

**DEVELOPING AND OPTIMISING A ROBUST KEY PERFORMANCE
EVALUATION SYSTEM FOR CLINICAL DEPARTMENTS IN A MULTI
SPECIALITY HOSPITAL: AN ANALYTICAL STUDY**

Dissertation Submitted to



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in

Hospital and Health Management

By

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Under the Supervision and Guidance of

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TO WHOMSOEVER IT MAY CONCERN

This is to certify that Ms. Ritika Bhattacharya has successfully completed her training from March 19, 2024, to June 10, 2024, in Medical Services department of CK Birla Healthcare, Gurgaon Unit.

During the period of her training with us, her performance was good and she was found punctual, hardworking, and inquisitive. She was present every day during her training in Gurgaon unit.

Any information used to complete the project is the intellectual property of CK Birla Healthcare Pvt. Ltd. and hence should not be used for any other purpose.

We wish her the very best for her future endeavors.

For, CK Birla Healthcare Pvt. Ltd.

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DECLARATION

I hereby declare that this dissertation titled “Developing and optimizing a robust key performance evaluation system for clinical departments in a multi-specialty hospital : an analytical study ” is the bonafede record of my original research work. I declare that it has not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.

Ritika Bhattacharya

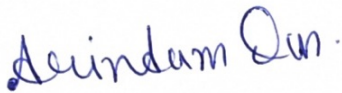
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Certificate

This is to certify that dissertation titled “**Developing and optimizing a robust key performance evaluation system for clinical departments in a multispecialty hospital : An analytical study**” is a record of research work undertaken by Dr. Ritika Bhattacharya in partial fulfilment of the requirements for the award of the degree of MBA (Hospital and health Management) from the IIHMR University, Jaipur under my guidance and supervision and her approach to the research study has been sincere, scientific and analytical.

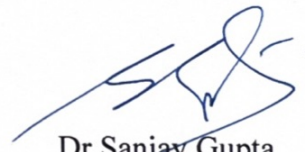
A handwritten signature in blue ink, appearing to read 'Arindam Das'.

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Acknowledgement

Any successful project is a teamwork that reflects the contribution of many people. I would like to thank everyone who has contributed to this effort by sharing their time and taking interest in my project and encouraging me all the way through.

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Dr. Ritika Bhattacharya

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ABSTRACT

Submitted by: Dr. Ritika Bhattacharya

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Healthcare management relies heavily on evaluating clinical department performance to ensure quality patient care and operational efficiency. This study focuses on developing and optimizing a robust Key Performance Evaluation (KPE) system tailored for clinical departments within a multi-specialty hospital setting. The study aims to achieve two primary objectives: first, to identify relevant key performance indicators (KPIs) that accurately reflect the functions and responsibilities of clinical departments; and second, to establish a methodological framework for measuring, analyzing, and improving departmental performance based on these indicators. Methodologically, a mixed-methods approach is employed. A comprehensive literature review and consultations with experts identify an initial set of KPIs. Qualitative interviews and focus groups with stakeholders—healthcare professionals, administrators, and patients—are then conducted to validate and prioritize these indicators based on their perceived importance and impact. Subsequently, quantitative analysis techniques such as factor analysis and regression modeling are used to refine and finalize the selected KPIs. This ensures an understanding of their interrelationships and overall impact on hospital operations and patient outcomes. The optimized KPE system includes a user-friendly dashboard or scorecard for real-time visualization of performance metrics, facilitating continuous monitoring and informed decision-making by hospital management and department heads. Training sessions and workshops support effective utilization of the KPE system by all stakeholders. By integrating qualitative insights with quantitative rigor, this study contributes to healthcare management by offering a structured approach to evaluating clinical department performance in multi-specialty hospitals. The developed KPE system aims to enhance transparency, accountability, and performance excellence, ultimately improving patient care outcomes and operational efficiencies.

Keywords :

NABH: National accreditation board for hospital and healthcare providers

KPI: Key performance indicators

WHO: World health organization

HCO: Healthcare organization

EBP: Evidence based practice

CAUTI: Catheter associated urinary tract infection

CLABSI: Central line associated blood stream infection

VAP: Ventilator associated pneumonia

SSI: Surgical site infection

TAT: Turn-around time

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CHAPTER 1 INTRODUCTION

The term "performance" has gained prominence in the health care industry in recent years. Performance is the measure of how well predetermined goals are accomplished. The notion of performance in the context of health care serves as a tool for reconciling efficacy, efficiency, and quality. As a result, performance is a multifaceted notion that encompasses many other ideas and concepts, including evidence-based practice (EBD), healthcare service continuity and integration, health promotion, and patient-centeredness. Any hospital's main objective is to provide specialised medical services that can effectively (quality) and efficiently (efficiency) solve patients' health issues. In order to do this, KPIs (Key performance indicators) set clear, measurable objectives that healthcare providers can aim for. Institute of healthcare improvement says that the best way to identify the relevant KPIs is to focus on the **Triple aim model**, three dimensions highlighted in this model provide a good look at how areas prospective KPIs should be designed, for positive health outcomes. The three dimensions are -

- A focus on improving the patient's overall care experience (inclusive of quality and satisfaction)
- A focus on improving the health of groups and/or populations
- A focus on reducing the per capital cost of health care.

Key Performance Indicators, or KPIs, are useful tools for meticulously tracking, assessing, and continuously enhancing service performance. KPIs cannot boost performance on their own. They do, nevertheless, offer "signposts" that indicate advancement towards targets and aims in addition to chances for long-term enhancements.

Well-crafted KPIs should assist the organisation in several ways, including as:

- * Generating baseline data, or the existing performance level
- * Quantifying benchmarks and goals for performance to encourage continuous improvement
- * Compare performance across geographic locations
- * Evaluate performance in relation to regional and worldwide peers or norms
- * Track and report progress over time
- * Permit stakeholders to evaluate the performance of the health sector on their own.

It is suggested that healthcare organisations (HCO) collect all data pertaining to clinical and support services. The data must be examined, and trends, rates, and dangers for all the indicators have to be demonstrated for appropriate action.

Incorporating the NABH 5th Edition indicators alongside CK Birla Healthcare Pvt. Ltd.'s unique clinical benchmarks, this study focuses on the organization's pursuit of accreditation for their Gurgaon unit by 2025. With a paramount objective of enhancing both quality and operational efficiency within their medical services, CK Birla

Healthcare endeavors to optimize its practices to meet the rigorous standards set forth by NABH, ensuring a successful accreditation outcome.

Aim of the study - Developing and optimizing a robust key performance evaluation system for clinical departments in a multi specialty hospital: An analytical study

The objectives of this study are as follows-

- Collation of medical service indicators across a unit of a multi-speciality hospital chain to form a repository
- Grouping indicators in various baskets to serve as a database for comprehensive dashboards for managerial review
- Review data sanctity, validate methodology, database and sample size and suggest corrective actions
- Implementation of actions to reduce the gaps in the non-conformance indicators and make recommendations for various stakeholders

The goal of NABH KPIs is to completely encompass the range of services for which a health care organisation (HCO) has submitted an application to be accredited. The table below provides an explanation of the standardised definitions for each indicator, along with the numerator and denominator of each key performance indicator. Each of the HCO can measure the data set, examine the combined data, and develop the necessary corrective and preventive measures. Although each HCO is free to create their own data collection approach, a general guidance note has been provided to help organisations comply with the NABH 5th edition reference book. All of the indicators, together with their description, estimation, and the benchmarking generated by the CK Birla group, are displayed in the table below.

