Estimation and sample size examples

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1- A study was conducted on 427 mechanically ventilated patients, 63 had clinical evidence of ventilator associated pneumonia, construct 95% CI for the proportion of all mechanically ventilated patients at these hospitals who may expected to develop VAP

%C.I for P = p ± [Z x√ [{p (1-p)} /n]

2-Some studies of Alzheimer's disease have shown an increase in CO_2 production in patients with the disease . In one such study the following CO_2 values were obtained from 16 neocortical biopsy samples from AD patients.

1009; 1280; 1180; 1255; 1547; 2352; 1956; 1080; 1776; 1767; 1680; 2050; 1452; 2857; 3100 ; 1621

Assume that the population of such values is normally distributed with SD of 350.

Construct 95 and 99% CI for the population mean.

$$\%C.I \text{ for } \mu = m \pm (Z * \delta / \sqrt{n})$$

1-Upper and lower boundaries of interval of confidence are classified as

A- error biased limits
B-marginal limits
C-estimate limits
D-confidence limits

2-To develop interval estimate of any parameter of population, value which is added or subtracted from point estimate is classified as

A-margin of efficiency
B-margin of consistency
C-margin of biasedness
D-margin of error

3-Considering sample size, sampling distribution standard error decreases when the

A-size of sample increases
B-size of sample decreases
C-margin of error increases
D-margin of error decreases

4-If (1 – α) is increased, the width of a confidence interval is:

(a) Decreased

(b) Increased

(c) Constant

(d) Same

5-By decreasing the sample size, the confidence interval becomes:

(a) Narrower

(b) Wider

(c) Fixed

(d) All of the above

4-The objective of study was to determine whether providing women with additional information of screening of cervical cancer would increase the willingness to be screened.

A group of 138 women received a leaflet on screening; another 136 women not received any leaflet.

In the 1st group 109 women indicated they wanted to have screening test for cervical cancer, while in the 2nd group 120 women indicated they wanted the screening test.

Construct 95% CI for the difference in proportion for the two populations represented by these samples and gives your comments.

%C.I for (P1 -P2) =

$$(p_1 - p_2) \pm (Z \times \sqrt{[p_1(1-p_1)/n_1 + p_2(1-p_2)/n_2]})$$

5- For MS patients, we wish to estimate the mean age at which the disease was first diagnosed.

We want 95% CI that is 10 years wide. If the population variance is 90, how large should be our sample?

$$\boxed{n = Z_2 X\ \delta_2 \ / \ d_2}$$

6-In a sample of 125 unemployed male high school dropouts between the ages of 16 and 21, 88 stated that they were regular consumers of alcoholic beverages.

Construct a 95% CI for the population proportion.

$$\%C.I \text{ for } P = p \pm [Z \times \sqrt{[\{p(1-p)\}/n]}$$

7-A team of clinical researchers hypothesized that major ECG abnormalities are a risk for death from CHD.
In a study designed to test this hypothesis, 47 men between 40 to 64 yr. of age at initial examination who had major ECG abnormalities and 144 men in the same age group with no ECG abnormalities were recruited as subjects.

Both groups were followed for 20 years and deaths from CHD recoded. The table below summarizes the results of this study.

ECG abnormality	Deaths from IHD	
	Yes	No
Present	8	39
Absent	10	134
Totals	18	173

1-What type of study design used?

2-What is the absolute risk of dying from CHD for those with ECG abnormalities?

3-Interpret RR from of death from CHD associated with presence of major ECG abnormalities, and calculated 95% CI and interpret it.

8-In the abstract of a research article, it was stated that the relative risk for the high risk group compared to the low risk group was 0.8 and that the 95 percent confidence interval for that relative risk value was from 0.3 to 1.7. What interpretation can be made from this finding?

A-The increased risk for the high risk group was statistically significant.

B-The increased risk for the high risk group was not statistically significant.

C-The decreased risk for the high risk group was statistically significant.

D-The decreased risk for the high risk group wasn't statistically significant.

E-No interpretation can be made from the limited information provided.

9-A study of 49 sudden infant death syndrome (SIDS) cases derives a mean birth weight of 2998 grams. From a listing of all birth weight, it is known that the standard deviation σ of birth weight in this population is 800 grams. Calculate a 95% confidence interval for the mean μ birth weight of SIDS cases in the population. Interpret your results.

%C.I for μ = m ± (Z * δ /√n)

10-A randomized controlled clinical trial was conducted to evaluate the relative efficacy of leg elevation and an antidiuretic in reducing edema in patients with stasis ulcers of the leg.

Patients were randomly assigned to the two treatments. After a two-week treatment period, the average reduction in leg volume, as determined by water displacement, was recorded for all subjects.

A 90% C.I estimate of the difference in the average reduction in leg volume produced by the two treatments was calculated as 19.1 to 40.9 cm^3.

All of the following represent correct interpretations of this confidence interval except:

A-The difference in mean reduction in leg volume between the population of patients treated with leg elevation and the population treated with antidiuretic drug is between 19.1 and 40.9 cm^3.
B-The physician conducting this study can be 90% confident that the average difference in the reduction in leg volume experienced by the two populations of patients is between 19.1 to 40.9 cm^3.

C-This 90% C.I is narrower than the corresponding 95% C.I.

D- In repeated sampling of the population in question, 90 out of every 100 confidence intervals would be expected to contain the true difference intervals between the population means (i.e. $\mu_1 - \mu_2$, where μ represents the average reduction in leg volume for population).

11- The mean survival time following chemotherapy for 2500 patients suffering from rhabdomyosarcoma is 48 months, with a standard deviation of 10 months; the median survival time is 30 months.

All of the following statements about patients undergoing chemotherapy for this malignancy are true except:

A- 95% of patients in the population will survive between 28.4 and 67.6 months. (not applicable in skewed distributions).

B- Approximately half of the patients in the population will survive more than 30 months.

C- A physician can be 95% confident that the mean survival time for the population of patients falls between 47.6 and 48.4 months.

D- Approximately half of the patients in the population survive less than 30 months.

12- A hospital administrator wishes to know what proportion of discharged patients is unhappy with the care received during hospitalization.

How large a sample should be drawn if we let $d = 0.05$, the confidence coefficient is 0.95, and no other information is available?

How large should be the sample if P is approximated by 0.25

13-A hospital administrator wishes to estimate the mean weight of babies born in her hospital.

How large a sample of birth records should be taken if she wants a 99% CI that is 1 pound wide?

Assume that a reasonable estimate of δ is 1 pound.

What sample size is required if the confidence coefficient is lowered to 0.95?