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You can't improve what you can't measure: A study on continuous quality indicator of clinical laboratory

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Abstract
"You can't improve what you can't measure" is a prominent and perhaps exhausted management myth, but it certainly applies to improve quality indicators (QIs) is an all-embracing term that covers the entire spectrum of the total testing cycle (TTC) that is commonly defined as pre-, intra-, and post-analytical phases. QIs assisted as instrument for dramatic fall in the rate of laboratory errors. The aim is make an effort to assess the performance and implies corrective measures to further improve the quality of laboratory services. This was carried out by evaluating the quality indicators from January 2019 To December 2019. This study was to determine the frequency of errors utilizing the quality indicators in a clinical laboratory. To improves quality indicator errors via CAPA. In the one-year period, a total of 77,101.00 specimens were received in the laboratory. Total error rate was 0.80% and of all the quality indicators used in this study the target level was < 1%. (According to NABL 112 (4.12) >1 % consider to take corrective action). Stepladder will takes to develop the upshot of quality indicators by taking corrective measures over a period of time. Unremittingly to improve the outcome of quality indicators by taking corrective measures over a period of time will beyond doubt to improve the quality of laboratory services and patient health care.

Keywords: CQI, TTC, CAPA

Introduction

Continuous Quality improvement (CQI) program in the quality management system on ISO 15189:2012 and NABH are used to measure and monitor the quality services rented to the patients. It also inspires the staffs in an environment of continuous and sustained quality. In clinical laboratory which covers the entire spectrum of the total testing cycle (TTC) that is commonly defined as pre-, intra-, and post-analytical phases. Clinical laboratories have a direct impact on patient diagnoses and treatments and thus have important roles in patient management and safety (Sciacovelli *et al.*, 2009). Given that 70–80% of all diagnoses are made, at least in part, based on laboratory tests, laboratory errors have consequences to misdiagnoses, diagnostic delays, inappropriate therapies, increased risks to patient safety, increased costs, and time lost (Howanitz *et al.*, 2005) [2].

QIs assisted as instrument for dramatic fall in the rate of laboratory errors. "Systematically measure and improve essential functions and work processes and their outcomes" (Joint commission- 2009) [5]. It is therefore necessary to put down certain prototype to measure laboratory functions. It is crucial to identify certain determinants for the assessment of the quality in laboratory functioning. Assessing the quality of laboratory services using quality indicators or performance measures requires a systematic, translucent, and reliable approach to collecting and analyzing data. (Lundberg *et al.*, 1983) A comprehensive approach would address all stages of the laboratory total testing cycle. 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 taking corrective measure for the purpose of increased equality and standardization of key processes among clinical laboratories. Certain laboratory medicine quality indicators have been advocated for use as quality assessment tools (CLSI 2004, Joint commission 2009) [7, 8]. The term quality indicators need to reduce the error rate has highlighted, especially in pre-analytical and post-analytical phases, the difficulty involved in identifying adverse events and complying with the International Standard for Accreditation

of Clinical Laboratories, ISO thus prompting laboratory professionals to develop and implement QIs (Plebani *et al.*,2012) [9].

As stated by the ISO, "The laboratory shall initiate QIs to monitor and evaluate performance in all the way through critical aspects of pre-examination, examination and post examination processes"; and "The process of monitoring QIs shall be planned, which includes establishing the objectives, methodology, interpretation, limits, action plan and duration of measurement." In recent years, different QIs have been developed to monitor critical processes and identify errors and mistakes in laboratories based on their particular characteristics and organization (Plebani *et al.*, 2013) [10]. This monitoring is based on the laboratories' different health care contexts, purposes and goals, patient number and typology, activity typology, and sensitivity and training of staffs, which are used for these determinants. Monitoring correct performance of each single step of the total testing cycle is not feasible. Instead, identify critical control points in this process. These are points that can serve as indicator for correct performance of the process. These indicators are called quality indicators. Ought monitored the set of quality indicator for a assured period of time (approximately 6 to 12 months), go one measure by further setting a limit of acceptability for each indicator and trying to optimize laboratory processes such that you achieve these limits. E.g. if for the indicator "percentage of samples rejected" the value is normally around 5%, set the limit of acceptability on 3% sample rejection.

Identify the causes leading most often to rejection of samples and try to resolve these causes. See if the percentage of rejected samples subsequently increases. Repeat this process until the 3% limit is achieved. Setting limits of acceptability for each indicator and trying to optimize the laboratory processes such that their performance doesn't exceed these limits is called prototype. Try to minimize the limits of acceptability as much as possible to trigger maximum laboratory performance improvement. However, do not put pressure on the laboratory staff to achieve the prototype as it will then become a perverse activity that does more harm than good. Improve the use of laboratory services is now expressed in the mantra "the right test in the right patient at the right time" (Smellie *et al.*, 2012) [11]. The success of the various methods used in the effort to manage demand depends on the medical context, and the different settings in which these approaches are employed. While there is as yet no magic bullet, the stepladder taken to improve the outcome of quality indicators by taking corrective measures over a period of time will definitely help to improve the quality of laboratory services and patient health care.

