

**Ex 1** At a hospital, the burn center is experimenting with a new plasma compress treatment. A sample of 316 patients with minor burns received the plasma compress treatment; 75 had no visible scars after treatment. Another sample of 419 patients with minor burns received no plasma compress treatment; 94 had no visible scars after treatment. At the  $\alpha = 0.01$  level, do patients receiving the plasma compress treatment have a significantly higher rate of no visible scarring than those without plasma compress treatment?

a. What is the explanatory variable? Is it categorical or quantitative?

b. What is the response variable? Is it categorical or quantitative?

c. State the hypotheses

$$H_0: p_1 = p_2$$

$$H_a: p_1 > p_2$$

$$H_0: p_1 - p_2 = 0$$

$$H_a: p_1 - p_2 > 0$$

d. Is it a left-tailed, right-tailed, or two-tailed test?

e. Explicitly check any assumptions needed to use the test.

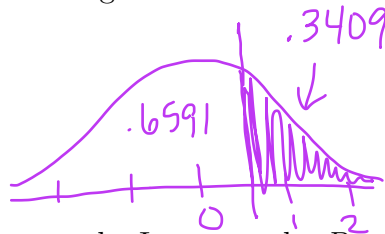
Randomly obtained data- if this were a clinical trial it should have used randomization in assignments to treatment groups

Independent samples- yes. No one is in both groups or matched pairs.

f. Compute the test statistic.

$$Z = \frac{75/316 - 94/419}{\sqrt{\frac{169}{735} \left( \frac{566}{735} \right) \left( \frac{1}{316} + \frac{1}{419} \right)}} \approx 0.41$$

g. Determine the  $P$ -value. Draw a labeled curve and shade the appropriate region.



Z	
0.4	.6591

$P$ -value is .3409

h. Interpret the  $P$ -value in the context of this problem. (You are not using  $\alpha$  yet.)

The probability of obtaining the difference in sample proportions of .013 or even larger, is 0.3409 by just random variation, assuming there is no difference in the actual population proportions.

i. (a) Are the results statistically significant or not statistically significant?

(b) Do we therefore reject the null hypothesis or not reject the null hypothesis?

(c) Explain in a complete sentences what this means in the context of this problem.

There isn't sufficient evidence that the proportion of "no visible scarring" patients is greater when receiving plasma compress treatment. That is, it is plausible that the overall proportion of patients who end up with no visible scarring is the same regardless of plasma compress treatment.

$$P < \alpha$$

$$.3409 < .01$$

	no (scar)	yes	total	prop.
1) plasma	75	241	316	75/316
2) no plasma	94	325	419	94/419
pooled	169	566	735	169/735

**Ex 2** A sample of 316 patients with minor burns received the plasma compress treatment; 75 had no visible scars after treatment. Another sample of 419 patients with minor burns received no plasma compress treatment; 94 had no visible scars after treatment. Find a 98% confidence interval for the difference in population proportions of those who had no visible scars after receiving the plasma compress treatment and those who had no visible scars after not receiving the treatment.

We already checked the assumptions on the prior page.

- a. Find a 98% confidence interval for the difference between the two population proportions.

$$\frac{75}{316} - \frac{94}{419} \pm 2.326 \sqrt{\frac{\frac{75}{316} \cdot \frac{241}{316}}{316} + \frac{\frac{94}{419} \cdot \frac{325}{419}}{419}}$$

df 98%  
∞ 2.326

$.013 \pm .073$   
 $(-0.06, 0.086)$

- b. Identify the critical value, the standard error, and the margin of error.

2.326      .031      .073

- c. Explain what the confidence interval means in practical terms.

I am 98% confident that the true difference between the population proportions for no visible scarring among those with plasma treatment and those without is between -0.06 and 0.086.

- d. Does the null hypothesis value for the difference between the two population proportions lie in the confidence interval? Does this match what you expected based on your significance test? Explain.

The "null hypothesis value" for a difference in two proportions is always 0. Because 0 is between -0.06 and 0.086, the difference in population proportions could be 0. That is, it is plausible that the two population means are the same. Based on these results, plasma treatment may not have any impact on visible scarring rates.