REDUCING MEDICATION ERRORS IN THE KUWAITI GOVERNMENT HOSPITALS THROUGH STAFF TRAINING AND CLINICAL VIGILANCE

Part 2

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DATA AND METHODS

Overview

The rationale of this study has been to investigate the major factors that cause medication errors within the context of Kuwaiti Government Hospitals. In this regard, the study has also been carried out to comprehend the ways of reducing medication error through clinical vigilance and staff training. For that purpose, researcher in this study has used the most appropriate methods and tools for collecting, analysing and interpreting the data in order to provide conclusive findings about the study. The selection of the right research methods carries huge importance for attaining desired research objectives, as use of any inappropriate method can make the findings invalid. Hence, the right selection of research methods has been ensured in this study in accordance with the nature and requirement of the research topic. This section presents the review of some of the key methods and techniques that have been used in this study for the collection and analysis of data.

Variables of the Study

In this study, researcher has followed primary source of data collection for gaining comprehensive information about each variable of this study. With respect to this study, researcher has incorporated several variables, pertaining to which the data has been collected from relevant sources. The key variable of this study includes efficiency of hospitals, number of incidents reports and complaints, and evaluation of professionals. To gain the required information about these variables, researcher has collected the information from six hospitals. The type of data collection method that has been used in this study was observation, which allows the researcher to gain useful information about the medication errors in different hospitals that work under Kuwait Government. The data pertaining to the efficiency of professionals with respect to category was collected on the basis of three different categories, which includes Dr/Physician, Pharmacist and Nurses. On the other hand, the data related to the number of incidents reported and complaint was collected with respect to different categories of hospitals. Lastly, data for the variables of efficiency of hospitals and efficiency of professionals was categorised by hospitals and scale. The data collection method that has been used in this study has enabled the researcher to easily quantify the data and provide more factual information about the research topic.

Data Processing and Analysis Technique

The processing and analysis of data is considered as another crucial part of the research, which determines the authenticity and reliability of research findings (Cole and Trinh, 2017). Therefore, it is important to make the right selection of analysis and processing techniques to accomplish the main research objective. Since, the data collected in this study was quantitative in nature, thus researcher has employed different statistical technique to interpret the quantitative data. Firstly, within each category of variables, researcher has arranged the total number of observations that was gathered from each of the six hospitals. At initial stages of data analysis, all the relevant data pertaining to different variables was arranged with regards to different hospitals that were under investigation. This allows the researcher to gain the important information about the issues and the information that is missing. Following that, the data was analysed through SPSS software where researcher has imported the data. Moreover, researcher has done the coding of data with respect to each categories of different variables including, efficiency of hospitals, number of incidents reports and complaints, efficiency of professionals, and efficiency of professionals with respect to category. The statistical tests that researcher has conducted in this study includes, descriptive statistics, ANOVA analysis, homogeneity of variances, means plot, and robustness of equality of means.

DATA ANALYSIS

Overview of the Data Analysis

There are different types of techniques that are used for the analysis of data; however, the right selection of analysis technique is highly dependent on the type of data that researcher looks to analyse (Kumar, 2019). In the context of this study, the main purpose of data analysis has been to evaluate the statistical significances of the collected data. Therefore, researcher has applied different statistical tests to critically assess the data, and to provide the clear and factual information about the research topic. In data analysis, researcher has analysed differences in mean values, statistical significances, and test homogeneity of variances. Moreover, researcher has conducted One-way ANOVA test to determine that whether or not the mean value of all the dependent variables is similar for all the groups. Some of the key statistical test that researcher has carried out in this study includes, ANOVA, descriptive statistics, test of homogeneity of variances, means plot, and robustness of equality of means. This section of the study presents the overall outcomes of data analysis pertaining to each variables of the study. Moreover, this section also provides the graphical representation of the results pertaining to different variables of this study to bring more clarity on the research outcome.

Evaluation of Efficiency of Hospitals

Categorised by Hospitals

The collection of the data is based on gathering of information from six Kuwaiti government hospitals for evaluating their efficiency along with the problems and common complaints regarding medication error. On the basis of the collected data, the evaluation of the six Kuwaiti government hospitals is conducted with respect to their efficiency. The main purpose is to determine as where there is a difference of efficiency among the six Kuwaiti government hospitals that affects the medication error. The evaluation of the efficiency of the hospitals is conducted through evaluating the descriptive statistics, testing of homogeneity of variances, ANOVA analysis, and robustness of equality and mean plots.

Descriptive Statistics

Table 1: Descriptive Analysis of Hospital's efficiency

	N	Mean	Std. Deviation	Std. Error	Minimum	Maximum
H1	10	1568.8	691.427	218.648	701	2855
H2	10	1198.3	747.087	236.25	236	2615
H3	10	1378.7	766.664	242.441	428	2516
H4	10	1297	627.164	198.327	458	2266
H5	10	1427.6	764.762	241.839	259	2683
H6	10	1101.1	905.745	286.422	381	2798
Total	60	1328.58	738.762	95.374	236	2855

Table 1 refers to the descriptive statistics of the hospital regarding the hospital's efficiency based on different aspects. The descriptive analysis is a useful tool that is commonly used for the evaluation of the data by summarizing the data into a meaningful for that is easier for the analyst to interpret (Amrhein, Trafimow and Greenland, 2019). The descriptive analysis is based on the information that is gathered from each of the six hospitals. While referring the H1 which is the first hospital, the mean value is computed as 1568.8 in which the maximum value is 3000. This indicates that the efficiency of H1 was slightly better than average. The standard deviation value is computed as 691.42 which demonstrates that the efficiency of H1 can either increase or decrease by 681.42. The minimum value of efficiency is computed as 701 whereas the maximum value of efficiency is computed as 2855. While referring to H2, the mean value is computed as 1198.3 which is significantly below the value 3000 which indicates that the efficiency for error reporting or when a medication error is committed is weak. The standard deviation is computed as 747.08 which indicates that the dispersion of the efficiency can increase or decrease by 747.08 units for H2. The minimum value is computed as 236 whereas the maximum value is calculated as 2615.

While referring to H3, the mean value is computed as 1378.7 which were below the value of 3000 which signifies that the efficiency regarding the error reporting is weak for H3. The standard deviation is computed as 766.6 which demonstrates that the efficiency aspect of the hospital can increase or decline by 766.6 units. The minimum value of efficiency was 428 whereas the maximum value of H3 is computed as 2516. Evaluating the descriptive of H4, the mean value is computed as 1297 which was significantly lower than the overall general scale. The dispersion value for H4 is computed as 627.16 which indicates that the efficiency can either increase or decline by 627.16. While examining H6, the mean value is computed as 1427.6 while the standard deviation of efficiency is identified as 764.75. Lastly, H6 mean value is computed as 1101.1 which

demonstrates weak efficiency aspect whereas the standard deviation is computed as 905.74. On the basis of the analysis and reflecting on the mean value, H1 is found to have the highest efficiency in comparison the other five hospitals.

Test of Homogeneity of Variances

Table 2: Levene's Test for Hospital Efficiency

	Levene Statistic	df1	df2	Sig.
Efficiency of Hospitals	0.285	5	54	0.919

The assumption of homogeneity of variance is a second statistical assumption which requires to be tested while comparing three or more groups on an outcome through ANOVA. The common tool that is used for measuring the assumption of homogeneity of variance is through Levene's tests in which the p-value must be above 0.05 for meeting the assumption whereas the value below leads towards the violating of the assumption (Jayalath et al., 2017). Based on the results, the significance value is computed as 0.919 in which the null hypothesis accepted. The variance among the different Kuwaiti government hospital pertaining to its efficiency is equal.

One-Way ANOVA

Table 3: One-Way ANOVA for Hospital's efficiency

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1397399.48	5	279479.90	0.49	0.782
Within Groups	30802993.10	54	570425.80		
Total	32200392.58	59			

Table 3 reflects on the table of ANOVA in which its F-statistic and significance value is evaluated. The null hypothesis of the case is that the mean value of hospital's efficiency is same for all groups. With respect to the significance value, it is computed as 0.782 and is above the threshold value 0.05. This means that the null hypothesis is accepted in which the mean value for the hospital's efficiency is same for all the groups.

Robustness of Equality of Means

Table 4: Robust Test of Equality of Means for Hospital's efficiency

Efficiency of Hospitals	Statistica	df1	df2	Sig.
Brown-Forsythe	0.49	5	51.293	0.782

Robust Test is similar to Levene's test which is used for testing the equality of the means through using the deviations from the group's medians (Karagö, and Saraçbasi, T., 2016). The robust test of equality of means has been evaluated through the sig value which is 0.782 (p-value >0.05). Therefore, the null hypothesis is accepted in which the means of all the groups are equal.

Means Plot

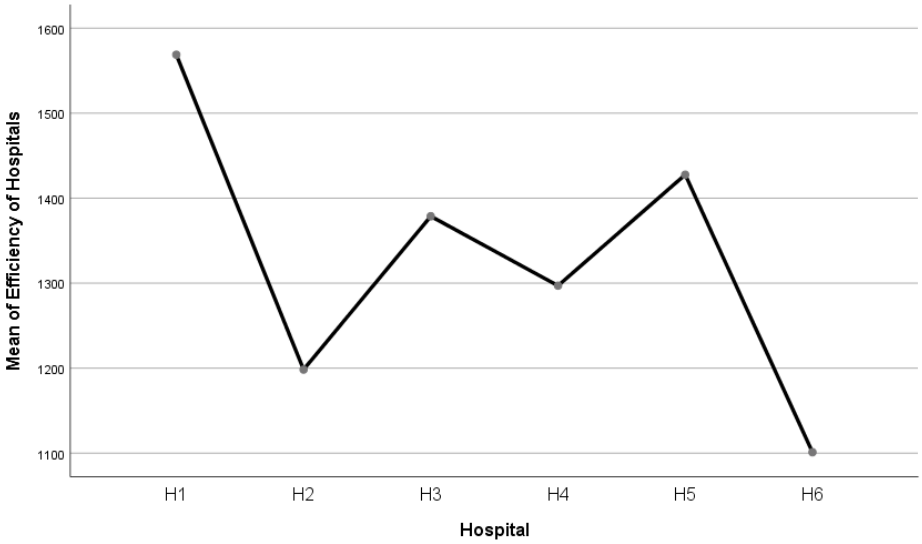


Figure 1: Mean Plots of Efficiency of Hospital

Figure 1 represents the mean plots of the efficiency of the six Kuwaiti government hospitals in which it is identified that the H1 has the highest mean value in comparison with the other hospital. This also implies that the H1 has a highest level of efficiency in terms of error reporting compared to the other hospital. On the contrary, H6 has the lowest mean point of efficiency of hospital which indicates of having the least efficiency.

