**Surgical Patient Survey Report**

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**Introduction**

The purpose of this report is to present the main findings related to the sample data of the surgical patient survey this quarter in the local hospital. Several data visualization methods are used to reveal the information and analysis results more effectively. The data set includes six variables. Four of them (overall satisfaction, friendliness, medical knowledge, and cleanliness) are quantitative variables. Would recommend and any complications are qualitative variables.

First, for the qualitative variables, “would recommend” has two values which are 0 and 1. 0 represents (No) this patient would not recommend this hospital and 1 represents (yes) this patient would recommend this hospital. “Any complications” also has two values 0 and 1. 0 represents (No) this patient has not complications after the surgical operations and 1 represents this patient has complications. Second, for the quantitative variables, overall satisfaction, friendliness, medical knowledge, and cleanliness are all have values from 1 to 10 which is the score the patients give corresponding aspects. 1 is lowest score and 10 is the highest score.

**Summary Statistics:**

1. Descriptive statistics for all six variables.

**Quantitative variables:**

Table

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**Qualitative variables:**

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1. Boxplot.

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1. Data visualization.

Chart

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**Discrete probability distributions and probabilities**

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* 1. Probabilities of very satisfied is 0.06 + 0.22 = 0.28.
  2. Probabilities of would recommend is 0.16.
  3. Probabilities of would recommend given that no complications are 7 / 28 = 0.25.

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* 1. Probabilities of very knowledgeable is 0.46 + 0.1 = 0.56.
  2. Probabilities of would recommend given very satisfied is 4 / 14 = 0.2857.

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Table

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* 1. Probabilities of not recommend given very unsatisfied is 6 / 6 = 1.

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Table

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**The probability distribution**

*DATA BINOMIAL;*

*n = 10;*

*p = 0.28;*

*do i = 0 to 10 by 1;*

*PROBABILITY = PDF('BINOM',i,P,N);*

*output binomial;*

*end;*

*PROC PRINT data=binomial;*

*RUN;QUIT;*

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I think that Binomial Probability Distribution should be used here. The reason is that it fits Binomial Probability Distribution’s definition description. Very satisfied success occurs with probability p（0.28） in each trial and a failure occurs with probability 1 − p（0.72）. In this example, the “trial” refers to the rating of 10 patients. We can define a success as a patient choosing a rating 9 or 10 and a failure as a customer not choosing these rating. The binomial probability distribution is then used to calculate the probability of a given number of successes (customers who choose 9 or 10) out of a given number of independent trials (10).

**The probability distribution**

*DATA POISSON;*

*u = 1;*

*do i = 0 to 10 by 1;*

*PROBABILITY = PDF('POISSON',i,U);*

*output poisson;*

*end;*

*PROC PRINT data poisson;*

*RUN;QUIT;*

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* 1. Probabilities of no major surgical complications in any month is 0.3679.
  2. Probabilities of at least two major surgical complications in any month is 1- 0.3678 – 0.3678 = 0.2644.
  3. Probabilities of no major surgical complications in any quarter is 0.0498.

*DATA POISSON;*

*u = 3;*

*do i = 0 to 15 by 1;*

*PROBABILITY = PDF('POISSON',i,U);*

*output poisson;*

*end;*

*PROC PRINT data poisson;*

*RUN;QUIT;*

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* 1. Probabilities of at least two major surgical complications in any quarter is 1- 0.0498 – 0.1494 = 0.8008
  2. Probabilities of budget less than $300,000 this year is (300000 / 34000 = 8.8; ) 0.000006 + 0.000074 + 0.00442 + 0.001770 + 0.005309 + 0.025481 + 0.043682 + 0.065523 = 0.1463

*DATA POISSON;*

*u = 12;*

*do i = 0 to 30 by 1;*

*PROBABILITY = PDF('POISSON',i,U);*

*output poisson;*

*end;*

*PROC PRINT data poisson;*

*RUN;QUIT;*

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**90% confidence intervals**

*Statistics, Summary statistics, Options*

*Additional Statistics, Confidence interval for the mean, set level*

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1. According to the formular of margin of error whose value is determined by both the sample proportion and the sample size. If the sample proportion is the same and the sample size is the same, margin of error should also be the same. Margin of error should be smaller as the sample size is larger, and vice versa. However, now the sample size is same, the sample proportion is different, so the margin of error is naturally different.
2. According to the formular of margin of error, I think accuracy would increase about 29% (1/sqrt2), if the research budget increase and the quarterly sample size can be double.

**For** **overall satisfaction**

claim: a higher average of overall satisfaction this quarter than the previous quarter.

Ho: μ ≤ 6.8

Ha: μ > 6.8

Statistics, t-test, select one sample, options, select tail (Upper One-Tail Test) and alternative hypothesis > 6.8.

Table

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α= 1 - c = 1 - 0.9 = 0.1. Because p-value is 0.088 less than the alpha of 0.1, the conclusion is REJECT THE NULL and 90% confident that this quarter’s average of overall satisfaction increase.

**For** **would recommend**

claim: a higher average of overall satisfaction this quarter than the previous quarter.

Ho: p ≤ 0.12

Ha: p > 0.12

po = 0.12, while sample p = 0.16, n = 50

z = (0.16 – 0.12) / sqrt (0.12 \* (1-0.12)/50) = 0.87

*DATA NORMAL;*

*x = 0.87;*

*u = 0;*

*s = 1;*

*PROBABILITY = CDF('NORMAL',X,U,S);*

*PROC PRINT;*

*RUN;QUIT;*

Table

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Since positive, in right tail, and p value = 1-0.80785 = 0.1922

Because p-value is 0.1922 greater than the alpha of 0.1, the conclusion is FAIL TO REJECT THE NULL and we cannot be 90% confident that this quarter’s average of would recommend increase.

**For any complications**

po = 0.35, while sample p = 0.44, n = 50

z = (0.44 – 0.35) / sqrt (0.35 \* (1-0.35)/50) = 1.335

Calendar

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p value = 1-0.90906 = 0.0909

Because p-value is 0.0909 less than the alpha of 0.1, the conclusion is REJECT THE NULL and 90% confident that this quarter’s average of any complications represents a significant increase.

**For friendliness,** because p-value is 0.7871 greater than the alpha of 0.1, the conclusion is FAIL TO REJECT THE NULL and we cannot be 90% confident that this quarter’s average of friendliness represents a significant increase.

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**For medical knowledge**

Because p-value is 0.0628 less than the alpha of 0.1, the conclusion is REJECT THE NULL and 90% confident that this quarter’s average of medical knowledge increase.

**For cleanliness**

Because p-value is 0.6407 greater than the alpha of 0.1, the conclusion is FAIL TO REJECT THE NULL and we cannot be 90% confident that this quarter’s average of cleanliness increase.

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