Table 1: NABH 5th Edition Indicators

Sr. No.	Name of the Indicator	Definition	Formula	Unit	Bench marking
1	Time taken for initial assessment of in-patients	The time beginning from the time that the patient has arrived at the bed of the ward up to the time that the first assessment has been completed by a doctor in the ward.	Sum of time taken for initial assessment of all admitted patients in a particular duration / total patient who were admitted in that duration in the hospital	Minutes	120 min
2	Number of reporting errors per 1000	Rate of reporting errors in the laboratory per 1000 reporting's	(Number of investigation/diagnosis reports which shows errors/inappropriateness were detected /	Percentage	5/1000

	investigations		Number of lab reports audited) x 1000		
3	Percentage of adherence to safety precautions by staff working in lab and radiology	The percentage of the staff who adhere to the standard precautions established by the hospital.	(Number of audits that proves/confirms conformance to precautions of safety in a duration of time / observations that were made in that duration) x 100	Percentage	Lab-100% Radiology-100%
4	Medications Error Rate	An event that causes or leads to errored medication use or patient harm while the usage is controlled by the doctors or nurses. Examples are: Prescription errors, Transcription error, Dispensing error, Administration error, Monitoring error, inappropriate dosage, inappropriate strength, inappropriate route etc	(Medication inappropriateness that has been seen/observed in a duration / Total number of prescription of drug events) x 100	Percentage	<2%
5	Percentage of medication charts which shows error-prone abbreviations	Error-prone abbreviations are defined by the errors in drug prescriptions in the drug charts and doctor notes/ non-compliance to standards of prescription standards.	(Number of medication charts which shows errored abbreviations / Number of medication charts that were audited) x 100	Percentage	<1%
6	Percentage of in-patients who developed adverse drug reactions	Adverse Drug reaction is a reaction to a drug which is toxic and unintended and which occurs at normally used in man for prophylaxis, diagnosis of disease, or treatment of disease.	(Number of cases which got adverse drug reactions in a period / Number of cases admitted in the in-patient department in that period) x 100	Percentage	0.5% (high risk-3%)

7	Percentage of unplanned return to OT	Unplanned return to the OT is an event which occurs due to complication resulting directly from the operation/procedure during same admission. For example, post-operative bleeding, secondary suturing, evaluation under anaesthesia etc.	No. of unplanned return to OT / No. of patients Operated*100	Percentage	0.20%
8	Percentage of surgeries where the organization's procedure to prevent adverse events like wrong site, patient and surgery have been adhered to.	---	No. of cases where the surgeries followed to prevent any kind of adverse events for e.g. wrong site, patients or surgery / No. of surgeries performed *100	Percentage	100%
9	Percentage of transfusion reaction	Any reaction to the transfusion of blood or blood components is to be considered as transfusion reaction. It may range from a mild allergic reaction to life-threatening complications.	(Number of cases who developed transfusion reaction by administration of blood / Patients who underwent blood transfusion) x 100	Percentage	0.5%
10	Standardized Mortality Ratio	The ratio of the observed or actual mortality and the predicted mortality for a specified duration of time. It requires an estimate of predicted mortality rate using a scoring system for e.g. SOFI scoring system	(Total number of deaths in ICU patients according to SOFI scoring in a duration/ Total number of patients discharged from ICU in that duration) x 100	Percentage	<1%

11	Return to the emergency department within 72 hours with similar presenting complaints	The patients who return to emergency dep. after 72 hours of visit in the same dep. with the similar complaints as before	Patients which returns to emergency department with the same presenting complaints within 72 hours/ Total number of patients who visited emergency department in a period x 100	Percent age	<5%
12	Incidence of hospital associated pressure ulcers/bed sores after admission	A pressure ulcer is localized lesion to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure, or pressure in combination with friction.	Number of patients who developed hospital-associated bed sores / Number of bedded days of the patients in a period x 1000	Percent age	<2
13	Catheter associated Urinary tract infection rate	The proportion of patients with urinary catheters who develop urinary tract infections during their hospital stay, expressed as a percentage.	(Number of patients developing Catheter associated urinary tract infection in specific duration of time / Total urinary-catheterization patient days in that duration of time) x 1000	Percent age	<2.09%
14	Ventilator associated Pneumonia rate	The Ventilator-Associated Pneumonia (VAP) Rate is the proportion of patients who develop pneumonia while undergoing mechanical ventilation in a healthcare facility, typically expressed as a rate per a specific unit of time (e.g., per 1,000 ventilator-days)	(Number of patients who developed Ventilator associated pneumonia in a duration / Total days the patients were in ventilator in that duration of time) x 1000	Percent age	<1.4%
15	Central line - associated Blood stream	The proportion of patients with central venous catheters who develop bloodstream infections attributable to the catheter within a specified period, typically expressed as a rate per a specific unit of	(Number of patients who developed central line associated blood stream infection in a duration / Total central line days in that duration) x 1000	Percent age	<1.02%

	infection rate	measurement (e.g., per 1,000 catheter-days).			
16	Surgical site infection rate	The Surgical Site Infection (SSI) Rate is the proportion of surgical procedures in which patients develop infections at the site of surgery within a defined period, typically expressed as a percentage.	(Number of patients who developed surgical site infection in a duration/ Total surgeries that have been performed in that duration) x 100	Percent age	<2.5%
17	Hand Hygiene Compliance Rate	The "Hand Hygiene Compliance Rate" is a measure of the extent to which healthcare workers adhere to recommended hand hygiene practices, including hand washing with soap and water or using alcohol-based hand rubs.	Observations where staff complied to the hand hygiene standards in a duration/Total observations that were made in that duration) x 100	Percent age	>70%
18	Percentage of cases who received appropriate prophylactic antibiotics	---	No. of patients who received appropriate prophylactic antibiotics / No. of patients who required prophylactic antibiotics in a duration * 100	Percent age	95%
19	Percentage of rescheduling of surgeries	This includes if there is any cancellation or delay (more than 4 hours) of the surgery.	No. of surgeries that were rescheduled / No. of surgeries that were performed in a duration * 100	Percent age	3%)
20	TAT for issuing of blood and blood components	T1 to be taken as the time when the request is received in the blood bank and T2 is taken as the time when the blood is made available for transfusion to the patient.	Sum total of the time taken for issue of blood and blood taken in every request / Total requests that have been required for blood and blood component transfusion in a period	Minutes	120 min
21	Nurse-patient ratio for ICUs	It is a ratio that quantifies the number of nurses assigned to care for patients within a hospital ward or ICU in	Ratio of the nurses available to the total patients admitted In ward/ICU at a time	Ratio	wards- 1:2 ICU - 1:1

	and wards	relation to the total number of patients present in that period.			
22	Waiting time for out-patient consultation	Waiting time for out- patient consultation is the time from which the patient has come to the out- patient department for consultation/treatment till the time that the concerned consultant starts the assessment.	Sum total of Patient time for consultation in a duration of time / Number of patients who visited out-patient department in that period	Minutes	30 min
23	Wait time for diagnosis	The time from which the patient comes to the diagnostic service (either for pathological test/radiological test) till that time when the test has been started.	Sum total of patient reporting time for the diagnosis in a period / Total Number of patients reported in diagnostics in that period	Minutes	< 30 min
24	Turn around time for discharge	The time from which the consultant writes for discharge and till the time when patient leaves the unit.	Sum of time taken for discharge of patients (cash and TPA separate) in a period/ Total patients whose discharge time is taken in that particular period	Minutes	Cash - 90-120 min
25	Percentage of medical records which have incomplete or improper consent	The medical records where the consent for any procedure that has been done/has to be done on patients is absent or incomplete. This KPI is really important for legal reasons in the future.	Medical records that have incomplete or improper consent in a period / Total number of medical records where consent was supposed to be there/any procedure or treatment was done.	Percentage	0%
26	Stock out Rate of the Emergency drugs	When a emergency medication listed in the inventory is not available in the inventory.	Number of emergency medications which are stocked out/ Total emergency drugs listed in the inventory) x 100	Percentage	0%
27	Number of variation in mock drills	When the standard procedure is not followed/complied to by the staff which is developed by the top managers of the hospital to close a drill.	(Number of variations which were observed in conducting mock-drills in a duration / Total number of observations that were made during the mock drill) x 100	Percentage	Scoring system >80% compliance