Categorised by Scale

In this section, the evaluation of the efficiency is measured on the basis of the developed scale in which 1 is equal to bad efficiency whereas 10 indicates perfect efficiency. The purpose is to indicate the aspects of efficiency that is employed on the hospital on the basis of scale.

Descriptive Statistics

Table 5: Descriptive analysis of Hospital efficiency on basis of scale

	N	Mean	Std. Deviation	Minimum	Maximum
1	6	1580.17	801.717	550	2516
2	6	1020.83	762.414	236	2256
3	6	994	603.634	458	1829
4	6	1019.5	704.329	381	2289
5	6	1349.83	949.383	421	2855
6	6	1079.83	555.876	428	2061
7	6	1648.5	890.648	693	2798
8	6	1768.5	765.909	1062	2729
9	6	1154.67	598.744	602	2266
10	6	1670	601.924	815	2437
Total	60	1328.58	738.762	236	2855

Table 5 represents the descriptive analysis of hospital efficiency on the basis of scale ranking where 1 is the worst and 10 is the best. With respect to the analysis, the efficiency of the Kuwaiti hospitals is found to be highest in the 8th scale based on the mean value which is 1768.5 and the standard deviation is computed as 765.90 in the 8th scale which means that it can increase or decrease by 765.90 units. The weakest efficiency of the hospitals is found to be at the 3rd scale which had an efficiency of 994 whereas the standard deviation is computed as 603.64 which illustrates the dispersion of efficiency.

Test of Homogeneity of Variances

Table 6: Levene's Test for Hospital Efficiency

	Levene Statistic	df1	df2	Sig.
Efficiency of Hospitals	0.679	9	50	0.724

Table 6 reflects on the measurement of the assumption of homogeneity of variance through the use of Levene's Test with respect to the ranking of the efficiency. The null hypothesis established for the model is that the variance among the scale rating pertaining to the hospital's efficiency is equal. The significance value is computed as 0.724 which is above the threshold value 0.05. Therefore, the null hypothesis is accepted where the scale rating pertaining to the hospital's efficiency is equal.

One-Way ANOVA

Table 7: One-Way ANOVA for Hospital's efficiency

Efficiency of Hospitals	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5222979.417	9	580331.046	1.076	0.397
Within Groups	26977413.17	50	539548.263		
Total	32200392.58	59			

Table 7 refers to the results of one-way ANOVA in which the hospital's efficiency is measured with respect to the ranking scale. The null hypothesis of the model is that mean value of the hospital's efficiency is similar for all the ranking groups. On the basis of the sig value, it is identified to be 0.397 which led towards the acceptance of null hypothesis. Thus, this implies that the mean value of the efficiency of hospital same for all the ranking groups.

Robustness of Equality of Means

Table 8: Robust Test of Equality of Means for Hospital's efficiency

Efficiency of Hospitals	Statistica	df1	df2	Sig.
Brown-Forsythe	1.076	9	44.5	0.399

Table 8 reflects on the robust test of equality of means for Hospital efficiency in which the sig value is computed as 0.399 which is above the p-value 0.05. Thus, the null hypothesis is accepted where the means of the all the groups are equal.

Means Plot

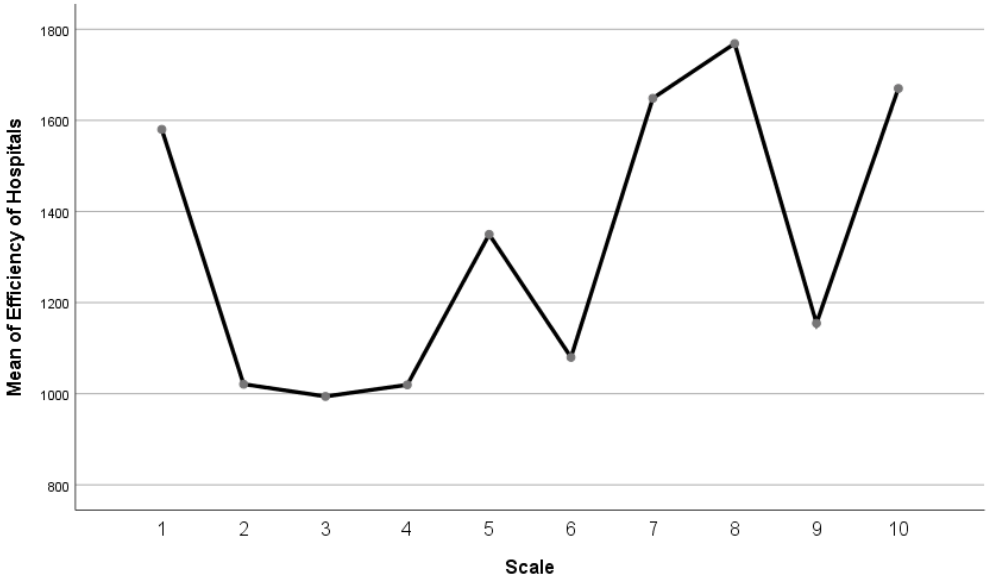


Figure 2: Mean Plots of Efficiency of Hospital

Figure 2 represents the mean plots of the efficiency of hospital based on the scale in which it is identified that highest efficiency of hospital was noted at the 8th ranking whereas the least efficiency among the hospital was observed in the 3rd scale. Moreover, it is also identified from the above graph that efficiency has significantly decline at the 9th scale of the Kuwaiti hospital.

Evaluation of Number of Incident Reports and Complaints

Descriptive Statistics

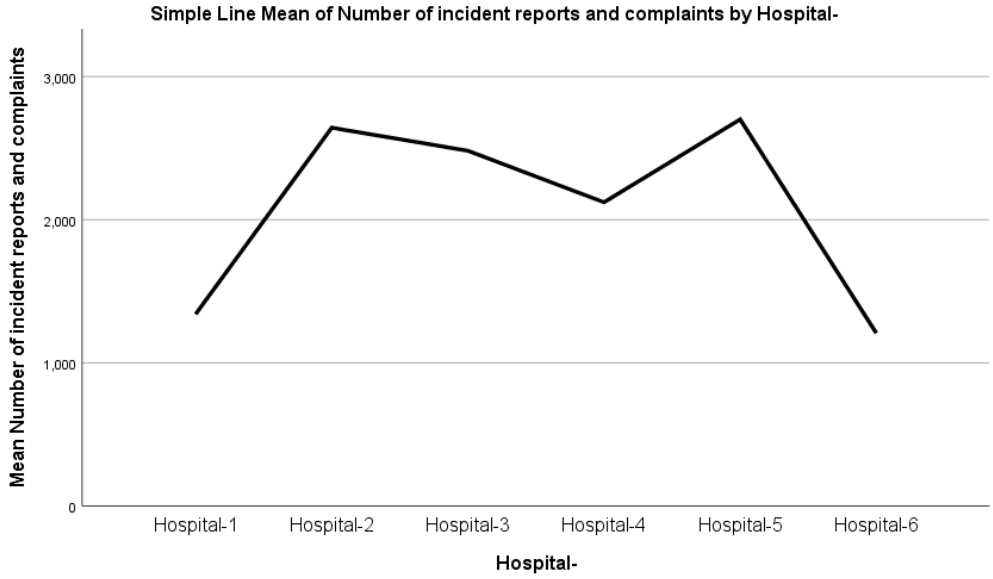
Table 9: Descriptive Analysis of Number of Incident Reports and Complaints

			Statistic	Std. Error
Number of incident reports and complaints	Mean		2082.67	269.191
	95% Confidence Interval for Mean	Lower Bound	1390.69	
		Upper Bound	2774.65	
	5% Trimmed Mean		2096.91	
	Median		2302.00	
	Variance		434783.867	
	Std. Deviation		659.381	
	Minimum		1208	
	Maximum		2701	
	Range		1493	
	Interquartile Range		1351	
	Skewness		-.631	.845
	Kurtosis		-1.956	1.741

Here it becomes important to mention that there were total of 6 hospitals that were involved in the survey process. On the basis of the aforementioned table, it can be observed that the sig value has been computed as 2082.67. This suggest that the average number of the incidents reports and complaints from the concerned hospitals were 2082.67 provided in a particular time frame. While discussing the median, the median value has been obtained as 2302.00. This suggests that that 2302, is the middle number when the data set is sorted and distributed between the two extremes. Further, in the context of standard deviation, the value has been computed as 659.381. This value suggests that to this extent the values are deviated from the mean value. Besides this, the minimum value has been identified as 1208 from the data set. This suggests that within the collected responses, the lowest number of reports collected were 1208. However, the highest

number of reports collected were 2701. This suggest that 2701 were the highest number of reports that were collected from the concerned hospitals in a particular time period. Further, the obtained skewness value suggests that distribution exhibit to be left skewed because the negative value has been obtained. Also, the value of Kurtosis suggests that the data is thin tailed relative to its normal distribution.