Materials and Method

One-year quality indicator data of a Billroth Hospitals-Clinical laboratory, Shenoy Nagar, Chennai was evaluated to describe the frequency of errors. An 'error' was defined as a defect during the TTC from time requisition was raised to phlebotomy was done until the result dispatch. QIs with a target value of 1 were considered good. (According to NABL 112 (4.12) >1 % consider to take corrective action). The Guideline was adopted form the ISO15189:2012 (Table 1) Stepladder will take to improve the outcome of quality indicators by taking corrective measures over a period of time.

Table 1: QIS that have been grouped according the total testing cycle

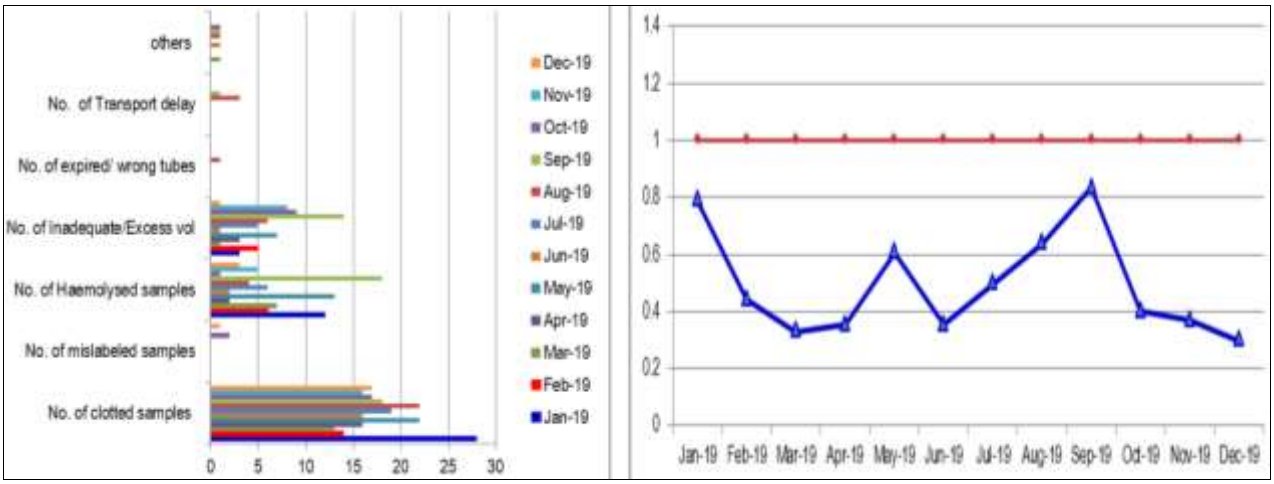
MATRIX FOR CAPTURING LABORATORY QUALITY INDICATORS						
S.No	**QUALITY INDICATOR**	**FORMULA**	**UOM**	**Target**	**Data Source Identification**	**Reference**
			PRE ANALYTICAL			
1	Sample Recollection (Rework).	Total No. of samples recollected / Total no. of samples collected ×100	%	< 1%	Sample rework register	NABL 112
2	Sample Rejections	No.of Rejections with respective reasons/No. of samples transported	%		Sample Rejection Register or Sample receiving Registe	NABL 112 - 4.12 Collection & identification, Transportation & Processing
3	Incidents & Accidents (ind. Needle Stick injury)	Total No. of Injuries sustained	Numbers	Nil	Incident /Accident Register	NABH -CQI.3.b
			ANALYTICAL			
4	Adherence to safety precaution by employees (inc. Pre-Analytical)	No. of employees adhering to safety precautions/No. of employees sampled X 100	%	< 25 staff - 100 % > 50 staff- 50 % 51-100 staff - 30 % > 100 staff- 20 %	Process Non Conformance Register	NABH -CQI.3.b.iv
5	Sample Rejections	No.of Rejections with respective reasons	Number		Sample Rejection Register	NABL 112 - 4.12 (Collection & identification)
6	Repeats (or redos)	No. of Redos /total no. of tests performed X 100	%		Repeat test Register	NABH -CQI.3.b.ii NABL 112-4.12 (Analysis & reporting of results)
7	Equipment down time	Sum of downtime for all critical equipment in hours	hrs & mns		Equipment break down Form	NABL 112 - 4.12 NABH-CQI.4.c.iii
8	Internal Quality Control (CV%)	CV for each analyte & Each level	CV %		Monthly Control Chart	NABL 112 - 4.12
9	Performance in EQAS/ILC	As per the Scores defined by EQAS provider ILC: Percentage of variation	VIS Score,Z score,SDI %	Based on acceptable limits given by EQAS provider. Acceptable Total Allowable Error for ILC tests.	EQAS/ ILC Reports	NABL 112 - 4.12
10	Laboratory Incidents/Accidents	Total no. of incidents				NABH-CQI-4.b
			POST ANALYTICAL			
11	customer Feed Back	Score achived/maximum possible score ×100	%	Complete customer satisfaction	Customer feed back form	NABL 112 - 4.12 NABH-CQI.4.d.i to iv
12	Turn Around Time & Short Turn Arounf Time (Urgent request)	No. samples reported beyond TAT /Total No. of Test reported ×100 (- 100)			LIS/ TAT & STAT monitoring Register	NABL 112 - 4.12
13	Reporting Errors (Per 1000 investigations)	Number of reporting errors (with respective reasons) /No. of tests performed X 1000	Number		Process non Conformance Register	NABH -CQI.3.b
14	Critical reporting	Total No. of critical reports are clinically useful/Total No. of critical reports X 100				NABL 112 - 4.12 (Analysis & reporting of results)
15	Reports Correlating with Clinical Diagnosis (Atleast for histopathology)	No. of reports correlating clinical diagnosis/no. of tests performed X 100	%	100 test/month - 100% 100-200 tests/month -50% 201-300 tests/month - 25% 301-500 tests/month - 20% > 500 tests/month - 15%		

