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A COMPARATIVE STUDY ON LABORATORY AND BLOOD BANK PERFORMANCE BY USING THE QUALITY INDICATORS

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ABSTRACT

Laboratory plays a pivotal role in disease control and prevention program by providing timely data or information for patient management and disease surveillance. [1] Quality in the laboratory has huge impact on diagnosis and patient management as about 80%[2] of all diagnoses is made on the basis of laboratory tests.[3] ***Objectives:*** To compare the semi-annual performance of the laboratory by using the Laboratory Quality Indicators. ***Methods:*** It is a Library Research Methodology, in which the analysis of historical records and data (all quality indicators of laboratory and blood bank) was done for the year 2016 for the study hospital laboratory and blood bank. ***Significance of Research:*** It was noted at the end of the year 2016 that there was no improvement in the performance of the laboratory and blood bank as compared to the first half of the year 2016. ***Hypothesis:*** Null Hypothesis (Ho) and Alternative Hypothesis (H1) were used and tested to compare the first half with second half of the year 2016. ***Study Design:*** All the Quality Indicators which were monitored during the year 2016 for the Laboratory and Blood bank were compared for the first half and second half of the year 2016 individually for measuring the performance. ***Study Population:*** All the Quality Indicators which were monitored during the year 2016 for the Laboratory and Blood bank. ***Data Collections:*** Primary data were collected from all the Quality Indicators which were monitored during the year 2016 for the Laboratory and Blood bank. Secondary data were collected from relevant published journals, articles, research papers, academic literature and web portals. ***Conclusion:*** The mean rating of the second half is better than the mean rating of the first half. The non-parametric Wilcoxon signed rank test for paired sample shows that the difference is significant with p-value< 0.05 with respect to the Lab Turnaround Time Lab/Serology Test and Blood Culture Contamination Rat, and the difference is not significant with p-value> 0.05 with respect to rest of the quality indicators monitored in the Laboratory and Blood Bank in the year 2016.

Key words: Quality Indicators, Laboratory and blood bank, performance improvement

INTRODUCTION

Assessing the quality of laboratory services using quality indicators or performance measures requires a systematic, transparent, and consistent approach to collecting and analysing data. Quality indicator data should be collected over time to identify, correct, and continuously monitor problems and improve performance and patient safety by identifying and implementing effective interventions and for the purpose of increased consistency and standardization of key processes among clinical laboratories.

REVIEW OF LITERATURE:

The increased international focus on improving patient outcomes, safety and quality of care has led stakeholders, policy makers and health care provider organizations adopt standardized processes for measuring health care systems.[4] International Organization for Standardization (ISO-15189) has recommended assessment and monitoring of quality management systems (QMS) in the laboratory as quality improvement efforts towards quality laboratory services.[5]

Based on the Institute of Medicine (IOM) definition of quality of care as "the degree to which health care services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge," [6] a quality indicator is a tool that enables the user to quantify the quality of a selected aspect of care by comparing it with a criterion.[7] A quality indicator may be defined as an objective measure that evaluates critical health care domains as defined by the IOM (patient safety, effectiveness, equity, patient-centeredness, timeliness, and efficiency), is based on evidence associated with those domains, and can be implemented in a consistent and comparable manner across settings and over time.[8]

DATA ANALYSIS:

Table 1. First Half versus Second Half with respect to the Lab Turnaround Time Lab/Serology Test

Year 2016	N	Mean	Std. Deviation	Minimum	Maximum	Wilcoxon signed rank test
First half	6	93.0050	1.96742	90.32	95.55	-2.201, **0.028**
Second half	6	97.2717	.97006	95.80	98.44	

Hypothesis:

H_0: There is no significant difference between the mean first half rating and second half rating

H_1: There is a significant difference between the first and second half rating

Table number 1 depicts that the mean rating of the second half is better than the mean rating of the first half. The non-parametric Wilcoxon signed rank test for paired sample shows that the difference is significant with p-value<0.05. Hence, H_0 is rejected and H_1 is accepted.