Graphical Assessment



The figure 3 presents the mean plots of the number of incidents reports and complaints by hospitals. In this regard, figure 3 outlines the all the six hospitals with their respective mean of number of incidents and complaints. As per the results, hospital 2 and hospital 5 are found to have the highest mean of number of incident complaints and reports. In contrast, the hospital 1 and 6 were identified with the lowest mean of incidents reporting.

Evaluation of Efficiency of Professionals

Categorised by Hospitals

The section is based on evaluating the efficiency of the professionals on the different government hospital of Kuwaiti for evaluating their ability for reporting the medical errors and taking proactive stance for dealing with the medical errors.

Descriptive Statistics

Table 9: Descriptive Analysis of Professionals efficiency

Efficiency of Professionals	N	Mean	Std. Deviation	Minimum	Maximum
H1	10	1343.3	791.403	272	2530
H2	10	1675.6	762.633	718	2907
H3	10	1749.3	895.537	379	2916
H4	10	1900.9	867.939	631	2817
H5	10	2018.3	775.313	594	2884
H6	10	1592.6	1001.45	215	2935
Total	60	1713.33	845.017	215	2935

Table 9 reflects on the descriptive analysis of the professional's efficiency on the basis of the six different hospitals. While referring to the results, it is found that H5 had the highest level of professional efficiency due to its mean value was computed as 2018.3 and its standard deviation is computed as 775.313. On the other hand, the hospital that is found to have lowest professionals' efficiency is H1 as its mean value is computed as 1343.3 and the dispersion value is identified as 791.40.

Test of Homogeneity of Variances

Table 10: Levene's Test for efficiency of Professional

	Levene Statistic	df1	df2	Sig.
Efficiency of Professionals	0.383	5	54	0.858

Table 10 reflects on the Levene's test for evaluating the assumption of homogeneity of variance. The significance value is computed as 0.858 which is above the p-value 0.05; therefore, the variance among the different Kuwaiti government hospital with respect to the professional efficiency is equal.

One-Way ANOVA

Table 11: One-Way ANOVA for Professional's efficiency

Efficiency of Professionals	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2824045.333	5	564809	0.776	0.571
Within Groups	39305126	54	727873		
Total	42129171.33	59			

While reflecting on table 11, its significance value is computed as 0.571 which is lower than the threshold value 0.05. Thus, the null hypothesis is accepted of the model where there is no mean value difference of the professional's efficiency among all the groups.

Robustness of Equality of Means

Table 12: Robust Test of Equality of Means for Professional's efficiency

Efficiency of Professionals	Statistica	df1	df2	Sig.
Brown-Forsythe	0.776	5	51.885	0.572

Table 12 reflects on the robust test for equality of means regarding the professional efficiency on the basis of the six hospitals. The significance value is 0.572 which indicates that acceptance of null hypothesis were the means of all the groups are equal.

Means Plot

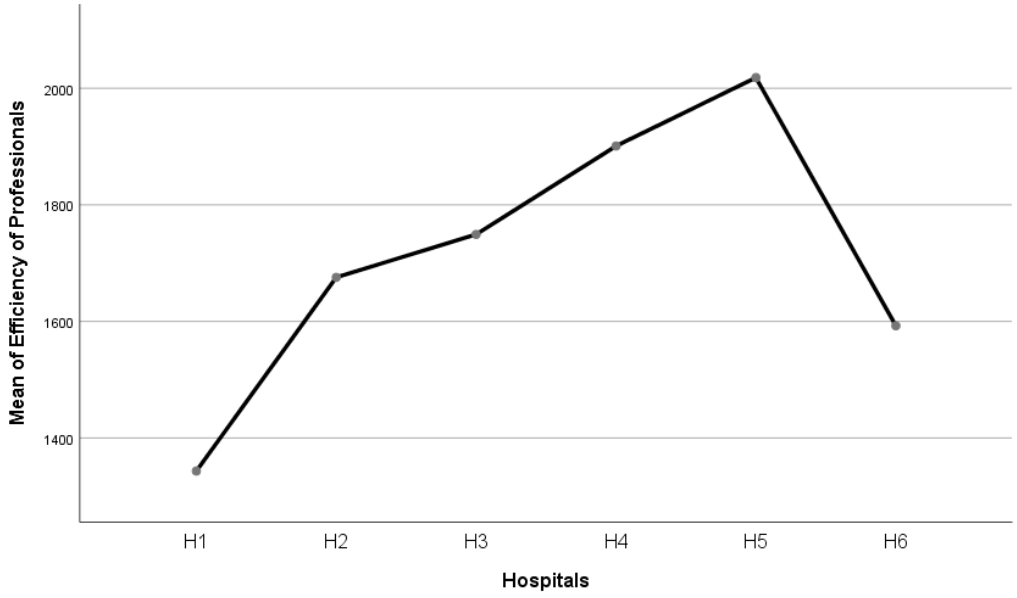


Figure 3: Mean Plots of Efficiency of Professionals

Figure 3 reflects on the mean plots of efficiency of professional in which the government hospital of Kuwaiti that has found to have the highest mean plot is H5 followed by H4. On the contrary, the hospital that is found that have the lowest efficiency of professional is H1.

Categorised by Scale

The following section is based on the evaluation of the efficiency of the professional which is categorized by the ranking scale from 1 till 10 where 1 reflects on bad efficiency and 10 reflects to perfect.

Descriptive Statistics

Table 13: Descriptive Analysis of Professionals efficiency by scale

Efficiency of Professionals	N	Mean	Std. Deviation	Std. Error	Minimum	Maximum
1	6	1531.5	828.58	338.267	215	2817
2	6	1816.83	1035.67	422.809	709	2869
3	6	1838.67	1146.28	467.967	272	2935
4	6	1529	695.19	283.81	250	2102
5	6	1373.5	769.711	314.233	379	2614
6	6	1990	669.674	273.393	947	2777
7	6	2131.17	993.947	405.777	504	2916
8	6	1461	884.414	361.061	292	2703
9	6	1747.17	881.997	360.074	631	2798
10	6	1714.5	806.602	329.294	625	2641
Total	60	1713.33	845.017	109.091	215	2935

Table 13 reflects on the descriptive statistics of the professional efficiency based on the scale in which it is determined that the highest level of professional efficiency aspect is observed in 7th scale where the mean value is computed as 2131.17 and the dispersion value is identified as 993.94. On the other hand, the lowest professional efficiency is observed at the 5th scale as the mean value is computed as 1373.5 for professional efficiency whereas the dispersion value is computed as 314.233.

Test of Homogeneity of Variances

Table 14: Levene's Test for efficiency of Professional

	Levene Statistic	df1	df2	Sig.
Efficiency of Professionals	0.892	9	50	0.539

Table 14 reflects on the Levene's test which is utilized for measuring the assumption of homogeneity of variance among the groups. The significance value is computed as 0.539 which demonstrates that the variance among the difference scale with respect to the professional efficiency is equal.

One-Way ANOVA

Table 15: One-Way ANOVA for Professional's efficiency

Efficiency of Professionals	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3149381	9	349931	0.449	0.901
Within Groups	38979790.33	50	779596		
Total	42129171.33	59			

Table 15 refers to the one-way ANOVA test for evaluating the mean value difference among the professional efficiency with respect to the different scale. The sig value is 0.901 which is above 0.05; therefore, the null hypothesis is accepted in which the mean value of professional efficiency with respect to all groups is equal.

Robustness of Equality of Means

Table 16: Robust Test of Equality of Means for Professional's efficiency

Efficiency of Professionals	Statistica	df1	df2	Sig.
Brown-Forsythe	0.449	9	45.018	0.9

Table 16 is the robust test of equality in which the Brown-Forsythe test is conducted for evaluating the equality of means for the professional's efficiency with respect to the scale. The significance value is 0.90 which is above the value 0.05; hence, the mean of all the groups are equal with respect to professional efficiency.

Means Plot

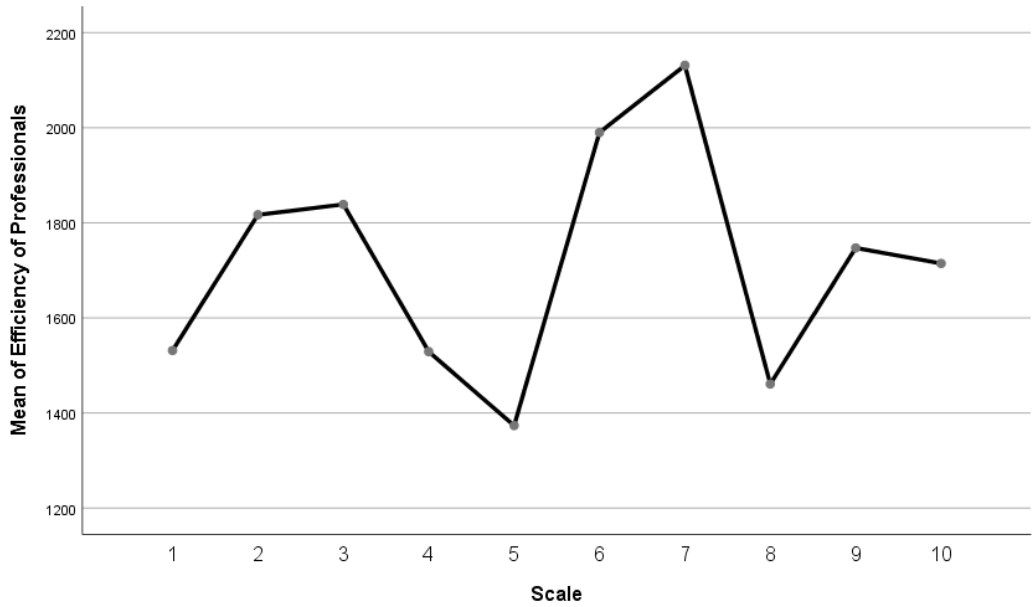


Figure 4: Mean Plots of Efficiency of Professionals

The mean plots of the efficiency of professionals can be observed in figure four where the highest efficiency is observed at 7th scale with respect to medical error reporting. On the contrary, the lowest professional efficiency is observed in the fifth scale with respect to the mean value.

