

# Statistical analysis of patient blood groups



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## Statistical Techniques: BUS7200

With each business, a new challenge arises. A key difference in organizational performance is how a company addresses their problems or challenges. In order to guarantee ones problem solving method is a strength and not a weakness, businesses have to determine how to adapt a challenge into opportunity. More so, it has to assess the manner the problems were solved.

OakTree Hospital suspects there are unusual amounts of distribution in blood groups from patients undergoing knee procedures. OakTree already knows that expected population distribution that performs the surgery is 45 percent Group O, 34 percent Group A, 15 percent Group B, ad 6 percent Group AB. A random sample was further taken from routine pre-operation blood results and then compared to the expected distribution. These results from the 180 patients were as follows:

Blood	# of patients
O	56
A	78
B	32
AB	14

The statistical technique for this problem that would work best is the chi-square goodness-of-fit test. This test would determine if the current and <https://assignbuster.com/statistical-analysis-of-patient-blood-groups/>

previous blood groups significantly differ and if sample data is reliable in hypothesized distributions. More so, a goodness-of-fit test can be conducted when there is categorical variables with two or more levels (Bowerman, O'Connell, Murphree, & Orris, 2015). Using this approach is appropriate because the variable under study is categorical, the sampling method equals simple random sampling, and each categorical variable level included an expected frequency count of at least 5.

#### Peer-reviewed research articles

In the article "Coping Among Individuals", a medical study was done to examine the goodness-of-fit test in persons with multiple sclerosis. The authors note that this test hypothesizes that managing stressors efficiently require using different approached in uncontrollable and controllable stressors (Roubinov, Turner, & Williams, 2015). In order to test the goodness-of-fit test relevance of a sample of MS in adults, the authors assessed ratios of two groups of coping. This included emotion-based meaning-focused and active problem solving approaches that acts as relators moderators between health and stress outcomes. The participants included 113 eligible veterans in which 94 were willing to participate but 90 finished the assessment (Roubinov et al., 2015). The goodness-of-fit hypothesis proposes problem-focused strategies are useful when the stressor are noted as controllable and unalterable stressor are led by emotion based strategies (Conway & Terry, 1992; Roubinov et al., 2015). More so, by using the regression analysis stress interaction and problem/meaning focused ratio on depressive and anxious symptoms were tested. These interactions were examined at 1 above and 1 below the coping mean.

In the article "Testing Association with Interactions", a test of the null hypothesis was proposed in gene-to-gene interaction effects. More so, a two locus relation analysis was conducted with a Pearson's chi-square for a  $2 \times 9$  table that contained 8 degrees of freedom, with a nominal level of significance of .05. This testing can be done by comparing the disequilibrium of inter-locus measures of controls and cases (Yang, He, & Ott, 2009) and can be seen as interaction pieces of the chi-square. Furthermore, using the chi-square could show the shape of the alternative hypothesis and having a test with fewer degree freedoms can be used in the study of association. When the main effect is strong, the interaction will show close power to the regression method while a more powerful test would show weak or absent marginal effects (Yang et al., 2009).

In the article "Evaluating the goodness of fit in model", the Poisson regression was used in modeling referral patterns of victims having end stage renal failure. The data set stemmed from 539 referred adult patients that suffered from end stage renal failure (Boyle, Flowerdew, & Williams, 1997). The main focus was to test if there were relationships between the renal unit distance and the referrals and if so, did these relations vary in patients from various age groups. More so, the authors noted that despite renal service improvements, concern was present on biased in patients referrals. The hypothesis entailed the 539 cases be split into 5 age groups to evaluate evidence in distant decay effect in the patterns of referrals with a 0.05 level of significance (Boyle et al., 1997). By splitting data into 5 age groups, the authors has 1225 observations with critical values of 1292 and

1130 (Boyle et al., 1997). The goodness-of-fit test showed that under dispersion became a problem.

### Statistical Analysis and Expected Results

The anticipated type of data that will be used for statistical analysis comes from randomly sampling person's from pre-operative blood drawing. This will include 180 patients from blood groups A, B, AB, and O. The expected frequency is displayed below.

Value	Observed	Expected	$(E-O)^2 / E$
1	56	81	1.806
2	78	61.2	0.301
3	32	27	0.310
4	14	10.8	4.50
TOTAL	180	180	6.918

Furthermore, the null hypothesis is  $H_0: P_1 = .45, P_2 = .34, P_3 = .15, P_4 = .6$ , while the alternative hypothesis is  $H_a: P_1 \neq$

. 45, P2  $\neq$

. 34, P3  $\neq$

. 15, P4  $\neq$

. 6. Based on this distribution, calculations should be done on what is expected in each group in the form of  $(E-O^2)/E$ . In looking at the table, the degree of freedom equaled 3, the level of significance is 0. 05 and the critical value is 7. 814 and a p-value of 0. 059. Since the p-value is more than the significance, will accept the null hypothesis as there is no evidence to reject the null.

#### Evaluation

The analysis results will help solve the business problem by showing that there is unusual/unequal amount of blood distributions in knee surgery patients. It also gives the basis or groundwork of ways to get equal inputs of blood types. This information will be useful in refining the hospitals allocation method and factoring in what can be done to increase to the lower blood groups amount. Since the alternative hypothesis is favored, the expected allocation is inaccurate and should be reviewed as to why this may have happened and what can be done to further prevent this and possibly accept the null in the future. More so, the observed and expected groups significantly differ.

#### Conclusion

In conclusion, there are unusual amounts of distribution in blood groups from patients undergoing knee procedures at OakTree Hospital. The expected population stems from the four blood groups O, AB, A, and B. Using chi-square goodness-of-fit test as the statistical technique for this problem would work best. This type of testing would determine if the current and previous blood groups significantly differ. Three articles were reviewed that included use of the goodness-of-fit test in hospitals or medical related areas. The type of data that will be used for statistical analysis comes from randomly sampling person's from pre-operative blood drawing that includes 180 patients from the four blood types. Since the total of 6.918 is less than the critical value of 7.814, will accept the null hypothesis as there is no evidence to reject the null. These analysis results will help solve the business problem by showing that there is unusual/unequal amount of blood distributions in knee surgery patients. It also gives the basis or groundwork of ways to get equal inputs of blood types

## References

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