Results

During the period of Jan 2019 to Dec 2019, a total of 77,101 specimens were received in the laboratory. Total error rate was 0.80% and all the standard quality indicators from pre analytical, analytical and post analytical used in this study and the target level was < 1%. (According to NABL 112 (4.12) >1 % consider to take corrective action). Steps will take to improve the outcome of quality indicators by the taking corrective measures for over a period of time. The quality indicators were classified into the following 3 categories: pre-analytical, analytical, and post-analytical.

Pre-analytical phase

S.No	Sample Rejections	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19
1	No. of clotted samples	28	14	13	16	22	16	19	22	18	17	16	17
2	No. of mislabeled samples	0	0	0	0	0	0	0	0	0	2	0	1
3	No. of Haemolysed samples	12	6	7	2	13	2	6	4	18	1	5	3
4	No. of Inadequate/Excess vol	3	5	1	3	7	1	5	6	14	9	8	1
5	No. of expired/ wrong tubes	0	0	0	0	0	0	0	1	0	0	0	0
6	No. of Transport delay	0	0	0	0	0	0	0	3	1	0	0	0
7	others	0	0	1	0	0	1	0	1	1	1	0	0
8	SUM of rejections	43	25	22	21	42	20	30	37	52	30	29	22
9	Total Rejections per year	373											
	% of Rejections	0.788991	0.442008	0.330927	0.353001	0.605973	0.353357	0.496524	0.638041	0.834403	0.40123	0.368957	0.299728
	% of Target	1	1	1	1	1	1	1	1	1	1	1	1



Type of rejections Percentage of rejections

Fig 1(a): Analysis of Sample rejections during Jan 2019– Dec 2019

S.No	Sample Rework	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19
1	Total No. of sample recollected	27	14	41	40	32	40	37	109	75	69	103	88
2	Total No. of Patient	5450	5656	6648	5949	6931	5660	6042	5799	6232	7477	7860	7340
3	%	0.50	0.25	0.62	0.67	0.46	0.71	0.61	1.88	1.20	0.92	1.31	1.20
	Target (< 1%)	1	1	1	1	1	1	1	1	1	1	1	1

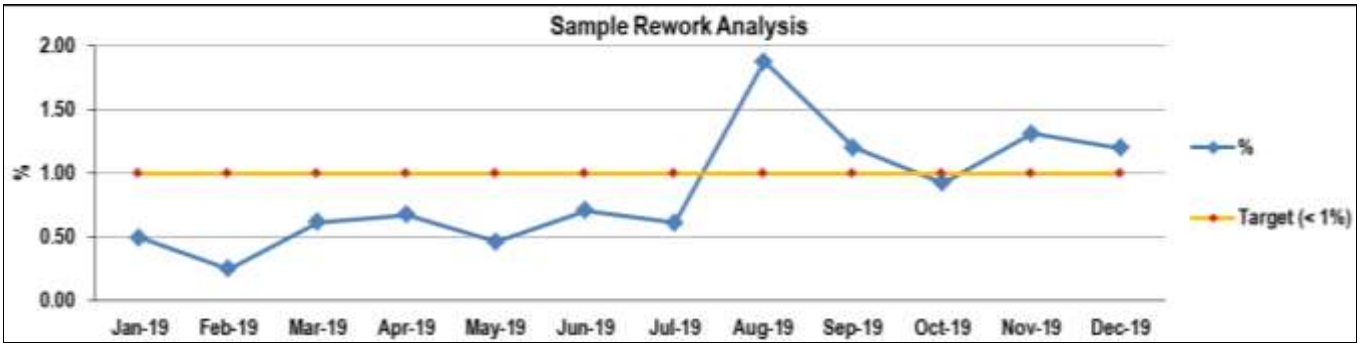


Fig 1b: Analysis of sample rework; 1c, Analysis of incidents and accidents happen during the period of Jan – Dec 2019

From this Figure 1 - A and B shows the sample rejection analysis per total No. of sample collected, which conquers No of sample delay, No of wrong tube taken, No of insufficient sample collection, No of hemolysed sample, No of mislabeled samples, No of clotted sample. (According to NABL 112 criteria the target value was <1%, if it is >% consider to take corrective and preventive action)This graphs are clearly reveals there is no significant evidence of target value exceed from >1%. So CAPA was not required.