Evaluation of Efficiency of Professionals with respect to Category

In the following section of the report, the evaluation has been conducted with respect to the categories of professionals working in the hospital. The purpose of this assessment is to evaluate whether or not the efficiency level differs amongst nurses, Dr/physicians or pharmacists.

Categorised by Hospitals

Specifically, in this section, the evaluation has been conducted in accordance with the six hospitals as mentioned earlier.

Descriptive Statistics

The results of descriptive statistics including mean, standard deviation, minimum and maximum has been presented in Table 17. It has been evaluated that the average efficiency of Dr/physicians is computed to be 1,338.3 out of 3,000. In addition, out of 3,000, the average efficiency of the nurses is computed to be 1,446.7 whilst pharmacists are computed to have 2,028.8. Similarly, the standard deviation in terms of efficiency scale in Dr/physicians, nurses and pharmacists is computed to be 686.3, 698.4 and 1043.09 respectively. This depicts that the highest efficiency is recorded in the category of pharmacists, however, the deviation in efficiency level is also high. The table also depicts maximum and minimum values where it has been found that the minimum efficiency is computed in the category of Dr/physicians whereas, the maximum is computed in the category of pharmacists.

Table 17: Descriptive Statistics of Efficiency of Professionals with respect to Category sorted by Hospitals

Descriptives

Efficiency by Professional's Category

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Dr/ physician	10	1338.30	686.345	217.041	847.32	1829.28	433	2577
Nurses	10	1446.70	698.440	220.866	947.07	1946.33	492	2688
Pharmacist	10	2028.80	1043.093	329.855	1282.62	2774.98	444	2958
Total	30	1604.60	854.609	156.029	1285.48	1923.72	433	2958

Test of Homogeneity of Variances

Since, it is one of the major assumptions of the one-way ANOVA analysis that the variances should not be heterogeneous, therefore, the Levene's test has been employed. The results should not be significant if a result is to be deemed significant. Considering this, the results presented in Table 18 imply that the variances are homogeneous. The assertion has been drawn based on the sig value which is computed to be 0.062> 0.05. Therefore, the null hypothesis entailing to inference that variances are homogenous have been retained.

Table 18: Homogeneity of Variances of Efficiency of Professionals Category sorted by Hospitals

Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Efficiency by Professional's Category	Based on Mean	3.089	2	27	.062
	Based on Median	1.885	2	27	.171
	Based on Median and with adjusted df	1.885	2	24.187	.173
	Based on trimmed mean	3.002	2	27	.066

ANOVA Analysis

In order to determine the differences amongst the categories of professionals, the results have been presented and interpreted in this section. The results have been illustrated in Table 19 which depicts that the f-statistics is computed to be 2.021 with p-value of 0.152. Hence, it can be concluded that the efficiency level does not differ amongst Dr/physicians, nurses and pharmacists significantly. The findings in this case are found to be similar to the study conducted by Laurant et al., (2018) who also found similar efficiency levels between them.

Table 19: ANOVA Analysis of Efficiency of Professionals Category sorted by Hospitals

ANOVA

Efficiency by Professional's Category

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2757937.400	2	1378968.700	2.021	.152
Within Groups	18422381.80	27	682310.437		
Total	21180319.20	29			

Robustness of Equality of Means

As the results are insignificant, it can be seen that the equality of means is also not robust in terms of Brown-Forsythe test. The results have been depicted in Table 20.

Table 20: Robustness of Equality of Means Efficiency of Professionals Category sorted by Hospitals

Robust Tests of Equality of Means

Efficiency by Professional's Category

	Statistic[a]	df1	df2	Sig.
Brown-Forsythe	2.021	2	22.942	.155

a. Asymptotically F distributed.

Means Plot

With one-way ANOVA, the means plot has also been made to envision the results in a more comprehensive form. In this concern, a line plot has been made which has been presented in Figure 5: Means Plot Means Plot of Efficiency of Professionals with respect to Category sorted by Hospital The figure presents that the pharmacists have relatively high efficiency level than the doctors, physicians and nurses, however, the difference between them is not statistically significant. The figure also depicts that between nurses and Dr/physician, the difference is relatively less in terms of the data accumulated from six hospitals.

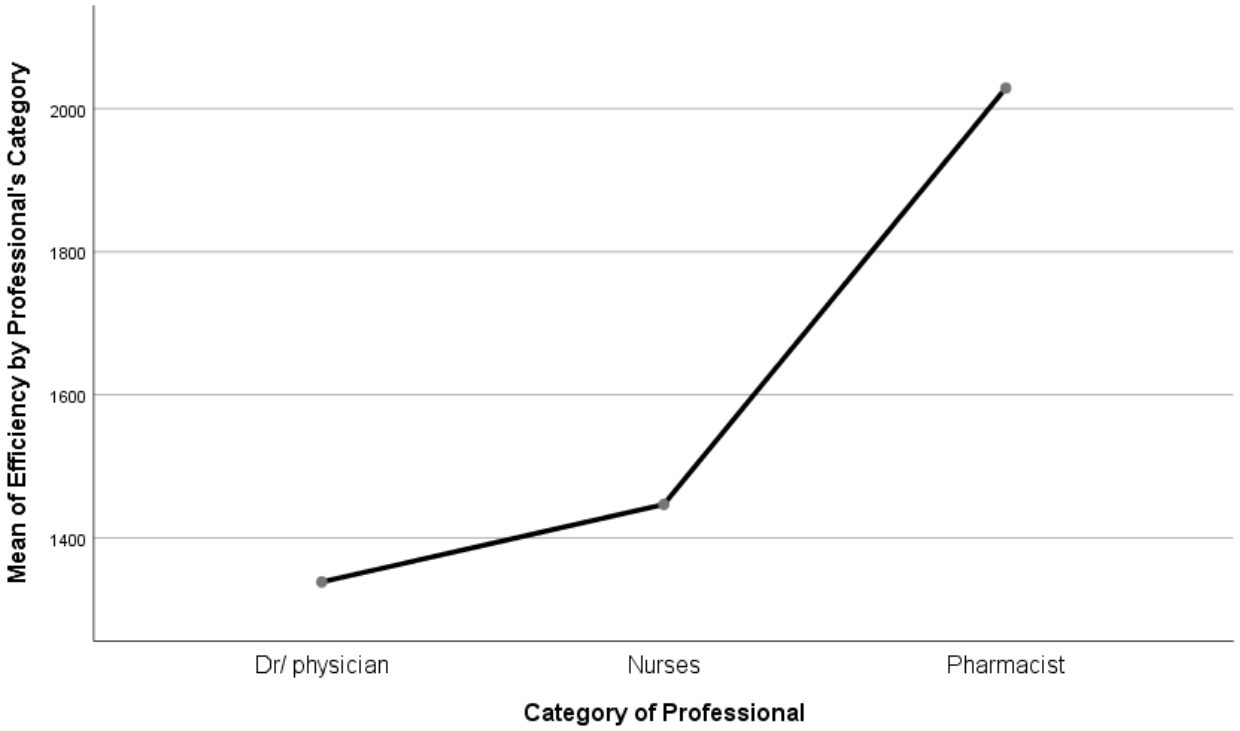


Figure 5: Means Plot Means Plot of Efficiency of Professionals with respect to Category sorted by Hospital

Categorised by Scale

In this specific section, the data has been sorted in accordance with the efficiency scale. This has helped in examining which scale is more common in hospitals in terms of efficiency. In addition, it has also assisted in determining the overall efficiency of Dr/physicians, nurses and pharmacists on the efficiency scale ranging from 1 to 10 implying low efficiency to perfect efficiency.

Descriptive Statistics

In the context of the data sorted by efficiency scale, the results of the descriptive statistics have been presented in Table 21. It has been found that the most concentrated scale score in terms of six hospitals is 9^{th} score having average value of which means all the professionals have considerably high efficiency. The least concentration of efficiency is found to be in the 7^{th} score having average value of 857. In addition, the minimum deviation amongst the efficiency in professionals is computed to be 9^{th} score attributed to a value of 334.6.

Table 21: Descriptive Statistics of Efficiency by Professionals' Category sorted by Scale

Descriptives

Efficiency by Professional's Category

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	3	1241.00	691.409	399.185	-476.56	2958.56	444	1680
2	3	972.67	467.367	269.835	-188.34	2133.67	433	1244
3	3	2121.00	1211.476	699.446	-888.47	5130.47	730	2945
4	3	1542.67	1230.710	710.551	-1514.59	4599.92	652	2947
5	3	1802.67	579.663	334.669	362.70	3242.63	1142	2226
6	3	1673.00	1141.209	658.877	-1161.92	4507.92	750	2949
7	3	857.00	370.622	213.979	-63.68	1777.68	492	1233
8	3	1976.67	918.858	530.503	-305.90	4259.24	1088	2923
9	3	2608.67	334.626	193.196	1777.41	3439.92	2291	2958
10	3	1250.67	405.320	234.012	243.80	2257.54	995	1718
Total	30	1604.60	854.609	156.029	1285.48	1923.72	433	2958

Test of Homogeneity of Variances

Even in this case, the report incorporates homogeneity testing using Levene's statistic which is computed to be 2.155 with p-value of 0.73. The p-value is above the threshold of 5%, hence, the null hypothesis entailing to the conclusion that variances are not heterogeneous is retained. The results have been depicted in Table 22.

