

Case study: quantitative reasoning

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This case presents a scenario in which a research study has carried out, and the results show that a new treatment will delay the emergence and progression of severe complications of a certain disease. Specifically, the new treatment was found to delay complications of congestive heart failure according to the following distribution (number of months): [3, 5, 6, 6, 8, 8, 9, 9, 9, 10, 11, 45] Accordingly, the researchers indicated that the average number of months that the new treatment was able to delay the progression of complications was 10.75 and the standard deviation for the distribution of months was 11.02.

As a result, the researchers indicated that the new treatment produced promising results, which should warrant additional funding for further research. The same opinion is held by patients and their families who are waiting for the Board of Directors of the American Heart Association to approve funding for further research on the new treatment. This paper reviews information regarding the new treatment and compares this to the old treatment besides providing a variety of factors that should be considered before making a decision about funding this research. From the case scenario, it is important to note that the average number of months that the new treatment was capable of delaying complications is:

$$[(3+5+6+6+8+8+9+9+9+10+11+45)/12 = 129/12 = 10.75]$$
, and the standard deviation is 11.02.

02. For the old treatment, the average number of months for which the treatment delayed disability and other complications in the patients was 9.6 and the standard deviation was 3.2. In this case, it is evident that the

difference between the mean for the new treatment and the old treatment is relatively small (compare 10.75 and 9).

6). On the other hand, the difference between the standard deviation for the new treatment and the old treatment is very large (compare 11.02 and 3.2). This implies that the distribution of months for the new treatment is more spread out as opposed to the old treatment.

Furthermore, for the new treatment, the mean and the standard deviation are almost the same (compare 10.75 and 11.02), meaning that the data is in a normal distribution as opposed to the case for the old treatment whose data is skewed (DIG Stats, 2011; StatSoft, n. d.).

Therefore, before making a decision about funding the new research, it is important to consider the following. First, from the distribution of months for the new treatment, 3 and 45 are major outliers. Consequently, the degree of distortion that resulted from these values could have influenced the results provided by the researchers. Perhaps, a better way of defining the typical score in this case would be to calculate the median. From the distribution, the median equals to: [3, 5, 6, 6, 8, 8, 9, 9, 9, 10, 11, 45] $(8+9)/2 = 8.5$.

5 As a result, by merely calculating the arithmetic mean for this distribution, the effect of 45 might have caused the final result (10.75) to indicate that the new treatment is much better than the old one (DIG Stats, 2011). For that, it is important to consider the median as the more accurate measure of the research findings in this case. Therefore, considering that the median is 8.5 and the average number of months is 10.

75, and comparing this to a mean value of 9.6 for the old treatment, it follows that the mean value for the new treatment is so far misleading. Based on the findings described in the foregoing discussions, it is obvious that the efficacy of the new treatment in delaying progression of complications in patients is not significantly different from that of the old treatment. Therefore, despite that the results provided by the researchers are promising, further research would not bear any fruits if the current data results are anything to go by. However, further research may reveal significant differences between the two types of treatment if the researchers seek to address the current statistical limitations (DIG Stats, 2011; StatSoft, n.

d.). Otherwise, the current study is not worth granting additional funds.