S.No	Incidents/Accidents	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19
1	Needle Stick Injury	0	0	0	0	1	0	0	0	0	0	0	0
2	Body fluid spillage	0	0	0	0	0	0	0	0	0	0	0	0
3	Incidents of falls	0	0	0	0	0	0	0	0	0	0	0	0
4	Other Incidents	0	0	0	0	0	0	0	0	0	0	0	0

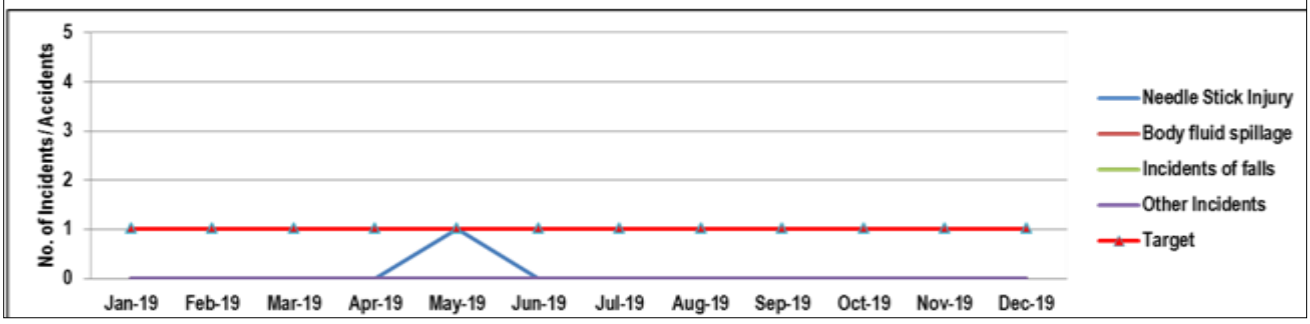


Fig 1c & d

Figure 1– C shows sample rework analysis. Which conquer Total No. of sample recollected per total No of patient tests. (According to NABL 112 criteria the target value was <1%, if it is >% consider to take corrective and preventive action)This graphs are clearly reveals there is no significant evidence of target value exceed from >1%. So CAPA was not required.

Figure 1 – D shows sample Incident/Accident analysis. Which conquer No of needle stick injury, body fluid spillage, incidents of fall, and other incidents was occurred per year. (According to NABL 112 criteria the target value was <1%, if it is >% consider to take corrective and preventive action). There is only one needle stick injury incident has happen during the month of May 2019. The HIC protocol was followed and after three months the staff was tested for the viral markers such as HIV I & II, HbsAG, Anti HCV Which shows the negative. This graphs are clearly reveals there is no other significant evidence of target value exceed from >1%. So CAPA was not applicable.

Analytical Phase

S.No	Safety Precutions of employees	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19
1	Total No. of employees in lab	39	46	48	48	45	47	49	45	47	49	47	44
2	No. of employees adhered to the safety precautions	35	42	45	47	44	45	48	40	42	45	45	40
3	% of employees adhered to safety precautions	90	91	94	98	98	96	98	89	89	92	96	91
	Target	100	100	100	100	100	100	100	100	100	100	100	100

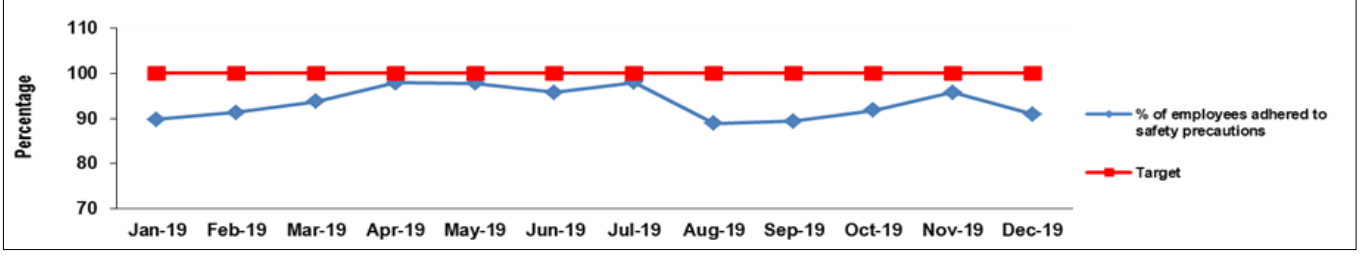


Fig 2a: Analysis of safety precautions

Figure 2a –shows safety precaution analysis of the employees. Which conquers No. of employees adhered to the safety precautions per total No of employees in lab.

S.No	Repeat tests (redos)	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19
1	No. of Repeat tests	974	896	922	993	739	896	892	869	796	891	577	962
2	Total no. of test performed	28907.0	29521	36846	30149	33606	29886	31690.0	29419.0	29780.0	34730.0	35865.0	34984.0
3	%	3.37	3.04	2.50	3.29	2.20	3.00	2.81	2.95	2.67	2.57	1.61	2.75