Table 22: Homogeneity Testing of Efficiency of Professionals with respect to Category sorted by Scale

Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Efficiency by Professional's Category	Based on Mean	2.155	9	20	.073
	Based on Median	.368	9	20	.937
	Based on Median and with adjusted df	.368	9	11.172	.928
	Based on trimmed mean	1.920	9	20	.108

ANOVA Analysis

In order to determine the variation in efficiency scale amongst all the medical professional, one-way ANOVA with respect to scale has been conducted. The results have been presented in

Table 23. The f-statistics has been computed to be 1.357 with p-value of 0.271 (p-value> 0.05). Hence, the p-value is implying that there is no difference in the scale efficiency of the professionals working in different hospitals. However, considering the sensitive nature of the profession, the health service sector and the associated practitioners should be highly efficient (WHO, 2016). The statement implies that the average efficiency of al professionals should be high and the model score obtained in this case is 9 which is also high, hence, the findings are consistent.

Table 23: ANOVA Analysis of Efficiency of Professionals with respect to Category sorted by Scale

ANOVA

Efficiency by Professional's Category

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	8030149.200	9	892238.800	1.357	.271
Within Groups	13150170.00	20	657508.500		
Total	21180319.20	29			

Robustness of Equality of Means

In the same vein, as the ANOVA analysis was insignificant, the Brown-Forsythe test to evaluate the robustness of means equality is also insignificant. The results can be seen in Table 24.

Table 24: Robustness of Equality of Means of Efficiency of Professionals with respect to Category sorted by Scale

Robust Tests of Equality of Means

Efficiency by Professional's Category

	Statistic[a]	df1	df2	Sig.
Brown-Forsythe	1.357	9	11.837	.306

a. Asymptotically F distributed.

Means Plot

According to the results of one-way ANOVE, means plot has been constructed and plotted in Figure 6. It is evident that the variation amongst the scale is present, however, that is statistically insignificant. The means plot is also depicting that the highest point is formed at score 9 which is followed by 3rd score. However, the lowest concentration is computed to be at 7th score. In furtherance, from point 4 to point 6, the difference is avidly minimal. Provided this, it can also be seen that some concentration at score 1 depicting poor efficiency is also present. On the contrary,

perfect score which is 10 is also found to be concentrated, however, it is relatively lesser than others.

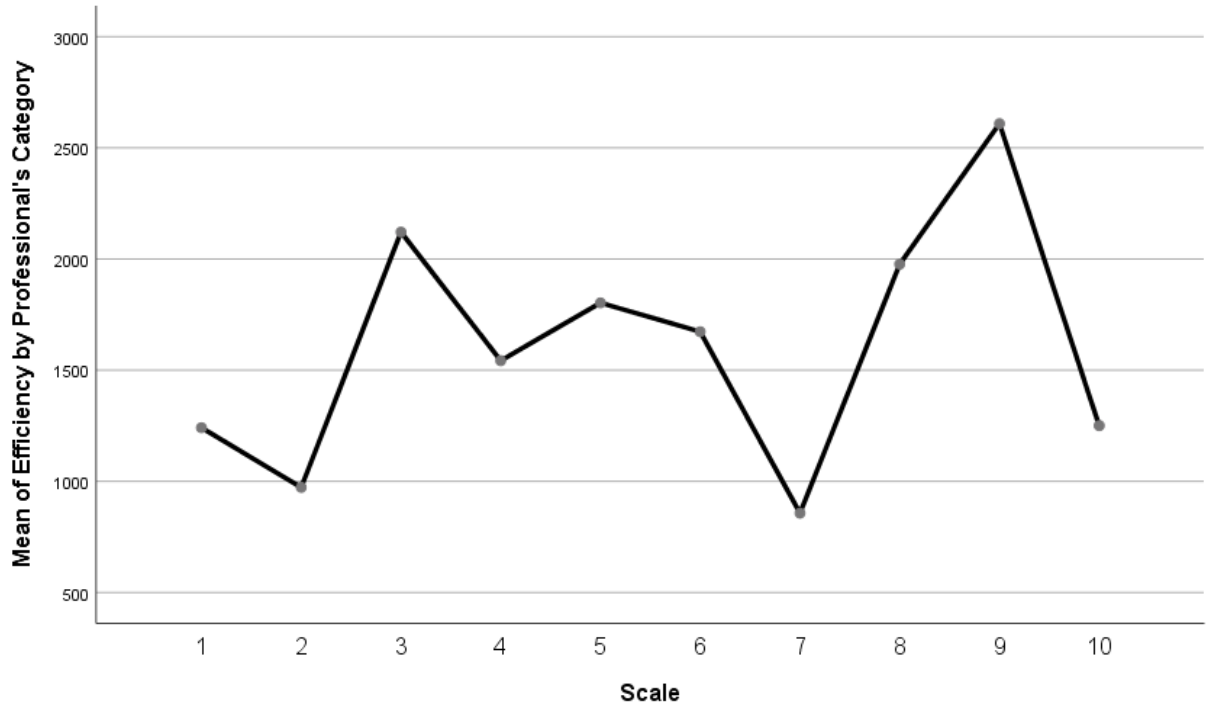


Figure 6: Means Plot of Efficiency of Professionals with respect to Category sorted by Scale

Evaluation of the Overall Hypotheses

In the context of the evaluation conduction in the preceding sections of this report, the evaluation of all the hypotheses has been conducted in this section in a tabular form. The decision of each hypothesis has been taken on the basis on p-values discussed, interpreted and evaluated in the preceding sections. In this concern, it has been found that all the hypotheses have been rejected because none of the p-values of the one-way ANOVA table were found to be statistically significant. All the values were above the threshold which was considered to be 5%. The assessment of the hypotheses has been presented in Table 25.

Table 25: Hypotheses Assessment Table

Hypothesis Number	Statement	Decision
H_{1a}	The efficiency of hospitals varies with respect each hospital significantly	Rejected
H_{2a}	The efficiency of hospitals varies with respect the efficiency scale significantly	Rejected

H_{3a}	The efficiency of professionals varies with respect each hospital significantly	Rejected
H_{4a}	The efficiency of professionals varies with respect the efficiency scale significantly	Rejected
H_{5a}	The efficiency of professionals working in hospital vary with respect their category significantly	Rejected
H_{6a}	The efficiency of professional's categories working in hospital vary with respect the efficiency scale significantly	Rejected

Summary of the Results

The overall analysis of the results provides conclusive findings about each variable of this study. Firstly, with respect to the efficiency of each hospitals that have been studied in this research, H1 is found to have highest level of efficiency in comparison with other hospitals. In this context, as per the results of Homogeneity of Variances, the significance value is figured ass 0.919. Based on this, the null hypothesis of this study has been accepted. Similarly, the results of ANOVA also validate with these findings. On the other hand, the efficiency of hospitals on the basis of scale ranking is found to be highest at 8^{th} scale; whereas the weakest efficiency of Kuwaiti hospitals is found to be at 3^{rd} scale. Moreover, as per the results of ANOVA the mean value of the efficiency of hospitals is found to be similar for all ranking groups. With respect to the number of incidents reports and complaints, the hospital 5 and 2 was found to have highest mean number of reported incidents.

The results pertaining to the efficiency of professionals amongst all the investigated hospitals, H5 is found to have highest level of professional efficiency, whereas H1 has the lowest level of professional efficiency. The results of professional efficiency on the basis of scale category identifies 7^{th} scale with the highest efficiency of professionals. Lastly, as per the results the professional category of pharmacists was recorded at highest efficiency, whereas DR/Physicians category of professional was found to be least efficient. Conclusively, the overall findings of this study have rejected all the hypothesis and accepted null hypothesis.

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Appendices

Appendix 1: Efficiency of Hospital (Categorized by Hospital)

Dependent Variable: Efficiency of Hospital

	(I) Hospital	(J) Hospital	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Bonferroni	H1	H2	370.5	337.765	1	-666.91	1407.91
		H3	190.1	337.765	1	-847.31	1227.51
		H4	271.8	337.765	1	-765.61	1309.21
		H5	141.2	337.765	1	-896.21	1178.61
		H6	467.7	337.765	1	-569.71	1505.11
	H2	H1	-370.5	337.765	1	-1407.91	666.91
		H3	-180.4	337.765	1	-1217.81	857.01
		H4	-98.7	337.765	1	-1136.11	938.71
		H5	-229.3	337.765	1	-1266.71	808.11
		H6	97.2	337.765	1	-940.21	1134.61
	H3	H1	-190.1	337.765	1	-1227.51	847.31
		H2	180.4	337.765	1	-857.01	1217.81
		H4	81.7	337.765	1	-955.71	1119.11
		H5	-48.9	337.765	1	-1086.31	988.51
		H6	277.6	337.765	1	-759.81	1315.01
	H4	H1	-271.8	337.765	1	-1309.21	765.61
		H2	98.7	337.765	1	-938.71	1136.11
		H3	-81.7	337.765	1	-1119.11	955.71
		H5	-130.6	337.765	1	-1168.01	906.81
		H6	195.9	337.765	1	-841.51	1233.31
	H5	H1	-141.2	337.765	1	-1178.61	896.21
		H2	229.3	337.765	1	-808.11	1266.71
		H3	48.9	337.765	1	-988.51	1086.31
		H4	130.6	337.765	1	-906.81	1168.01
		H6	326.5	337.765	1	-710.91	1363.91
	H6	H1	-467.7	337.765	1	-1505.11	569.71
		H2	-97.2	337.765	1	-1134.61	940.21
		H3	-277.6	337.765	1	-1315.01	759.81
		H4	-195.9	337.765	1	-1233.31	841.51
		H5	-326.5	337.765	1	-1363.91	710.91