28	Patient fall rate (Falls per 1000 patient days)	It is an event that results in a person who inadvertently comes on the ground or floor due to negligence of the staff during the bedded days of the patient.	(Total number of fall of the patient reported in a duration / Total bedded days of the patients in that duration) x 1000	Percent age	2/1000
29	Near misses percentage	Any event that could lead to harm of the patient but was somehow controlled is categorized as a near miss.	(Number of near-misses that were reported in a period / Total number of errors that were reported in that period) x 100	Percent age	<5%
30	Incidence of needle stick injuries	When there is any injury/accident when a patient is undergone a needle stick procedure.	Number of needle-stick injuries that were reported in a period / Total number of bedded days of the patient in that period) x 100	Percent age	<5/1000
31	Appropriate handovers that occurred during the shift change (separate for doctors and nurses)	Errors that occurred during the shift change of the nurses or doctors.	Total no. of handovers done that had been done in an appropriate manner / Total no. of handovers that were registered x 100	Percent age	>90%
32	Compliance rate to Medication Prescription in capitals	The medications written in the prescriptions are in capital letters which is according to the prescription standards given by WHO (world health organization)	(Number of drugs in the prescription sheets written in capital letter / Total number of prescription sheets that were checked during the audit cycle x 100	Percent age	90%

Source: NABH fifth edition guidelines for key performance indicator to be monitored by the healthcare organization.

Clinical Indicators in departments

This study also includes a few clinical indicators which were showing discrepancies over few months in Emergency, ICU and wards. The indicators and their significance are mentioned below-

1)Readmission within 48 hours in ICU - measuring and tracking readmission rates monthly help to understand the actual ICU performance and its tendency over time. Quarterly bench marking based in case-mix expands understanding and supports new strategic plans of action. Unplanned early readmissions are often related to the discharge of a patient who is not ready for the transition of care to the wards. This could be due to an incomplete resolution of acute medical problems, or a need for intensive monitoring that the wards are not able to provide, or unforeseen short-term complications, or less often acute complications acquired in the wards. Readmission rates and analyzing the cases provide targets for quality improvement projects.

2)Return to emergency department within 72 hours - Patients who come back to the Emergency Department with the same presenting complaints lead to risk of adverse events & increase in cost to the healthcare unit. Analyzing the return of patients within 72 hour with similar complaints is considered a way to measure the quality of treatment that has been taken care of in the Emergency department. Patients who come back to the Emergency department within a short period of time (for e.g. in this case study 72 hours) from initial diagnosis contribute to overcrowding in the department leading to delay in treatment, patient irritation/dissatisfaction, waste of resources (in terms of consultant hours & medicines) and increase in costs of health care to the patients as well as doctors. Patients who return to the Emergency department within a small duration like 72 hours of discharge are characterized to have given poor treatment or diagnosis. Return to department which have crossed a benchmark of 5% may reflect poor quality of care. According to an analysis in the organization itself, it has been observed that there is a rise in return rates in the ED and majority of returns rates in the hospital have been related to patients who have complaints of abdominal pain, Bleeding PV, Fever in children (under 18 yrs of age a/c to the hospital) and chest pain due to incomplete investigations and absence of consultations in certain cases. So, this study involves the analysis of underlying causes of return and corrective and preventive actions for the same.

3) Refusal of treatment in ICU, Emergency and ward -*Patient not complying to the suggested treatment protocol or patient not following a proper treatment protocol for treatment of a particular disease/injury suggested by doctors* has been considered a major factor in failure of any treatment procedure in both regular practice and also in long duration scientific trials. So, the refusal needs to be tracked to prevent therapeutic failures. Any patient needs to be properly counselled about a treatment protocol and the benefits of that treatment. This might lead to less therapeutic failures and wastage of resources.

All 32 indicators of NABH 5th edition and 8 department specific clinical indicators (Emergency, ICU and IPD) are assessed, tracked and analyzed prospectively in a multi-specialty hospital in Delhi NCR region over a period of 6 months. All the parameters were compared to that of the benchmark standards. Root cause analysis of all the non-conformance indicators was done. Problems were identified and actions were suggested and implemented.

CHAPTER 2 REVIEW OF LITERATURE

An article published in **Journal of Eastern Europe Research** “Relevance of Key Performance Indicators (KPIs) in a Hospital Performance Management Model” by Andrei Stefan Nestian & Tita Silviu in the year 2012 States that “In previous years it has been proved that performance is considered a very important word in the healthcare industry. Performance is the estimate that signifies that the set objectives by any organization have been accomplished. The concept of performance in any healthcare organization is known for bringing quality, efficacy & efficiency altogether. At the same time, the idea of performance is complex, including multiple dimensions such as evidence-based practice (EBO), healthcare service continuity and integration, health promotion, and patient-focused orientation. Research conducted by these authors in the Romanian health unit confirms that the KPI model in respect to other models has shown a series of advantages. Among the advantages that are noted few are as follows : Easier Strategic planning, a vigorous performance management system would be there in place which would give a bigger picture to the management of any healthcare organization and lastly using the KPI model in multiple dimensions in clinical matters as well as in the financial or administrative matters. One more advantage of the model is that it gives the organization feedback possibilities which can improve the quality of care. The later stage of this model involves implementation and improvement.

Health information and quality authority (HIQA), suggests that the key purpose of any KPI is:

- 1) Indication of what is going on.
- 2) Help to **keep an eye on the core areas of the service** and how they are performing.
- 3) **Indicates** areas that **require further follow-up**.
- 4) Beneficial for both department heads and senior management

A research paper published by **oxford university press** “From a process of care to a measure: the development and testing of a quality indicator” by *HR Rubin, P Pronovost, GB Diette* in the year 2001 confirms that Performance indicators have been highly preferred by the providers since they clearly tell how can the providers improve their treatment and administrative outcomes. As electronic medical records have come into place in the healthcare organizations, Tracking of the performance indicators is easily possible, which can also lead to implementation. Tracking of performance indicators can constantly give an educational reminder/support to administration about the correct procedure and avoid duplication of collection of data for quality assessment. Quality indicators are becoming more practicable because of the partnerships between payer agencies, professional organisations, and external government or governmental organisations in their development and maintenance. Quality indicators have to be related to significant outcomes, or they have to be established via consensus procedures and deemed significant by medical professionals in relation to patient outcomes, in order for them to be regarded as legitimate. Over the last ten years, there has been a growing focus on combining the available research to determine how the treatment process influences patient outcomes. This information is becoming increasingly more easily available to the public and provider community.