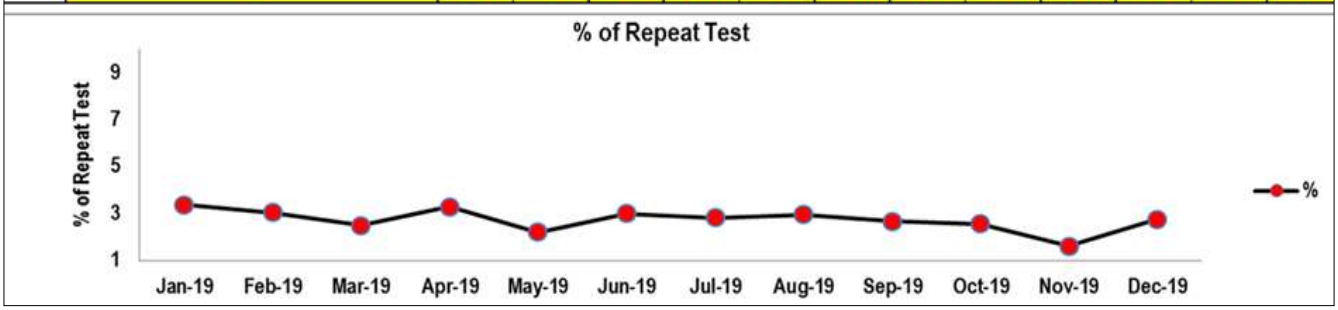


Fig 2b: Analysis of sample repeats during Jan – Dec 2019

Figure 2b shows No. of repeat test analysis, which conquer based on repeat test criteria no of repeat test performance per total No of test performed. (According to NABL 112 criteria the target value was < 25 staff - 100 %, > 50 staff- 50 %, 51-100 staff - 30 %, 100 staff- 20 % consider to take corrective and preventive action) this B graphs are clearly reveals there is no significant evidence of target value exceed from aforementioned staff. So CAPA was not applicable.

Aforementioned Figures was analyses statistically, (According to NABL 112 criteria the target value was <1%, if it is >% consider to take corrective and preventive action) this A and B graphs are clearly reveals there is no significant evidence of target value exceed from >1%. So CAPA was not applicable.

S.No	Equipment Down time (in hrs)	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19
1	AU 480 (BIO)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.9
2	AU 400 (BIO)	22.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	Access2 (Hormones)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2
4	D10 - (HPLC)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.4	6.9
5	Unilyte6+ 1	0.4	0.0	0.4	0.0	0.9	0.0	0.5	0.3	3.6	0.4	0.0	0.0
6	Unilyte6+ II	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	3.6	0.3	0.0	0.0
7	CENTRIFUGE(BIO)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	CENTRIFUGE(BIO)	19.4	73.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	LH750 I (HAM)	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	2.6	3.8	0.0	0.0
10	LH 750 II (HAM)	2.6	5.4	0.0	0.0	6.7	0.0	0.7	0.0	0.0	2.0	2.4	0.3
11	VESMATIC 20 (HAE)	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	ACL 7000 (HAE)	0.4	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	1.6
13	CENTRIFUGE(HAE)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	U411 ROCHE (CP)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	CENTRIFUGE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	ELISA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	Sterlisation Autoclave MICRO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41.9	0.0	0.0	0.0
18	Incubator	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.7	0.0	0.0	0.0

Fig 2c: Analysis of equipment breakdown in % of hours during Jan – Dec 2019

Figure 2c - table shows the equipment breakdown, reveals that - Since most of the equipment are supported with the backup one the breakdown is not affect the TAT of the report.

Post-analytical phase

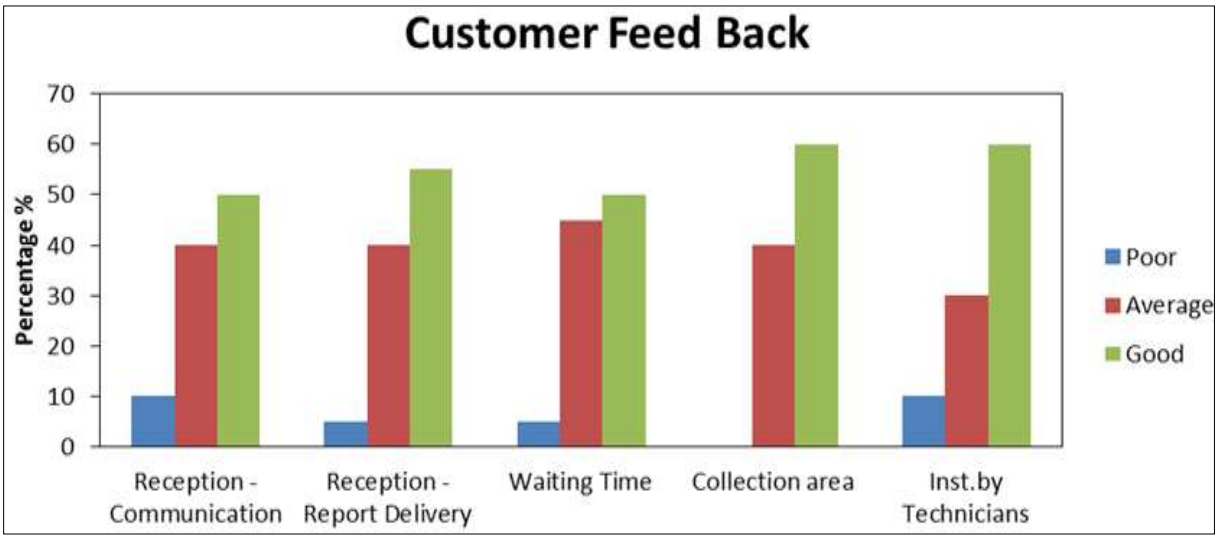


Fig 3a: Analysis of Customer feedback representative view of a year 2019

Figure 3a shows customer feedback analysis was done by No. of Feedback forms received, which conquers reception – communication, reception - report delivery, waiting time, collection area, and instructions given by technicians. (According to NABL 112 criteria the target value was complete customer satisfaction, if it fails in customer stratification consider to take corrective and preventive action) this F graphs are clearly reveals there is no significant evidence deterioration of complete customer satisfaction. So CAPA was not applicable.