Hypothesis:

H_0: There is no significant difference between the mean first half rating and second half rating

H_1: There is a significant difference between the first and second half rating

Table 2. First Half versus Second Half with respect to the Transfusion Reaction rate

Year 2016	N	Mean	Std. Deviation	Minimum	Maximum	Paired t test, p-value
First half	6	1.0017	.63465	.40	1.88	-1.782, 0.075
Second half	6	.3917	.28799	.00	.79	

Table number 2 depicts that the mean rating of the second half is better than the mean rating of the first half. The non-parametric Wilcoxon signed rank test for paired sample shows that the difference is not significant with p-value> 0.05. Hence, H_0 is accepted and H_1 is rejected.

Hypothesis:

H_0: There is no significant difference between the mean first half rating and second half rating

H_1: There is a significant difference between the first and second half rating

Table 3. First Half versus Second Half with respect to the Lab Turnaround Compliance Rate

Year 2016	N	Mean	Std. Deviation	Minimum	Maximum	Paired t test ,p-value
First half	6	93.0950	.90186	92.17	94.76	
Second half	6	94.1100	.41139	93.50	94.50	-1.782, 0.075

Table number 3 depicts that the mean rating of the second half is better than the mean rating of the first half. The non-parametric Wilcoxon signed rank test for paired sample shows that the difference is not significant with p-value> 0.05. Hence, H_0 is accepted and H_1 is rejected.

Hypothesis:

H_0: There is no significant difference between the mean first half rating and second half rating

H_1: There is a significant difference between the first and second half rating

Table 4. First Half versus Second Half with respect to the Lab Sampling Non Compliance Rate

Year 2016	N	Mean	Std. Deviation	Minimum	Maximum	Paired t test, p-value
First half	6	.2900	.08672	.21	.44	-1.782, 0.075
Second half	6	.1867	.06346	.10	.29	

Table number 4 depicts that the mean rating of the second half is better than the mean rating of the first half. The non-parametric Wilcoxon signed rank test for paired sample shows that the difference is not significant with p-value> 0.05. Hence, H_0 is accepted and H_1 is rejected.

Hypothesis:

H_0: There is no significant difference between the mean first half rating and second half rating

H_1: There is a significant difference between the first and second half rating

Table 5. First Half versus Second Half with respect to the Needle Stick Injuries Rate

Year 2016	N	Mean	Std. Deviation	Minimum	Maximum	Paired t test, p-value
First half	6	.0017	.00408	.00	.01	-1.00 0.317
Second half	6	.0000	.00000	.00	.00	

Table number 5 depicts that the mean rating of the second half is better than the mean rating of the first half. The non-parametric Wilcoxon signed rank test for paired sample shows that the difference is not significant with p-value> 0.05. Hence, H_0 is accepted and H_1 is rejected.

Hypothesis:

H_0: There is no significant difference between the mean first half rating and second half rating

H_1: There is a significant difference between the first and second half rating

Table 6. First Half versus Second Half with respect to the Availability of Blood and blood products rate

Year 2016	N	Mean	Std. Deviation	Minimum	Maximum	Paired t test , p-value
First half	6	100.0000	.00000	100.00	100.00	0.000, 1.00
Second half	6	100.0000	.00000	100.00	100.00	

Table number 6 depicts that the mean rating of the second half is better than the mean rating of the first half. The non-parametric Wilcoxon signed rank test for paired sample shows that the difference is not significant with p-value> 0.05. Hence, H_0 is accepted and H_1 is rejected.

H_0: There is no significant difference between the mean first half rating and second half rating

H_1: There is a significant difference between the first and second half rating

Table 7. First Half versus Second Half with respect to the Cross match transfusion Ratio

Hypothesis:

Year 2016	N	Mean	Std. Deviation	Minimum	Maximum	Paired test statistic, p-value
First half	6	1.5317	.06014	1.45	1.62	-0.734, 0.463
Second half	6	1.5767	.17317	1.31	1.81	

Table number 7 depicts that the mean rating of the second half is better than the mean rating of the first half. The non-parametric Wilcoxon signed rank test for paired sample shows that the difference is not significant with p-value> 0.05. Hence, H_0 is accepted and H_1 is rejected.