Games-Howell	H1	H2	370.5	321.902	0.853	-653.19	1394.19
		H3	190.1	326.473	0.991	-848.65	1228.85
		H4	271.8	295.196	0.936	-667.32	1210.92
		H5	141.2	326.026	0.998	-896.08	1178.48
		H6	467.7	360.339	0.782	-686.28	1621.68
	H2	H1	-370.5	321.902	0.853	-1394.19	653.19
		H3	-180.4	338.513	0.994	-1256.29	895.49
		H4	-98.7	308.46	0.999	-1082.24	884.84
		H5	-229.3	338.083	0.982	-1303.8	845.2
		H6	97.2	371.283	1	-1087.47	1281.87
	H3	H1	-190.1	326.473	0.991	-1228.85	848.65
		H2	180.4	338.513	0.994	-895.49	1256.29
		H4	81.7	313.227	1	-918.06	1081.46
		H5	-48.9	342.438	1	-1137.18	1039.38
		H6	277.6	375.253	0.974	-918.56	1473.76
	H4	H1	-271.8	295.196	0.936	-1210.92	667.32
		H2	98.7	308.46	0.999	-884.84	1082.24
		H3	-81.7	313.227	1	-1081.46	918.06
		H5	-130.6	312.761	0.998	-1128.77	867.57
		H6	195.9	348.383	0.992	-926.49	1318.29
	H5	H1	-141.2	326.026	0.998	-1178.48	896.08
		H2	229.3	338.083	0.982	-845.2	1303.8
		H3	48.9	342.438	1	-1039.38	1137.18
		H4	130.6	312.761	0.998	-867.57	1128.77
		H6	326.5	374.865	0.949	-868.53	1521.53
	H6	H1	-467.7	360.339	0.782	-1621.68	686.28
		H2	-97.2	371.283	1	-1281.87	1087.47
		H3	-277.6	375.253	0.974	-1473.76	918.56
		H4	-195.9	348.383	0.992	-1318.29	926.49
		H5	-326.5	374.865	0.949	-1521.53	868.53

Appendix 2: Efficiency of Hospital (Categorized by Scale)

	(I) Scale	(J) Scale	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Bonferroni	1	2	559.333	424.087	1	-908.38	2027.04
		3	586.167	424.087	1	-881.54	2053.88
		4	560.667	424.087	1	-907.04	2028.38
		5	230.333	424.087	1	-1237.38	1698.04
		6	500.333	424.087	1	-967.38	1968.04
		7	-68.333	424.087	1	-1536.04	1399.38
		8	-188.333	424.087	1	-1656.04	1279.38
		9	425.5	424.087	1	-1042.21	1893.21
		10	-89.833	424.087	1	-1557.54	1377.88
	2	1	-559.333	424.087	1	-2027.04	908.38
		3	26.833	424.087	1	-1440.88	1494.54
		4	1.333	424.087	1	-1466.38	1469.04
		5	-329	424.087	1	-1796.71	1138.71
		6	-59	424.087	1	-1526.71	1408.71
		7	-627.667	424.087	1	-2095.38	840.04
		8	-747.667	424.087	1	-2215.38	720.04
		9	-133.833	424.087	1	-1601.54	1333.88
		10	-649.167	424.087	1	-2116.88	818.54
	3	1	-586.167	424.087	1	-2053.88	881.54
		2	-26.833	424.087	1	-1494.54	1440.88
		4	-25.5	424.087	1	-1493.21	1442.21
		5	-355.833	424.087	1	-1823.54	1111.88
		6	-85.833	424.087	1	-1553.54	1381.88
		7	-654.5	424.087	1	-2122.21	813.21
		8	-774.5	424.087	1	-2242.21	693.21
		9	-160.667	424.087	1	-1628.38	1307.04
		10	-676	424.087	1	-2143.71	791.71
	4	1	-560.667	424.087	1	-2028.38	907.04
		2	-1.333	424.087	1	-1469.04	1466.38
		3	25.5	424.087	1	-1442.21	1493.21
		5	-330.333	424.087	1	-1798.04	1137.38
		6	-60.333	424.087	1	-1528.04	1407.38
		7	-629	424.087	1	-2096.71	838.71
		8	-749	424.087	1	-2216.71	718.71
		9	-135.167	424.087	1	-1602.88	1332.54
		10	-650.5	424.087	1	-2118.21	817.21
	5	1	-230.333	424.087	1	-1698.04	1237.38
		2	329	424.087	1	-1138.71	1796.71
		3	355.833	424.087	1	-1111.88	1823.54
		4	330.333	424.087	1	-1137.38	1798.04
		6	270	424.087	1	-1197.71	1737.71
		7	-298.667	424.087	1	-1766.38	1169.04
		8	-418.667	424.087	1	-1886.38	1049.04
		9	195.167	424.087	1	-1272.54	1662.88
		10	-320.167	424.087	1	-1787.88	1147.54
	6	1	-500.333	424.087	1	-1968.04	967.38
		2	59	424.087	1	-1408.71	1526.71
		3	85.833	424.087	1	-1381.88	1553.54
		4	60.333	424.087	1	-1407.38	1528.04
		5	-270	424.087	1	-1737.71	1197.71
		7	-568.667	424.087	1	-2036.38	899.04
		8	-688.667	424.087	1	-2156.38	779.04
		9	-74.833	424.087	1	-1542.54	1392.88
		10	-590.167	424.087	1	-2057.88	877.54
	7	1	68.333	424.087	1	-1399.38	1536.04
		2	627.667	424.087	1	-840.04	2095.38
		3	654.5	424.087	1	-813.21	2122.21
		4	629	424.087	1	-838.71	2096.71
		5	298.667	424.087	1	-1169.04	1766.38
		6	568.667	424.087	1	-899.04	2036.38
		8	-120	424.087	1	-1587.71	1347.71
		9	493.833	424.087	1	-973.88	1961.54
		10	-21.5	424.087	1	-1489.21	1446.21
	8	1	188.333	424.087	1	-1279.38	1656.04
		2	747.667	424.087	1	-720.04	2215.38
		3	774.5	424.087	1	-693.21	2242.21
		4	749	424.087	1	-718.71	2216.71
		5	418.667	424.087	1	-1049.04	1886.38
		6	688.667	424.087	1	-779.04	2156.38
		7	120	424.087	1	-1347.71	1587.71
		9	613.833	424.087	1	-853.88	2081.54
		10	98.5	424.087	1	-1369.21	1566.21
	9	1	-425.5	424.087	1	-1893.21	1042.21
		2	133.833	424.087	1	-1333.88	1601.54
		3	160.667	424.087	1	-1307.04	1628.38
		4	135.167	424.087	1	-1332.54	1602.88
		5	-195.167	424.087	1	-1662.88	1272.54
		6	74.833	424.087	1	-1392.88	1542.54
		7	-493.833	424.087	1	-1961.54	973.88
		8	-613.833	424.087	1	-2081.54	853.88
		10	-515.333	424.087	1	-1983.04	952.38
	10	1	89.833	424.087	1	-1377.88	1557.54
		2	649.167	424.087	1	-818.54	2116.88
		3	676	424.087	1	-791.71	2143.71
		4	650.5	424.087	1	-817.21	2118.21
		5	320.167	424.087	1	-1147.54	1787.88
		6	590.167	424.087	1	-877.54	2057.88
		7	21.5	424.087	1	-1446.21	1489.21
		8	-98.5	424.087	1	-1566.21	1369.21
		9	515.333	424.087	1	-952.38	1983.04

