1.0 (because 1.0 is between 0.7 and 2.5) which is the same as saying "1 times as likely... or equally likely."

### Discussion 4c:

Is the nurse correct?

**Answer:**