Research conducted by 4 scientists *Hamed R, Zahra K, Payam S, Erfan K* of Shiraz university of Iran in the year 2017. Delphi survey was conducted by these scientists on experts of the healthcare industry to confirm the validity of implementation of KPIs in a hospital. The experts comprised of 17 professionals from the healthcare industry who had five or more years of related experience and seven of them had more than fifteen years. 12 of experts were managers/directors of hospitals, and five were researchers or professors in healthcare management. Experts rated the validity of the indicators on a Likert-scale of five. In the criteria for calculation of the importance level, the values that came 1-3 were considered as not important (given 0 point) and 4-5 considered to (1 point) be as important. A addition weightage technique was used to rank all the indicators which were given points and also to select hospital's relevant KPIs. The analysis was done by excel 2010 edition. The result of the study confirms that identifying the hospital's relevant KPIs provides an opportunity for hospital administrators to recognize the points which are critical with lower costs and time and needs to be look after. As a result, it turned out simple to identify and visualise the hospital's areas that needed any improvement. This model is beneficial for comparing and contrasting hospital performance. However, this model is flexible and can be changed to account for variations in the target hospitals. This model also advises hospitals to evaluate their own performance using the framework provided by the research that is conducted. This paradigm can also be used in future research to gauge hospital performance, detect functional shortcomings, and enhance overall quality of care, which could ultimately lead to higher patient satisfaction and more stable financial growth for hospitals.

At **King Faisal Hospital & Research Centre, Saudi Arabia**, the two scientists *Mohamed Khalifa & Parwaiz Khalid* in the year 2015 decided to use and develop KPIs for monitoring, measurement & improvement of the hospital performance in different departments in the same unit. The main objective of the study was to make data which would be measurable and information available for the higher as well as middle management to make improvements in the current quality of care. Many of the KPIs analyzed in this study like medication errors, deficient medical records, increased length of stay resulted to be really important for performance evaluation in hospitals for e.g. - Hospital bed occupancy rates have been proposed as a measure that indicates the correct utilization of various resources in the in-patient department, OT utilization indicator reflects the quality of care. Infection control rates shows safety measures followed by the staff to prevent infections. This work's primary contribution gives a broader view to healthcare professionals, a more specific perspective when it comes to grouping KPIs into various baskets. At last why do we measure concerns more than how are we creating this framework for strategic KPIs is crucial since it will not only help to report on performance, point out imperfections and suggest improvements, but it will also spark further innovative ideas on how to evaluate tactical and operational performances as well.

KPIs were used by **HealthFirst** (by- intrafocus website- focused on KPIs in action still in progress), a healthcare provider, to enhance the services they were providing. The principal objective of the organization was a 15 % reduction in patient wait times to acquire any services. They adopted a KPI that measured the typical amount of time patients spent in the waiting area in order to track their progress. Every week, they used

this KPI to assess their progress. However, they did not only glance at the figures. They made significant adjustments using this data. For instance, they adjusted staff schedules when they discovered that waiting times were prolonged due to a shortage of personnel during peak hours. A KPI was also established for patient follow-ups. Their goal was to ensure that patients get a check-up call within a week.

By the project's conclusion, the organization didn't just meet their target but exceeded their performance in reducing the waiting time of patients. 20% less time was spent on tracking waiting of patients and do the root cause analysis and their follow-up care was much better than ever. Their story illustrates how things can be improved by following on recommendations which are seen in KPI analysis.

These studies highlight the need for and importance of the present research and underscore the advantages of analyzing and implementing Key Performance Indicators (KPIs).

CHAPTER 3 METHODOLOGY

This is a cross sectional and analytical study using primary and secondary data that employs a mixed-method approach, integrating both **qualitative** and **quantitative** tools to collect comprehensive information on the **33 Key Performance Indicators (KPIs)** outlined in the 5th edition of the NABH standards over a six-month period in a multi-specialty hospital. It is worth mentioning that the primary data was collected through qualitative techniques, whereas the quantitative data was collected from hospital records, which is secondary in nature.

Qualitative Data Collection

A) Stakeholders' In-depth Interviews:

The objective of these interviews was to gather qualitative insights into the operational challenges and the perceived effectiveness of current performance indicators. In-depth interviews were conducted with various stakeholders, including healthcare providers, administrative staff, and patients. These interviews helped in understanding the contextual factors influencing KPI performance.

B) Health Information System Analysis:

Secondary Data from the health information system of the hospital was collected to provide a detailed account of the hospital's performance across different parameters. This included patient records, treatment outcomes, and other relevant healthcare delivery metrics.

Quantitative Analysis

Quantitative data was systematically collected for all 33 KPIs over a six-month period from November 2023 to April 2024. This included tracking metrics of all the 33 indicators of NABH fifth edition.

Numerator and denominator were determined by data collected through qualitative analysis and quantitative Analysis was done by developing dashboards and graphs in excel for each 33 indicators.

Additional methods that are used in this study involves:

A) Data Validation of the indicators:

To ensure that the data is accurate and reliable for the analysis, a thorough data validation process has also been implemented through manual audits after data collection. This included cross-verification of data entries and consistency checks through conducting departmental audits in a cycle of 15 days to eliminate errors and discrepancies.

B) Reliability Testing:

This was done by **Data collection consistency checks** in which multiple data points were collected over different time intervals to assess the consistency of the data and comparing data entries from various sources and times to ensure uniformity and accuracy.

Involved **Inter-rater reliability** where multiple observers (the main quality manager and other data managers of the hospital, administrative nurses) independently recorded the same KPI data. The degree of agreement between observers was measured using statistical methods to ensure that the data collection process was reliable and not significantly influenced by individual biases or errors.

C) Statistical Analysis:

Advanced statistical methods were applied to analyze the data, including root cause analysis using methods like 5 whys, fishbone diagram and scatter diagram. This helped in identifying patterns, trends, and relationships in the KPIs.

Steps followed in the study :

Step 1- Collation of Medical Service Indicators:

The first objective was to collate medical service indicators across a unit of a multi-specialty hospital chain. This involved gathering comprehensive data to create a centralized repository of performance metrics

Step 2- Grouping Indicators and developing dashboards for data analysis:

The indicators were grouped into various categories department wise- emergency (1), OPD (1), Infection control (7), diagnostics (3), IPD (4), ICU (2), IPD (1), OT (4), Pharmacy (2), Others (6), Blood and blood components (2) to facilitate easier analysis and interpretation. These categories served as the foundation for developing comprehensive dashboards for managerial review, enabling efficient monitoring and decision-making.

Step 3- Review and Validation:

After the analysis and dashboards development reviewing the sanctity of the data collected, validate the methodology employed, and ensure the robustness of the database and sample size was done.

Step 4- Implementation and Recommendations:

Actions were implemented to address gaps identified in the non-conformance indicators. Recommendations were made for various stakeholders to improve performance and compliance with the KPIs. This involved suggesting process improvements, training programs, and policy adjustments to bridge performance gaps.

By employing this comprehensive methodology, the study aims to provide a robust evaluation system for KPI analysis and implementation, ensuring that the findings are reliable, actionable, and beneficial for improving healthcare delivery.

Sample size calculation: -

Since a Dashboard for KPIs has not implemented until the start of this project, a sample size for analyzing an indicator was also not determined.

1) Census has been taken for the analysis of 27 indicators out of the total 33 indicators that are analyzed.

2) Six percent sample size for Time for Initial assessment of patients in the wards has been taken due to time and shortage of data availability.