Hypothesis:

H_0: There is no significant difference between the mean first half rating and second half rating

H_1: There is a significant difference between the first and second half rating

Table 8. First Half versus Second Half with respect to the Blood Culture Contamination Rate

Year 2016	N	Mean	Std. Deviation	Minimum	Maximum	Paired test statistic, p-value
First half	6	3.2050	.91828	2.45	4.78	
Second half	6	2.0067	.48607	1.41	2.88	-2.201, **0.028**

Table number 8 depicts that the mean rating of the second half is better than the mean rating of the first half. The non-parametric Wilcoxon signed rank test for paired sample shows that the difference is significant with p-value< 0.05. Hence, H_0 is rejected and H_1 is accepted.

Hypothesis:

H_0: There is no significant difference between the mean first half rating and second half rating

H_1: There is a significant difference between the first and second half rating

Table 9. First Half versus Second Half with respect to the Correction Report Rate

Year 2016	N	Mean	Std. Deviation	Minimum	Maximum	Paired t test statistic, p-value
First half	6	.0100	.00632	.00	.02	-1.633, 0.102
Second half	6	.0033	.00516	.00	.01	

Table number 9 depicts that the mean rating of the second half is better than the mean rating of the first half. The non-parametric Wilcoxon signed rank test for paired sample shows that the difference is not significant with p-value> 0.05. Hence, H_0 is accepted and H_1 is rejected.

Hypothesis:

H_0: There is no significant difference between the mean first half rating and second half rating

H_1: There is a significant difference between the first and second half rating

Table 10. First Half versus Second Half with respect to the Lab Turnaround time (Chemistry) Rate

Year 2016	N	Mean	Std. Deviation	Minimum	Maximum	Paired t test statistic, p-value
First half	6	90.6650	.82558	90.04	92.06	
Second half	6	90.2633	.42903	90.00	91.00	-1.363, 0.173

Table number 10 depicts that the mean rating of the second half is better than the mean rating of the first half. The non-parametric Wilcoxon signed rank test for paired sample shows that the difference is not significant with p-value> 0.05. Hence, H_0 is accepted and H_1 is rejected.

Hypothesis:

H_0: There is no significant difference between the mean first half rating and second half rating

H_1: There is a significant difference between the first and second half rating

Table 11. First Half versus Second Half with respect to the Specimen Misidentification and labeling monthly rate

Year 2016	N	Mean	Std. Deviation	Minimum	Maximum	Pair t test statistic, p-value
First half	6	90.6650	.82558	90.04	92.06	-1.363, 0.173
Second half	6	90.2633	.42903	90.00	91.00	

Table number 11 depicts that the mean rating of the second half is better than the mean rating of the first half. The non-parametric Wilcoxon signed rank test for paired sample shows that the difference is not significant with p-value> 0.05. Hence, H_0 is accepted and H_1 is rejected.

Hypothesis:

H_0: There is no significant difference between the mean first half rating and second half rating

H_1: There is a significant difference between the first and second half rating

Table 12. First Half versus Second Half with respect to the Donor Adverse Reaction Rate

Year 2016	N	Mean	Std. Deviation	Minimum	Maximum	Pair t test statistic, p-value
First half	6	.0000	.00000	.00	.00	
Second half	6	.0000	.00000	.00	.00	0.000, 1.000

Table number 12 depicts that the mean rating of the second half is better than the mean rating of the first half. The non-parametric Wilcoxon signed rank test for paired sample shows that the difference is not significant with p-value> 0.05. Hence, H_0 is accepted and H_1 is rejected.

Hypothesis:

H_0: There is no significant difference between the mean first half rating and second half rating

H_1: There is a significant difference between the first and second half rating

Table 13. First Half versus Second Half with respect to the Rejected Units

Year 2016	N	Mean	Std. Deviation	Minimum	Maximum	Pair test statistic, p-value
First half	6	2.3050	1.12253	.71	3.86	
Second half	6	1.9250	1.10003	.55	3.57	-0.524, 0.600

Table number 13 depicts that the mean rating of the second half is better than the mean rating of the first half. The non-parametric Wilcoxon signed rank test for paired sample shows that the difference is not significant with p-value> 0.05. Hence, H_0 is accepted and H_1 is rejected.

Hypothesis:

H_0: There is no significant difference between the mean first half rating and second half rating

H_1: There is a significant difference between the first and second half rating

Table 14. First Half versus Second Half with respect to the Donors Satisfaction

Year 2016	N	Mean	Std. Deviation	Minimum	Maximum	Pair test statistic, p-value
First half	6	6.0350	4.77846	2.76	15.43	
Second half	6	3.8383	2.21294	.94	7.79	-0.314, 0.753

Table number 14 depicts that the mean rating of the second half is better than the mean rating of the first half. The non-parametric Wilcoxon signed rank test for paired sample shows that the difference is not significant with p-value> 0.05. Hence, H_0 is accepted and H_1 is rejected.