S.No	TAT	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19
1	No. of reports deviated from TAT	70	69	42	34	47	54	59	56	61	87	133	61
2	Number of report analysed	5450	5656	6648	5949	6931	5660	6042	5799	6232	7477	7860	7340
3	% of TAT Achived	98.72	98.78	99.37	99.43	99.32	99.05	99.02	99.03	99.02	98.84	98.31	99.17

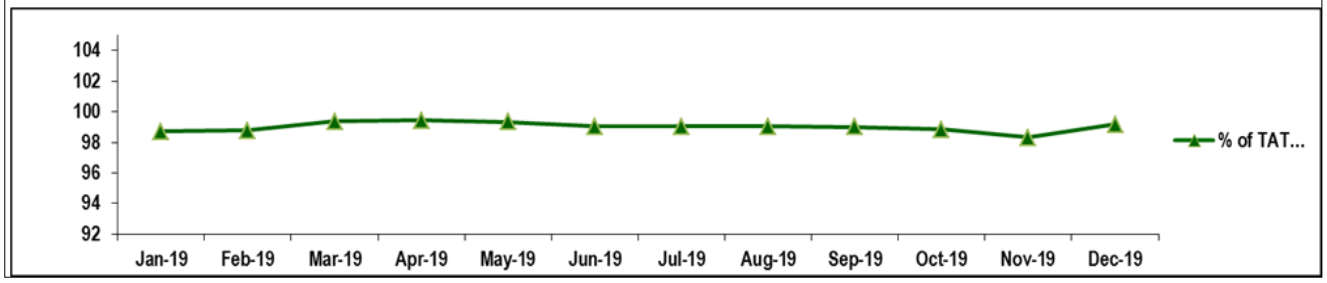


Fig 3b: Test turnaround time analysis during Jan – Dec 2019

Figure 3b shows turnaround time (TAT) analysis, which conquer No. of reports deviated from TAT per No of report analyzed. (According to NABL 112 (4.12) >1 % consider to take corrective action). From this TAT analysis shows significant evidence of statistical turnaround time target value exceed from > 1%. Root cause was analysed. Corrective action was taken.

S.No	Reporting Errors per 1000 investigations	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19
1	Analytical Errors	0	0	0	0	0	2	0	0	0	0.0	0.0	0.0
2	Lab - Demographic errors	0	0	0	0	0	0	0	0	2	0.0	0.0	0.0
3	Client - Demographic errors	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0
4	Total Number of Test Reported	5450	5656	6648	5949	6931	5660	6042.0	5799.0	6232.0	7477.0	7860.0	7340.0
5	Analytical Errors / 1000 Reports	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0
6	Lab - Demographic errors / 1000 Reports	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0
7	Client - Demographic errors / 1000 Reports	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

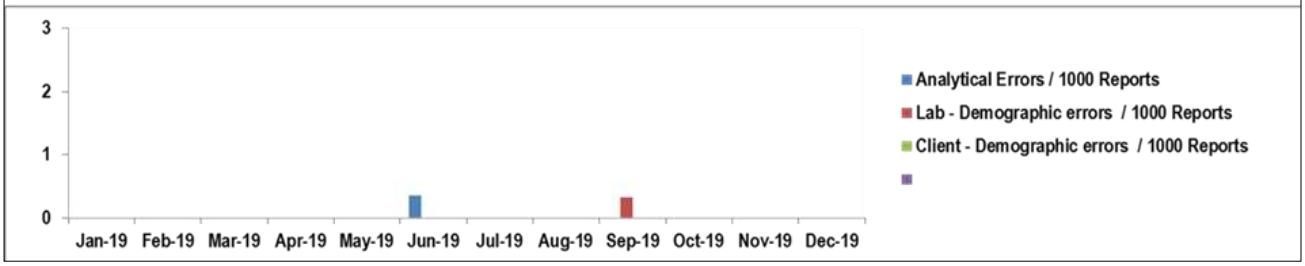


Fig 3c: Analysis of reporting errors

Figure 3c shows reporting errors (for amended reports) per 1000 investigations, which conquer analytical errors/ 1000 Reports, Lab - Demographic errors/ 1000 Reports, Client - Demographic errors / 1000 Reports, total no of reporting errors was analysed statistically, (According to NABL 112 criteria the target value was <1%, if it is >% consider to take corrective and preventive action) this B graphs are clearly reveals there is no significant evidence of target value exceed from >1%. So CAPA was not applicable.