3) Thirty percent sample size of waiting time for diagnostics and error prone abbreviations has been taken as per NABH 5th edition guidelines due to very high population.

CHAPTER 4 RESULTS AND DISCUSSIONS

Abstract

A **summary/abstract** of all the NABH 5th edition key performance indicator's risks identified according to performance standards, along with their categorization is as follows:

Table 2 : Executive summary of all the departments according to risk.

#	Department	High risk	Medium risk	Low risk	Total
1	Emergency	1	0	0	1
2	OPD	1	0	0	1
3	Infection Control	0	0	7	7
4	Diagnostics	0	1	2	3
5	IPD	2	0	2	4
6	ICU	2	0	0	2
7	ICU, IPD	0	0	1	1
8	OT	1	0	3	4
9	Pharmacy	1	0	1	2
10	Others	2	1	3	6
11	Blood and blood components	0	2	0	2
	Total	10	4	19	33

KPI Analysis (Risk assesment)

■ High risk ■ Medium risk ■ Low risk

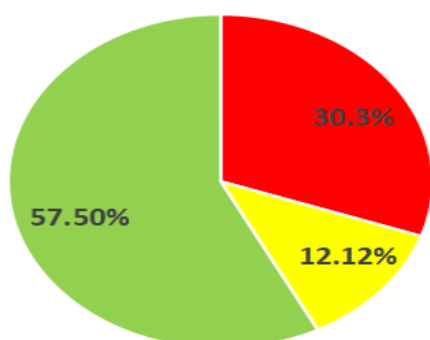


Figure 1: KPI analysis on the basis of risks

Criteria:

4 or above months crossing benchmark (Bad performance)	High risk 
3 months crossing benchmark (Average performance)	Medium risk 
Less than 3 months crossing benchmark (Good performance)	Low risk 

Figure 2: Definition of risks

A summary of all the NABH 5th edition key performance indicator's implementation identified according to performance standards, along with their categorization is as follows:

Table 3: Executive summary on the basis of implementation

#	Department	Not implemented	Incorrectly implemented	Correctly Implemented	Total
1	Emergency	0	0	1	1
2	OPD	0	1	0	1
3	Infection Control	0	0	7	7
4	Diagnostics	1	0	2	3
5	IPD	3	0	1	4
6	ICU	1	0	1	2
7	ICU, IPD	0	0	1	1
8	OT	0	1	3	4
9	Pharmacy	0	2	0	2
10	Others	1	3	2	6
11	Blood and blood components	1	0	1	2
	Total	7	7	19	33

KPI Analysis (Implementation status)

■ Not implemented ■ Incorrectly implemented ■ Implemented

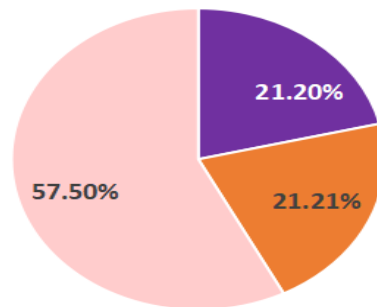


Figure 3: KPI Analysis on the basis of implementation

Criteria:

Implemented	
Incorrectly implemented	
Not implemented	

Figure 4: Criteria for implementation status

Root Cause Analysis of the indicators:

1. **Design Gap – Lack of SOP** has been noted in the following areas
Standardized-Mortality Ratio (ICU), Time which was taken for initial assessment of in-patients, Indicators related to mock drills, near misses and patient handover during shift change for doctors, medical records showing error prone abbreviations and the rate of cases who got appropriate prophylactic antibiotics in a defined time frame
Shows lack of SOPs.

2. **Gaps in IT implementation** have been noted in Compliance rate to Medication Prescription in capitals (Pharmacy), Total amount of time that took place for initial assessment of in- patients & Percentage of the medical records/prescription charts which shows errored abbreviations

It is to be noted that the above IPD and Pharmacy related indicators are high risk due to HIS inefficiency.

3. **Staff related challenges** has been observed in 9 indicators out of which 6 are high risk category-

- A. **Undertrained** staff has been noted in 5 indicators.
- B. Both **Undertrained** staff & **Understaffing** have been noted in 4 indicators

(Please refer Annexure 1 for details of staff related challenges for A,B & C above)

4. Indicator of total time that took place for initial assessment of the in-patients suffers from all 3 root causes.

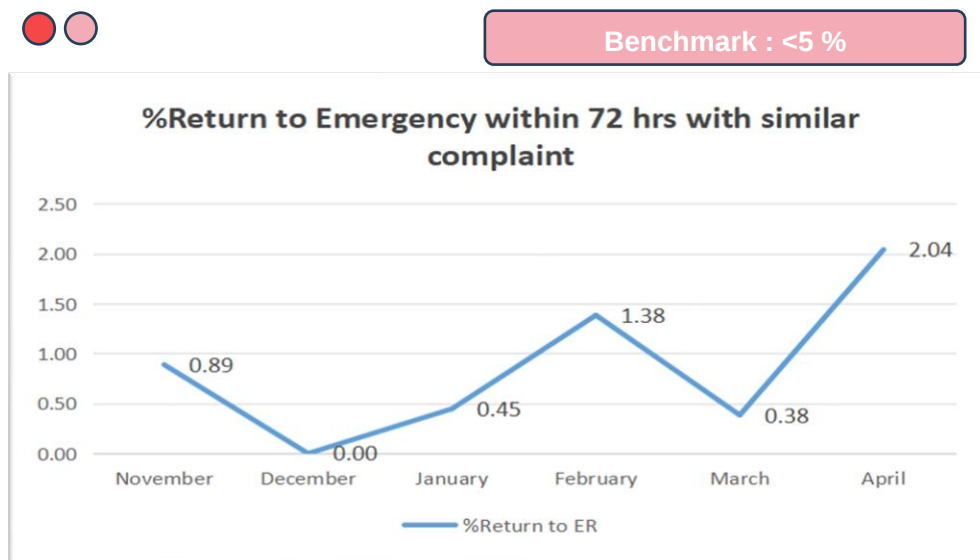
Annexure 1: Indicators that show undertrained and understaffed issues

S. No	Name of the Indicator	Risk Rating	Staff Challenge
1	Time taken for initial assessment of indoor patients	High	Undertrained
2	Percentage of medication charts with error-prone abbreviations	High	Undertrained
3	Return to the emergency department within 72 hours with similar presenting complaints	High	Understaffed, Undertrained
4	Percentage of cases who received appropriate prophylactic antibiotics within the specified timeframe	Low	Undertrained
6	Waiting time for out- patient consultation	High	Understaffed, Undertrained
7	Waiting time for diagnostics	Low	Undertrained
8	Time taken for discharge	High	Understaffed, Undertrained
9	Number of variations observed in mock drills	Medium	Undertrained
10	Compliance rate to Medication Prescription in capitals	High	Understaffed, Undertrained

Detailed Analysis and discussions:

1. Emergency:

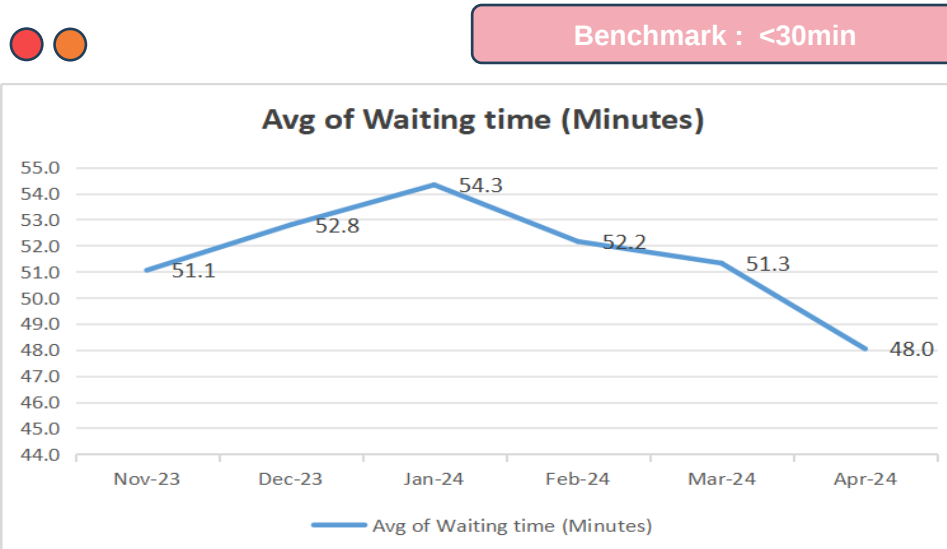
Return to emergency within 72 hours:



It has been noted that the data sent for this indicator was wrong from the month November to March. After daily audits, the actual data turned out to be higher than expected in the month of April. The root cause analysis being absence of consultants on the night shift.

2. OPD

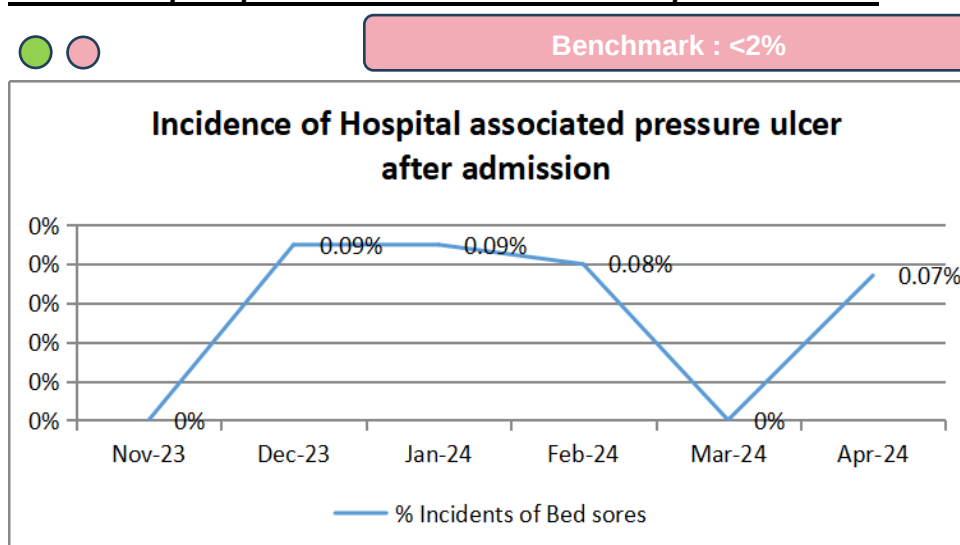
Waiting time for out patient consultation :



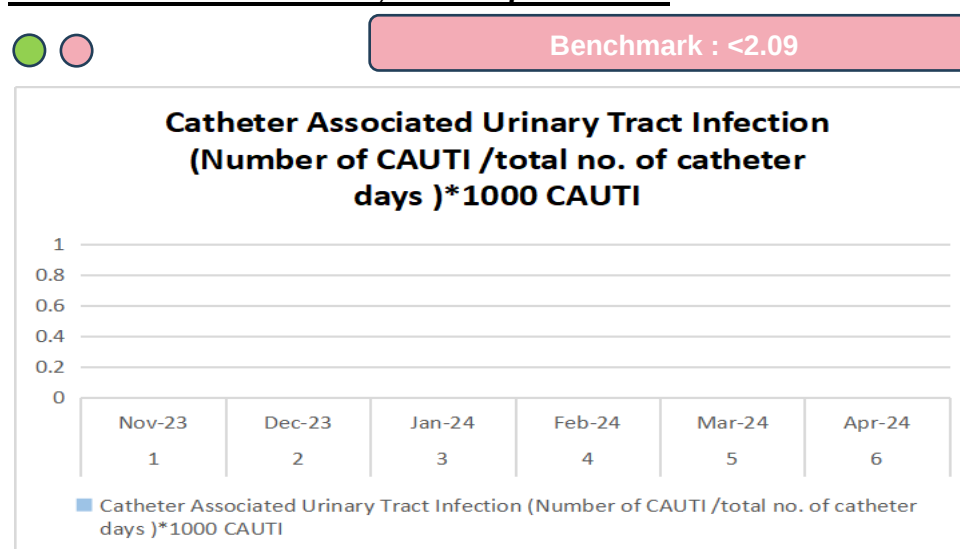
After the analysis, it has been noted that the waiting time for out patient consultation have been consistently crossing the benchmark set by the organization

3. Infection control department:

A. Incidence of Hospital Associated Pressure ulcer after admission :



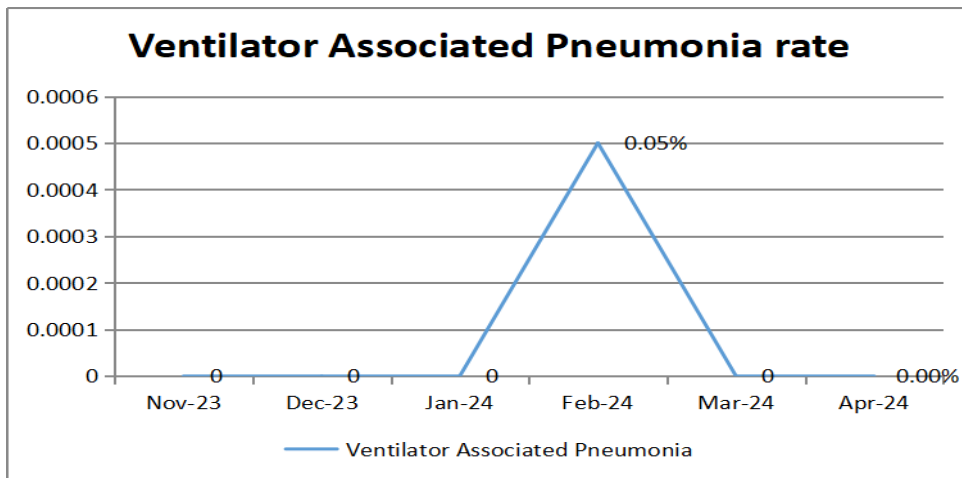
B. Catheter Associated Urinary Tract Infection rate:



C. Ventilator Associated Pneumonia rate:



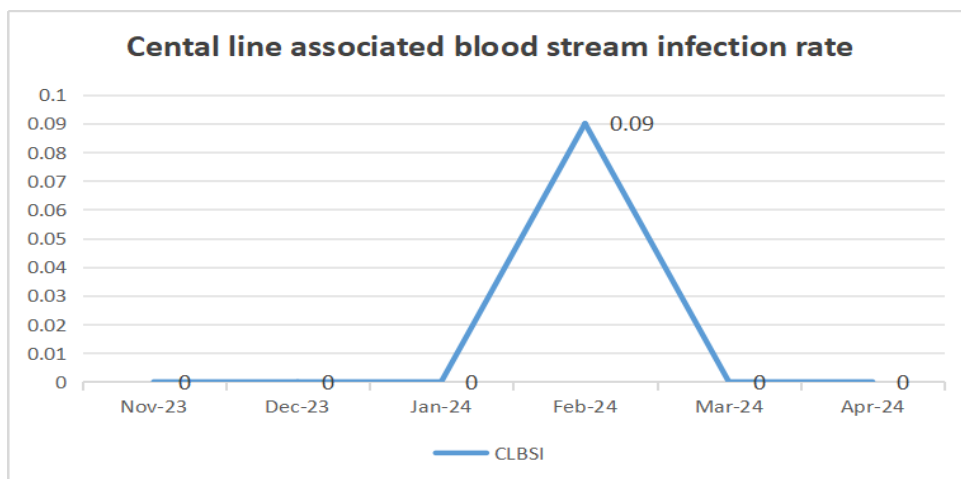
Benchmark : <1.4%



D. Central line associated blood stream infection rate:



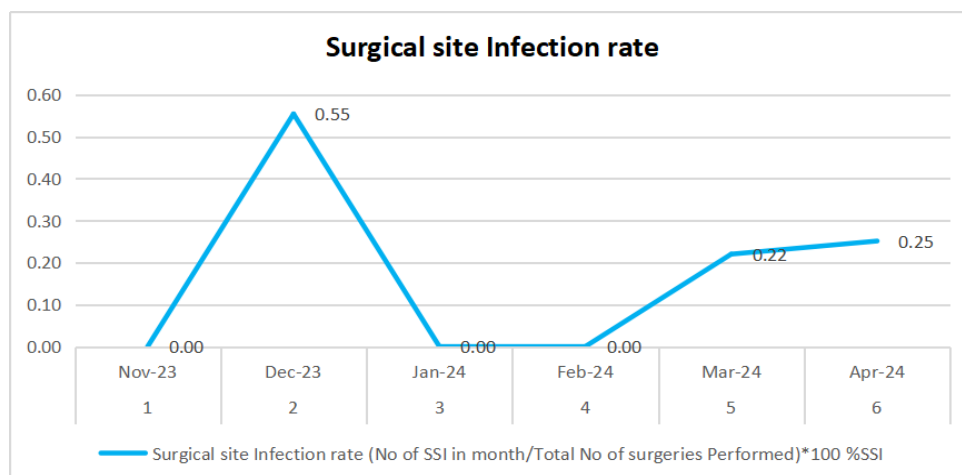
Benchmark : <1.02%



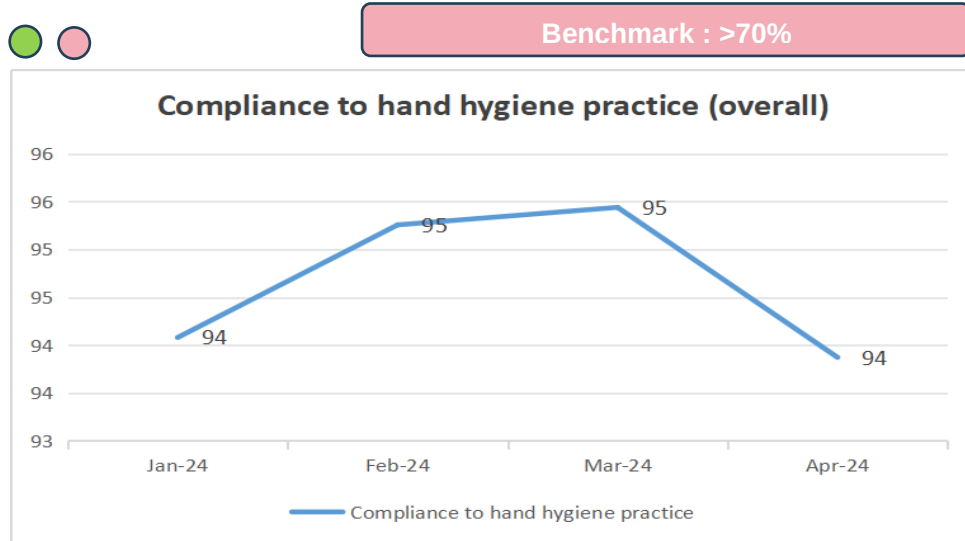
E. Surgical site infection rate:



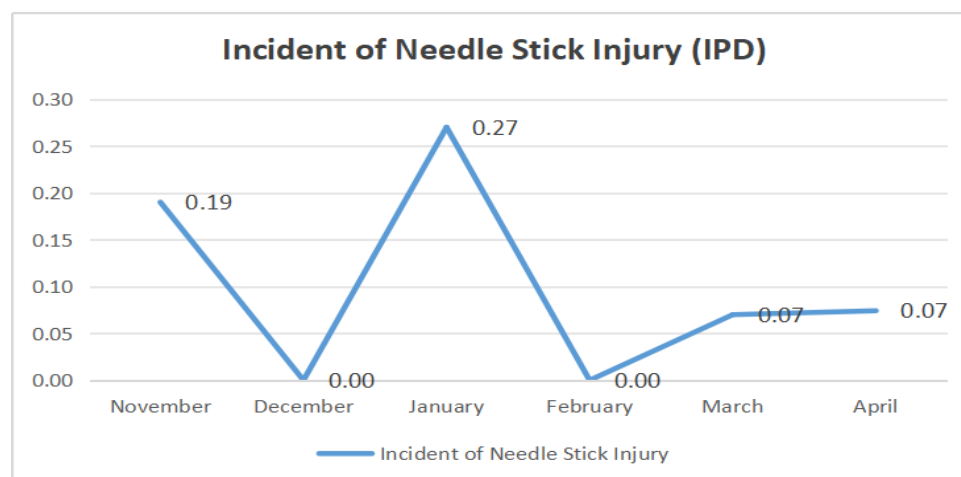
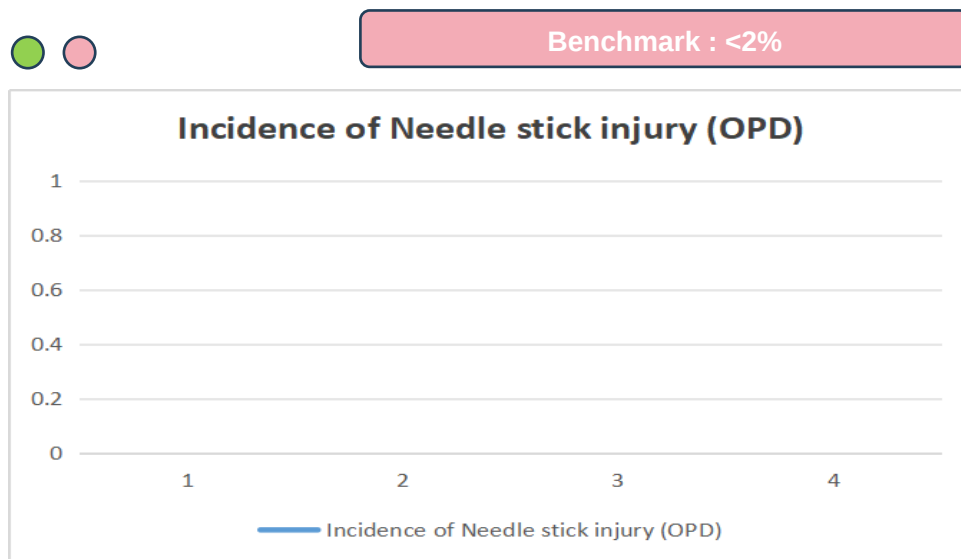
Benchmark : <2.5%