Games-Howell	1	2	559.333	451.668	0.948	-1229.67	2348.34
		3	586.167	409.7	0.89	-1063.48	2235.81
		4	560.667	435.666	0.936	-1170.36	2291.69
		5	230.333	507.293	1	-1790.43	2251.09
		6	500.333	398.277	0.942	-1120	2120.67
		7	-68.333	489.218	1	-2009.71	1873.05
		8	-188.333	452.652	1	-1981.06	1604.39
		9	425.5	408.502	0.98	-1220.86	2071.86
		10	-89.833	409.28	1	-1738.32	1558.65
	2	1	-559.333	451.668	0.948	-2348.34	1229.67
		3	26.833	396.999	1	-1563.24	1616.91
		4	1.333	423.744	1	-1678.46	1681.13
		5	-329	497.092	0.999	-2317.31	1659.31
		6	-59	385.2	1	-1615.91	1497.91
		7	-627.667	478.632	0.929	-2532.45	1277.12
		8	-747.667	441.19	0.778	-2494.19	998.86
		9	-133.833	395.763	1	-1720.22	1452.55
		10	-649.167	396.566	0.805	-2237.94	939.61
	3	1	-586.167	409.7	0.89	-2235.81	1063.48
		2	-26.833	396.999	1	-1616.91	1563.24
		4	-25.5	378.694	1	-1532.45	1481.45
		5	-355.833	459.293	0.997	-2248.23	1536.56
		6	-85.833	335.006	1	-1414	1242.33
		7	-654.5	439.247	0.867	-2447.2	1138.2
		8	-774.5	398.119	0.647	-2369.77	820.77
		9	-160.667	347.099	1	-1534.73	1213.4
		10	-676	348.015	0.648	-2053.68	701.68
	4	1	-560.667	435.666	0.936	-2291.69	1170.36
		2	-1.333	423.744	1	-1681.13	1678.46
		3	25.5	378.694	1	-1481.45	1532.45
		5	-330.333	482.598	0.999	-2276.83	1616.16
		6	-60.333	366.305	1	-1527.92	1407.26
		7	-629	463.561	0.915	-2485.88	1227.88
		8	-749	424.793	0.743	-2433.23	935.23
		9	-135.167	377.398	1	-1637.79	1367.46
		10	-650.5	378.24	0.765	-2155.93	854.93
	5	1	-230.333	507.293	1	-2251.09	1790.43
		2	329	497.092	0.999	-1659.31	2317.31
		3	355.833	459.293	0.997	-1536.56	2248.23
		4	330.333	482.598	0.999	-1616.16	2276.83
		6	270	449.134	1	-1605.18	2145.18
		7	-298.667	531.442	1	-2404.37	1807.03
		8	-418.667	497.987	0.995	-2409.73	1572.4
		9	195.167	458.225	1	-1695.21	2085.55
		10	-320.167	458.919	0.999	-2211.85	1571.52
	6	1	-500.333	398.277	0.942	-2120.67	1120
		2	59	385.2	1	-1497.91	1615.91
		3	85.833	335.006	1	-1242.33	1414
		4	60.333	366.305	1	-1407.26	1527.92
		5	-270	449.134	1	-2145.18	1605.18
		7	-568.667	428.613	0.922	-2339.77	1202.44
		8	-688.667	386.354	0.733	-2251.13	873.79
		9	-74.833	333.54	1	-1396.82	1247.15
		10	-590.167	334.492	0.743	-1916.17	735.83
	7	1	68.333	489.218	1	-1873.05	2009.71
		2	627.667	478.632	0.929	-1277.12	2532.45
		3	654.5	439.247	0.867	-1138.2	2447.2
		4	629	463.561	0.915	-1227.88	2485.88
		5	298.667	531.442	1	-1807.03	2404.37
		6	568.667	428.613	0.922	-1202.44	2339.77
		8	-120	479.561	1	-2027.91	1787.91
		9	493.833	438.13	0.968	-1296.39	2284.05
		10	-21.5	438.856	1	-1813.33	1770.33
	8	1	188.333	452.652	1	-1604.39	1981.06
		2	747.667	441.19	0.778	-998.86	2494.19
		3	774.5	398.119	0.647	-820.77	2369.77
		4	749	424.793	0.743	-935.23	2433.23
		5	418.667	497.987	0.995	-1572.4	2409.73
		6	688.667	386.354	0.733	-873.79	2251.13
		7	120	479.561	1	-1787.91	2027.91
		9	613.833	396.886	0.845	-977.78	2205.45
		10	98.5	397.687	1	-1495.48	1692.48
	9	1	-425.5	408.502	0.98	-2071.86	1220.86
		2	133.833	395.763	1	-1452.55	1720.22
		3	160.667	347.099	1	-1213.4	1534.73
		4	135.167	377.398	1	-1367.46	1637.79
		5	-195.167	458.225	1	-2085.55	1695.21
		6	74.833	333.54	1	-1247.15	1396.82
		7	-493.833	438.13	0.968	-2284.05	1296.39
		8	-613.833	396.886	0.845	-2205.45	977.78
		10	-515.333	346.604	0.871	-1887.43	856.76
	10	1	89.833	409.28	1	-1558.65	1738.32
		2	649.167	396.566	0.805	-939.61	2237.94
		3	676	348.015	0.648	-701.68	2053.68
		4	650.5	378.24	0.765	-854.93	2155.93
		5	320.167	458.919	0.999	-1571.52	2211.85
		6	590.167	334.492	0.743	-735.83	1916.17
		7	21.5	438.856	1	-1770.33	1813.33
		8	-98.5	397.687	1	-1692.48	1495.48
		9	515.333	346.604	0.871	-856.76	1887.43

Appendix 3: Efficiency of Professionals (Categorized by Hospital)

	(I) Hospital	(J) Hospital	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Bonferroni	H1	H2	-332.3	381.542	1	-1504.17	839.57
		H3	-406	381.542	1	-1577.87	765.87
		H4	-557.6	381.542	1	-1729.47	614.27
		H5	-675	381.542	1	-1846.87	496.87
		H6	-249.3	381.542	1	-1421.17	922.57
	H2	H1	332.3	381.542	1	-839.57	1504.17
		H3	-73.7	381.542	1	-1245.57	1098.17
		H4	-225.3	381.542	1	-1397.17	946.57
		H5	-342.7	381.542	1	-1514.57	829.17
		H6	83	381.542	1	-1088.87	1254.87
	H3	H1	406	381.542	1	-765.87	1577.87
		H2	73.7	381.542	1	-1098.17	1245.57
		H4	-151.6	381.542	1	-1323.47	1020.27
		H5	-269	381.542	1	-1440.87	902.87
		H6	156.7	381.542	1	-1015.17	1328.57
	H4	H1	557.6	381.542	1	-614.27	1729.47
		H2	225.3	381.542	1	-946.57	1397.17
		H3	151.6	381.542	1	-1020.27	1323.47
		H5	-117.4	381.542	1	-1289.27	1054.47
		H6	308.3	381.542	1	-863.57	1480.17
	H5	H1	675	381.542	1	-496.87	1846.87
		H2	342.7	381.542	1	-829.17	1514.57
		H3	269	381.542	1	-902.87	1440.87
		H4	117.4	381.542	1	-1054.47	1289.27
		H6	425.7	381.542	1	-746.17	1597.57
	H6	H1	249.3	381.542	1	-922.57	1421.17
		H2	-83	381.542	1	-1254.87	1088.87
		H3	-156.7	381.542	1	-1328.57	1015.17
		H4	-308.3	381.542	1	-1480.17	863.57
		H5	-425.7	381.542	1	-1597.57	746.17

Games-Howell	H1	H2	-332.3	347.552	0.926	-1437	772.4
		H3	-406	377.929	0.885	-1609.08	797.08
		H4	-557.6	371.435	0.668	-1739.13	623.93
		H5	-675	350.347	0.419	-1788.47	438.47
		H6	-249.3	403.635	0.988	-1539.64	1041.04
	H2	H1	332.3	347.552	0.926	-772.4	1437
		H3	-73.7	371.967	1	-1259.13	1111.73
		H4	-225.3	365.367	0.988	-1388.57	937.97
		H5	-342.7	343.907	0.913	-1435.68	750.28
		H6	83	398.058	1	-1191.94	1357.94
	H3	H1	406	377.929	0.885	-797.08	1609.08
		H2	73.7	371.967	1	-1111.73	1259.13
		H4	-151.6	394.374	0.999	-1405.07	1101.87
		H5	-269	374.579	0.977	-1462.12	924.12
		H6	156.7	424.839	0.999	-1195.3	1508.7
	H4	H1	557.6	371.435	0.668	-623.93	1739.13
		H2	225.3	365.367	0.988	-937.97	1388.57
		H3	151.6	394.374	0.999	-1101.87	1405.07
		H5	-117.4	368.026	0.999	-1288.63	1053.83
		H6	308.3	419.072	0.975	-1026.49	1643.09
	H5	H1	675	350.347	0.419	-438.47	1788.47
		H2	342.7	343.907	0.913	-750.28	1435.68
		H3	269	374.579	0.977	-924.12	1462.12
		H4	117.4	368.026	0.999	-1053.83	1288.63
		H6	425.7	400.5	0.889	-855.94	1707.34
	H6	H1	249.3	403.635	0.988	-1041.04	1539.64
		H2	-83	398.058	1	-1357.94	1191.94
		H3	-156.7	424.839	0.999	-1508.7	1195.3
		H4	-308.3	419.072	0.975	-1643.09	1026.49
		H5	-425.7	400.5	0.889	-1707.34	855.94

Appendix 4: Efficiency of Professionals (Categorized by Scale)

	(I) Scale	(J) Scale	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Bonferroni	1	2	-285.333	509.77	1	-2049.58	1478.91
		3	-307.167	509.77	1	-2071.41	1457.08
		4	2.5	509.77	1	-1761.75	1766.75
		5	158	509.77	1	-1606.25	1922.25
		6	-458.5	509.77	1	-2222.75	1305.75
		7	-599.667	509.77	1	-2363.91	1164.58
		8	70.5	509.77	1	-1693.75	1834.75
		9	-215.667	509.77	1	-1979.91	1548.58
		10	-183	509.77	1	-1947.25	1581.25
	2	1	285.333	509.77	1	-1478.91	2049.58
		3	-21.833	509.77	1	-1786.08	1742.41
		4	287.833	509.77	1	-1476.41	2052.08
		5	443.333	509.77	1	-1320.91	2207.58
		6	-173.167	509.77	1	-1937.41	1591.08
		7	-314.333	509.77	1	-2078.58	1449.91
		8	355.833	509.77	1	-1408.41	2120.08
		9	69.667	509.77	1	-1694.58	1833.91
		10	102.333	509.77	1	-1661.91	1866.58
	3	1	307.167	509.77	1	-1457.08	2071.41
		2	21.833	509.77	1	-1742.41	1786.08
		4	309.667	509.77	1	-1454.58	2073.91
		5	465.167	509.77	1	-1299.08	2229.41
		6	-151.333	509.77	1	-1915.58	1612.91
		7	-292.5	509.77	1	-2056.75	1471.75
		8	377.667	509.77	1	-1386.58	2141.91
		9	91.5	509.77	1	-1672.75	1855.75
		10	124.167	509.77	1	-1640.08	1888.41
	4	1	-2.5	509.77	1	-1766.75	1761.75
		2	-287.833	509.77	1	-2052.08	1476.41
		3	-309.667	509.77	1	-2073.91	1454.58
		5	155.5	509.77	1	-1608.75	1919.75
		6	-461	509.77	1	-2225.25	1303.25
		7	-602.167	509.77	1	-2366.41	1162.08
		8	68	509.77	1	-1696.25	1832.25
		9	-218.167	509.77	1	-1982.41	1546.08
		10	-185.5	509.77	1	-1949.75	1578.75
	5	1	-158	509.77	1	-1922.25	1606.25
		2	-443.333	509.77	1	-2207.58	1320.91
		3	-465.167	509.77	1	-2229.41	1299.08
		4	-155.5	509.77	1	-1919.75	1608.75
		6	-616.5	509.77	1	-2380.75	1147.75
		7	-757.667	509.77	1	-2521.91	1006.58
		8	-87.5	509.77	1	-1851.75	1676.75
		9	-373.667	509.77	1	-2137.91	1390.58
		10	-341	509.77	1	-2105.25	1423.25
	6	1	458.5	509.77	1	-1305.75	2222.75
		2	173.167	509.77	1	-1591.08	1937.41
		3	151.333	509.77	1	-1612.91	1915.58
		4	461	509.77	1	-1303.25	2225.25
		5	616.5	509.77	1	-1147.75	2380.75
		7	-141.167	509.77	1	-1905.41	1623.08
		8	529	509.77	1	-1235.25	2293.25
		9	242.833	509.77	1	-1521.41	2007.08
		10	275.5	509.77	1	-1488.75	2039.75
	7	1	599.667	509.77	1	-1164.58	2363.91
		2	314.333	509.77	1	-1449.91	2078.58
		3	292.5	509.77	1	-1471.75	2056.75
		4	602.167	509.77	1	-1162.08	2366.41
		5	757.667	509.77	1	-1006.58	2521.91
		6	141.167	509.77	1	-1623.08	1905.41
		8	670.167	509.77	1	-1094.08	2434.41
		9	384	509.77	1	-1380.25	2148.25
		10	416.667	509.77	1	-1347.58	2180.91
	8	1	-70.5	509.77	1	-1834.75	1693.75
		2	-355.833	509.77	1	-2120.08	1408.41
		3	-377.667	509.77	1	-2141.91	1386.58
		4	-68	509.77	1	-1832.25	1696.25
		5	87.5	509.77	1	-1676.75	1851.75
		6	-529	509.77	1	-2293.25	1235.25
		7	-670.167	509.77	1	-2434.41	1094.08
		9	-286.167	509.77	1	-2050.41	1478.08
		10	-253.5	509.77	1	-2017.75	1510.75
	9	1	215.667	509.77	1	-1548.58	1979.91
		2	-69.667	509.77	1	-1833.91	1694.58
		3	-91.5	509.77	1	-1855.75	1672.75
		4	218.167	509.77	1	-1546.08	1982.41
		5	373.667	509.77	1	-1390.58	2137.91
		6	-242.833	509.77	1	-2007.08	1521.41
		7	-384	509.77	1	-2148.25	1380.25
		8	286.167	509.77	1	-1478.08	2050.41
		10	32.667	509.77	1	-1731.58	1796.91
	10	1	183	509.77	1	-1581.25	1947.25
		2	-102.333	509.77	1	-1866.58	1661.91
		3	-124.167	509.77	1	-1888.41	1640.08
		4	185.5	509.77	1	-1578.75	1949.75
		5	341	509.77	1	-1423.25	2105.25
		6	-275.5	509.77	1	-2039.75	1488.75
		7	-416.667	509.77	1	-2180.91	1347.58
		8	253.5	509.77	1	-1510.75	2017.75
		9	-32.667	509.77	1	-1796.91	1731.58