S.No	CRITICAL RESULT REPORTING	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19
1	Critical reports are clinically useful	433.0	429.0	317.0	385.0	395.0	379.0	499.0	478.0	441.0	500.0	562.0	506.0
2	Total No. of critical reports Reported	489.0	454.0	323.0	411.0	428.0	398.0	523.0	498.0	455.0	530.0	594.0	515.0
3	% of critical reports are clinically useful	88.55	94.49	98.14	93.67	92.29	95.23	95.41	95.98	96.92	94.34	94.61	98.25

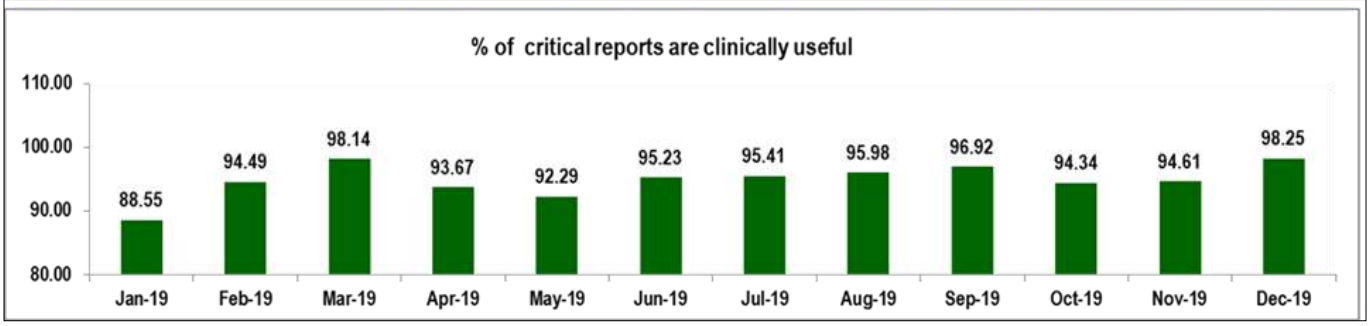


Fig 3d: Critical result reporting during Jan – Dec 2019

Figure 3d shows critical result reporting analysis, which conquer Critical reports are clinically useful per total no. of critical reports reported. (According to NABL 112 criteria the target value was <1%, if it is >% consider to take corrective and preventive action) this C graphs are clearly reveals there is no significant evidence of target value exceed from >1%. So CAPA was not applicable.

S.No	REPORT CORRELATION	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19
1	No. of reports correlating clinical diagnosis	164	167	234	197	255	209	221	203	221	213	194	202
2	No. of reports Analysed	169	174	239	200	259	211	223	207	225	217	196	204
3	% of Report Correlating with clinical diagnosis	97.04	95.98	97.91	98.50	98.46	99.05	99.10	98.07	98.22	98.16	98.98	99.02
	Target >95%	100	100	100	100	100	100	100	100	100	100	100	100

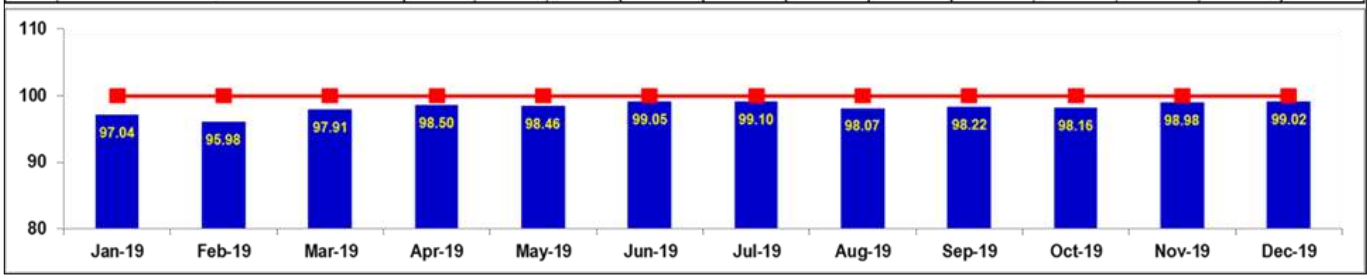


Fig 3e: Analysis of report correlating with clinical diagnosis

Figure 3e Shows report correlating with clinical diagnosis, which conquer No. of reports correlating clinical diagnosis per total no of report analysed. (According to NABL 112 criteria the target value was surpass from > 95%, if it is < 95% consider to take corrective and preventive action) this D graph are clearly reveals there is no significant evidence of target value was labefaction from >95%.

S.No	STAT RESULT REPORTING	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19
1	Total No. of STAT reports are clinically useful	231.0	232.0	263.0	294.0	309.0	301.0	348.0	340.0	343.0	384.0	241.0	301.0
2	Total No. of STAT reports Reported	231.0	265.0	263.0	320.0	328.0	314.0	359.0	344.0	350.0	393.0	251.0	302.0
3	% of critical reports are clinically useful	100.00	87.55	100.00	91.88	94.21	95.86	96.94	98.84	98.00	97.71	96.02	99.67
4	Target 97%	100	100	100	100	100	100	100	100	100	100	100	100
5	Corrective Action	85	85	85	85	85	85	85	85	85	85	85	85

