WHAT IS A CONFIDENCE INTERVAL?

A large urban hospital has about 50,000 emergency room (ER) visits per year. Records are kept on each visit, including the time of check-in and the time the patient is admitted to an examining room. An outside organization wishes to assess the time from check-in to examining room (CItoExR time), to see if it satisfies a proposed standard of at most 20 minutes. For reasons of patient privacy, the hospital cannot release complete patient data, but is able to give the organization the check-in times and times of admission to an examining room for a random sample of 200 ER visits during the past year. The organization's statistician uses this information to calculate a 95% confidence interval for the proportion p of visits having CItoExR time within the proposed standard of 20 minutes. The resulting confidence interval is (0.63, 0.87).

Each of the following is an attempt to say what the statement, "(0.63, 0.87) is a 95% confidence interval for the proportion p of all visits to that hospital's ER that year that had CItoExR time at most 20 minutes" means. Classify each attempt as follows:

A. Shows misunderstanding.
B. Gets the basic idea, but some details omitted. (State what is omitted.)
C. Good understanding.

1. p is between 0.63 and 0.87.

2.The probability that p is between 0.63 and 0.87 is 0.95.

3. No matter what sample of size 200 you chose from the total population of ER visits that year, you would get a sample proportion $\hat{p}$ (of visits with CItoExR time at most 20 minutes) for that sample between 0.63 and 0.87.

4. There is a 95% chance that the true proportion p is between 0.63 and 0.87.

5. 95% of all random samples of size 200 from the total number of ER visits that year would give sample proportions $\hat{p}$ between 0.63 and 0.87.

6. Between 0.63 and 0.87 of ER visits to that hospital that year had CItoExR time at most 20 minutes.

7. The sample proportion $\hat{p}$ for the sample the hospital gave out is between 0.62 and 0.87.

8. The probability is 95% that the sample proportion $\hat{p}$ for the sample the hospital gave out is between 0.62 and 0.87.

9. We have calculated the confidence interval (0.63, 0.87) by a method that, for 95% of all possible random samples from the population of ER visits that year, will give an interval containing the true proportion p.

10. We have calculated the confidence interval (0.63, 0.87) by a method that, for 95% of all possible random samples of size 200 from the population of ER visits that year, will give an interval containing the true proportion p.