Appendix 5: Efficiency of Professionals Category Sorted by Hospital

Multiple Comparisons

Dependent Variable: Efficiency by Professional's Category

	(I) Category of Professional	(J) Category of Professional	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Bonferroni	Dr/ physician	Nurses	-108.400	369.408	1.000	-1051.30	834.50
		Pharmacist	-690.500	369.408	.217	-1633.40	252.40
	Nurses	Dr/ physician	108.400	369.408	1.000	-834.50	1051.30
		Pharmacist	-582.100	369.408	.380	-1525.00	360.80
	Pharmacist	Dr/ physician	690.500	369.408	.217	-252.40	1633.40
		Nurses	582.100	369.408	.380	-360.80	1525.00
Games-Howell	Dr/ physician	Nurses	-108.400	309.659	.935	-898.72	681.92
		Pharmacist	-690.500	394.856	.219	-1712.20	331.20
	Nurses	Dr/ physician	108.400	309.659	.935	-681.92	898.72
		Pharmacist	-582.100	396.971	.333	-1608.23	444.03
	Pharmacist	Dr/ physician	690.500	394.856	.219	-331.20	1712.20
		Nurses	582.100	396.971	.333	-444.03	1608.23

Appendix 6: Efficiency of Professionals Category Sorted by Scale

Multiple Comparisons

Dependent Variable: Efficiency by Professional's Category

	(I) Scale	(J) Scale	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Bonferroni	1	2	268.333	662.072	1.000	-2250.44	2787.11
		3	-880.000	662.072	1.000	-3398.77	1638.77
		4	-301.667	662.072	1.000	-2820.44	2217.11
		5	-561.667	662.072	1.000	-3080.44	1957.11
		6	-432.000	662.072	1.000	-2950.77	2086.77
		7	384.000	662.072	1.000	-2134.77	2902.77
		8	-735.667	662.072	1.000	-3254.44	1783.11
		9	-1367.667	662.072	1.000	-3886.44	1151.11
		10	-9.667	662.072	1.000	-2528.44	2509.11
	2	1	-268.333	662.072	1.000	-2787.11	2250.44
		3	-1148.333	662.072	1.000	-3667.11	1370.44
		4	-570.000	662.072	1.000	-3088.77	1948.77
		5	-830.000	662.072	1.000	-3348.77	1688.77
		6	-700.333	662.072	1.000	-3219.11	1818.44
		7	115.667	662.072	1.000	-2403.11	2634.44
		8	-1004.000	662.072	1.000	-3522.77	1514.77
		9	-1636.000	662.072	1.000	-4154.77	882.77
		10	-278.000	662.072	1.000	-2796.77	2240.77

3	1	880.000	662.072	1.000	-1638.77	3398.77
	2	1148.333	662.072	1.000	-1370.44	3667.11
	4	578.333	662.072	1.000	-1940.44	3097.11
	5	318.333	662.072	1.000	-2200.44	2837.11
	6	448.000	662.072	1.000	-2070.77	2966.77
	7	1264.000	662.072	1.000	-1254.77	3782.77
	8	144.333	662.072	1.000	-2374.44	2663.11
	9	-487.667	662.072	1.000	-3006.44	2031.11
	10	870.333	662.072	1.000	-1648.44	3389.11
4	1	301.667	662.072	1.000	-2217.11	2820.44
	2	570.000	662.072	1.000	-1948.77	3088.77
	3	-578.333	662.072	1.000	-3097.11	1940.44
	5	-260.000	662.072	1.000	-2778.77	2258.77
	6	-130.333	662.072	1.000	-2649.11	2388.44
	7	685.667	662.072	1.000	-1833.11	3204.44
	8	-434.000	662.072	1.000	-2952.77	2084.77
	9	-1066.000	662.072	1.000	-3584.77	1452.77
	10	292.000	662.072	1.000	-2226.77	2810.77

5	1	561.667	662.072	1.000	-1957.11	3080.44
	2	830.000	662.072	1.000	-1688.77	3348.77
	3	-318.333	662.072	1.000	-2837.11	2200.44
	4	260.000	662.072	1.000	-2258.77	2778.77
	6	129.667	662.072	1.000	-2389.11	2648.44
	7	945.667	662.072	1.000	-1573.11	3464.44
	8	-174.000	662.072	1.000	-2692.77	2344.77
	9	-806.000	662.072	1.000	-3324.77	1712.77
	10	552.000	662.072	1.000	-1966.77	3070.77
6	1	432.000	662.072	1.000	-2086.77	2950.77
	2	700.333	662.072	1.000	-1818.44	3219.11
	3	-448.000	662.072	1.000	-2966.77	2070.77
	4	130.333	662.072	1.000	-2388.44	2649.11
	5	-129.667	662.072	1.000	-2648.44	2389.11
	7	816.000	662.072	1.000	-1702.77	3334.77
	8	-303.667	662.072	1.000	-2822.44	2215.11
	9	-935.667	662.072	1.000	-3454.44	1583.11
	10	422.333	662.072	1.000	-2096.44	2941.11
7	1	-384.000	662.072	1.000	-2902.77	2134.77
	2	-115.667	662.072	1.000	-2634.44	2403.11
	3	-1264.000	662.072	1.000	-3782.77	1254.77
	4	-685.667	662.072	1.000	-3204.44	1833.11
	5	-945.667	662.072	1.000	-3464.44	1573.11
	6	-816.000	662.072	1.000	-3334.77	1702.77
	8	-1119.667	662.072	1.000	-3638.44	1399.11
	9	-1751.667	662.072	.698	-4270.44	767.11
	10	-393.667	662.072	1.000	-2912.44	2125.11

8	1	735.667	662.072	1.000	-1783.11	3254.44
	2	1004.000	662.072	1.000	-1514.77	3522.77
	3	-144.333	662.072	1.000	-2663.11	2374.44
	4	434.000	662.072	1.000	-2084.77	2952.77
	5	174.000	662.072	1.000	-2344.77	2692.77
	6	303.667	662.072	1.000	-2215.11	2822.44
	7	1119.667	662.072	1.000	-1399.11	3638.44
	9	-632.000	662.072	1.000	-3150.77	1886.77
	10	726.000	662.072	1.000	-1792.77	3244.77
9	1	1367.667	662.072	1.000	-1151.11	3886.44
	2	1636.000	662.072	1.000	-882.77	4154.77
	3	487.667	662.072	1.000	-2031.11	3006.44
	4	1066.000	662.072	1.000	-1452.77	3584.77
	5	806.000	662.072	1.000	-1712.77	3324.77
	6	935.667	662.072	1.000	-1583.11	3454.44
	7	1751.667	662.072	.698	-767.11	4270.44
	8	632.000	662.072	1.000	-1886.77	3150.77
	10	1358.000	662.072	1.000	-1160.77	3876.77
10	1	9.667	662.072	1.000	-2509.11	2528.44
	2	278.000	662.072	1.000	-2240.77	2796.77
	3	-870.333	662.072	1.000	-3389.11	1648.44
	4	-292.000	662.072	1.000	-2810.77	2226.77
	5	-552.000	662.072	1.000	-3070.77	1966.77
	6	-422.333	662.072	1.000	-2941.11	2096.44
	7	393.667	662.072	1.000	-2125.11	2912.44
	8	-726.000	662.072	1.000	-3244.77	1792.77
	9	-1358.000	662.072	1.000	-3876.77	1160.77