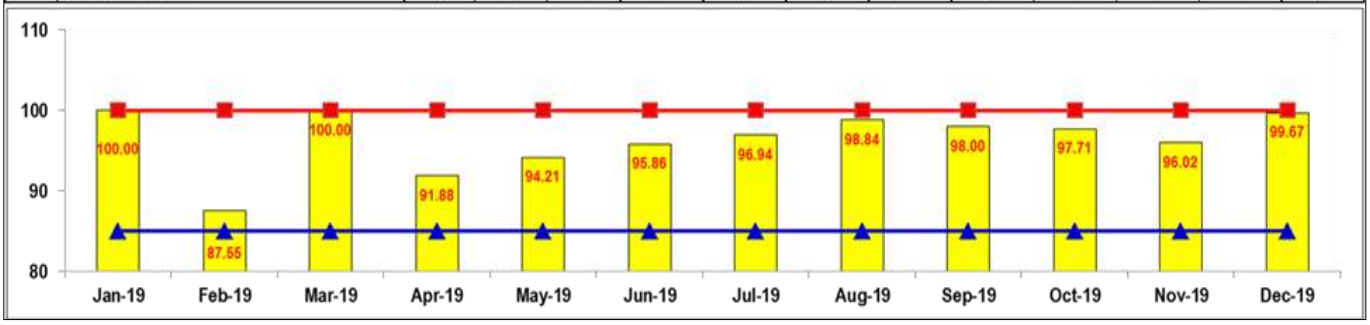


Fig 3f: Short turnaround time report analysis during Jan – Dec 2019

Figure 3f Shows STAT result reporting analysis, which conquer Total No. of STAT reports are clinically useful per Total No. of STAT reports reported. (According to NABL 112 criteria the target value was surpass from > 97%, if it is < 97% consider to take corrective and preventive action) this E graph are clearly reveals there is no significant evidence of target value was labefaction from >97%.

Discussion

Laboratory testing and services have an important role in the stipulation of health care. The intention of the clinical laboratory is to afford useful information for screening, diagnosis and monitoring diseases. For this reason, the laboratory performs determinations in patient's samples by measurement procedures that ensure to get credent and reliable information for clinical use. Within the analytical process, the laboratory must ensure its quality, not only verifying that pre-established requests are met, but also confirming that the benefits obtained meet the potential of in cooperation the requesting physicians and patients seen.

Laboratory tests play a tremendously important function in diagnosing, monitoring, and evaluating patient outcomes, evidence-based assessment of laboratory performances is decisive to ensuring that patients receive safe, efficient, and effective care.

The term ‘‘quality indicator’’ refers to a systematic measurement process planned to afford information about the quality of a system. The process of monitoring for and addressing error does not just occur. Quality takes time to define. It requires planning of the processes and procedure that develop appropriate, measurable, interpretable information upon which action can take place in the cycle of continuous improvement. Those procedures can refer to as quality indicators. Quality indicators are an integral component of all quality management systems, including ISO 9001, ISO 15189. An indicator was developed by other organization and national bodies. Assessing the quality of laboratory services using quality indicators or performance measures requires a systematic, translucent, and reliable approach to collecting and analyzing data. A wide-ranging approach would address all stages of the laboratory total testing cycle, with a focal point on the areas considered most likely to have important consequences on patient care and health outcomes.

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.2 “the grade to which health care services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge,” a quality indicator is a tool that enables the user to quantify the quality of a certain phase of care by comparing it with a decisive factor A quality indicator may be defined as an intention measure that evaluates crucial health care domains as defined by the - patient safety, effectiveness, equity, patient-centeredness, timeliness, and efficiency, is based on evidence associated with those domains, and can be implemented in a reliable and similar manner across settings and over time. Frequency of laboratory errors varies to the highest degree depending on the stepladder of the TTC investigated, a series of papers have drawn the attention of laboratory professionals to the pre-analytical and post-analytical phases, which have been verified to be more vulnerable to errors than the analytical phase; the pre-analytical phase has the highest error rates, accounting for up to 70% of all mistakes in laboratory diagnostics.

Lab professionals are interested in service quality, which encompasses total testing error (imprecision and trueness), availability, cost, relevance, and timeliness. However, because the quality of a laboratory is frequently estimated by timeliness, many laboratories may be ready to give up analytical quality for a nearer turnaround time Figure III – A shows turnaround time (TAT) analysis, which conquer No. of reports deviated from TAT per No of report analyzed. (According to NABL 112 (4.12) >1 % consider to take corrective action). From this TAT analysis shows significant evidence of statistical turnaround time target value exceed from > 1%. Root cause was analyzed. Corrective action was taken. This Results related to the timeliness of report release were usually satisfactory and point out on the whole good control of this phase. Delayed reporting was caused by insufficient availability of resources (human, technology), sub-optimal work flow and failure to define the required reporting time. Corrective action will involve review of all these factors with a focus on patient requirements, and may require modification of traditional working practices.

Conclusion

Working constantly to improve the outcome of these indicators by taking corrective measures over a period of time will definitely help to improve the quality of laboratory services and patient health care. The concept of quality indicators has revolutionized the field of laboratory medicine. These pre-analytical, post-analytical indicators are of paramount magnitude in the comparison of individual laboratory performance with the aim of improving corrective measure to improve laboratory quality.

Conflict of interest: Nil

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