Hypothesis:

H_0: There is no significant difference between the mean first half rating and second half rating

H_1: There is a significant difference between the first and second half rating

Table 15. First Half versus Second Half with respect to the Rejected Donors Rate

Year 2016	N	Mean	Std. Deviation	Minimum	Maximum	Pair test statistic, p-value
First half	6	10.4967	5.06913	4.65	17.04	
Second half	6	6.4067	2.36017	3.85	10.30	-1.572, 0.116

Table number 15 depicts that the The mean rating of the second half is better than the mean rating of the first half. The non-parametric Wilcoxon signed rank test for paired sample shows that the difference is not significant with p-value> 0.05. Hence, H_0 is accepted and H_1 is rejected.

Hypothesis:

H_0: There is no significant difference between the mean first half rating and second half rating

H_1: There is a significant difference between the first and second half rating

Table 16. First Half versus Second Half with respect to the Discarded Units of Blood and Blood Products Rate

Year 2016	N	Mean	Std. Deviation	Minimum	Maximum	Pair test statistic, p-value
First half	6	5.1617	2.33585	2.76	8.37	-1.782, 0.075
Second half	6	8.2117	4.30497	3.03	14.29	

Table number 16 depicts that the mean rating of the second half is better than the mean rating of the first half. The non-parametric Wilcoxon signed rank test for paired sample shows that the difference is not significant with p-value> 0.05. Hence, H_0 is accepted and H_1 is rejected.

Hypothesis:

H_0: There is no significant difference between the mean first half rating and second half rating

H_1: There is a significant difference between the first and second half rating

Table 17. First Half versus Second Half with respect to the Lab Turnaround Time (Routine Tests) Rate

Year 2016	N	Mean	Std. Deviation	Minimum	Maximum	Pair test statistic, p-value
First half	6	100.0000	.00000	100.00	100.00	
Second half	6	100.0000	.00000	100.00	100.00	0.000 1.000

Table number 17 depicts that the mean rating of the second half is better than the mean rating of the first half. The non-parametric Wilcoxon signed rank test for paired sample shows that the difference is not significant with p-value> 0.05. Hence, H_0 is accepted and H_1 is rejected.

Table 18. First Half versus Second Half with respect to the Correlation between Initial and Postoperative Diagnosis Rate

Year 2016	N	Mean	Std. Deviation	Minimum	Maximum	Pair test statistic, p-value
First half	6	100.0000	.00000	100.00	100.00	
Second half	6	100.0000	.00000	100.00	100.00	0.000 1.000

Table number 18 depicts that the mean rating of the second half is better than the mean rating of the first half. The non-parametric Wilcoxon signed rank test for paired sample shows that the difference is not significant with p-value> 0.05. Hence, H_0 is accepted and H_1 is rejected.

CONCLUSION

The mean rating of the second half is better than the mean rating of the first half. The non-parametric Wilcoxon signed rank test for paired sample shows that the difference is significant with p-value< 0.05 with respect to the Lab Turnaround Time Lab/Serology Test and Blood Culture Contamination Rate. The non-parametric Wilcoxon signed rank test for paired sample shows that the difference is not significant with p-value> 0.05 with respect to the transfusion reaction rate, lab turnaround compliance rate, lab sampling non compliance rate, needle stick injuries rate, availability of blood and blood products rate, cross match transfusion ratio, correction report monthly rate, lab turnaround time rate (chemistry), specimen misidentification and labelling rate, donor adverse reaction rate, rejected units rate, donors satisfaction rate, rejected donors rate, discarded units of blood and blood products rate, lab turnaround time rate (routine tests), correlation between initial and post-operative diagnosis rate.

LIMITATIONS OF THE STUDY: This study is limited to the Laboratory and Blood Bank of the study hospital and for a limited duration (Year 2016) only.

DIRECTIONS FOR FUTURE RESEARCH: In future such research should be conducted to study the performance of other departments of the hospital by using the quality indicators as per the national and international accrediting organizations standards.

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