F. Hand hygiene compliance rate:



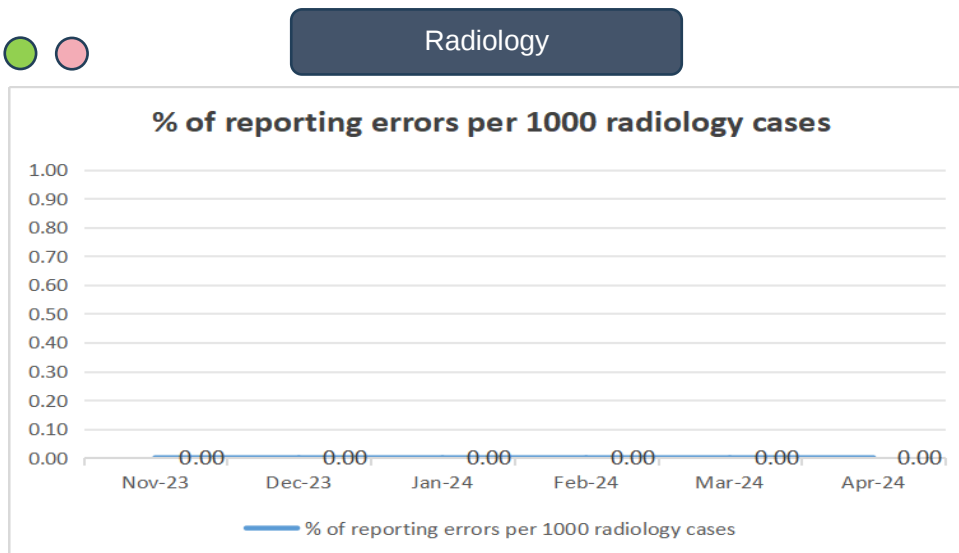
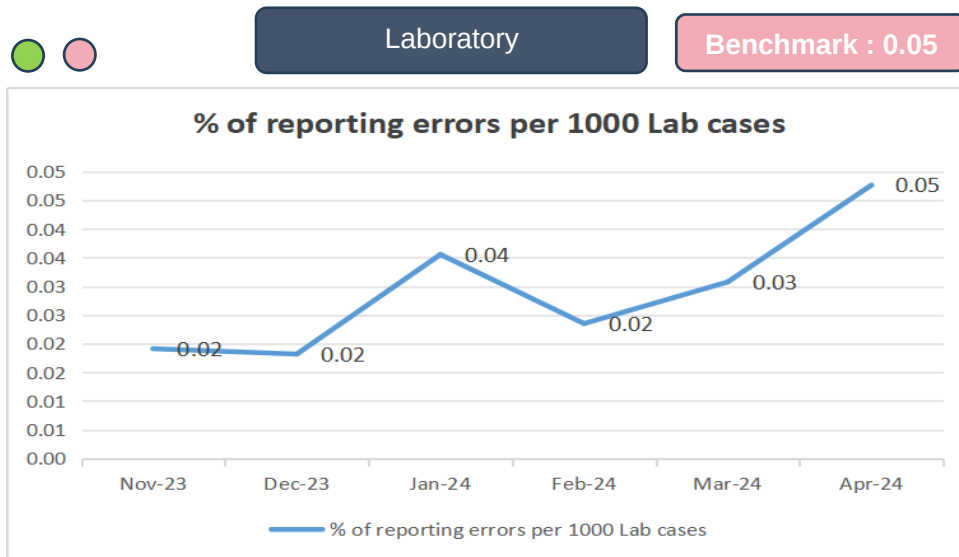
G. Incidence of Needle stick injuries (OPD & IPD):



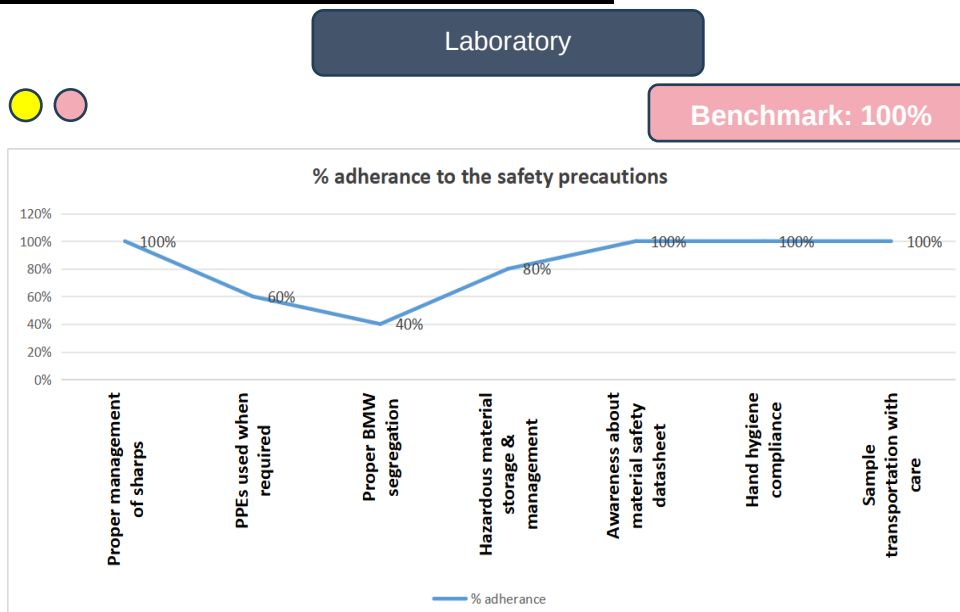
It is seen that all the infection control department indicators have been implemented and consistently been showing good performance throughout the months.

4. Diagnostics:

A. Number of reporting errors per thousand investigations:

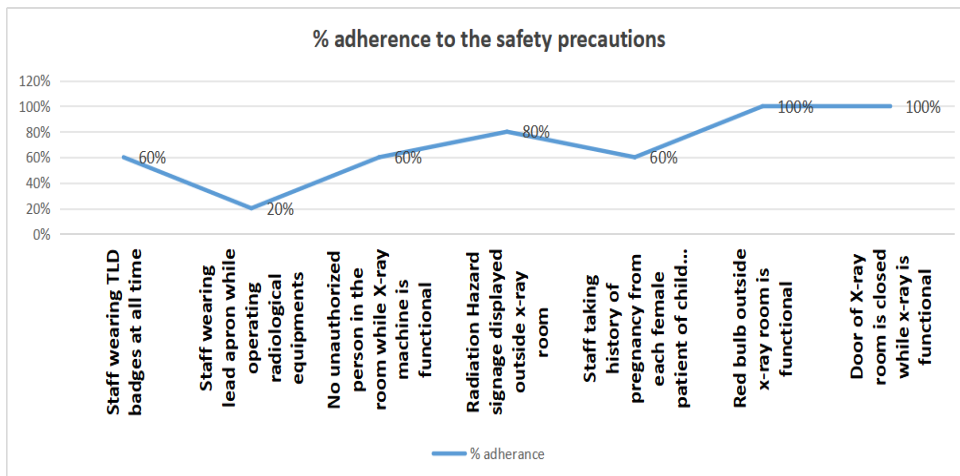


B. Percentage of adherence to safety precautions:





Radiology

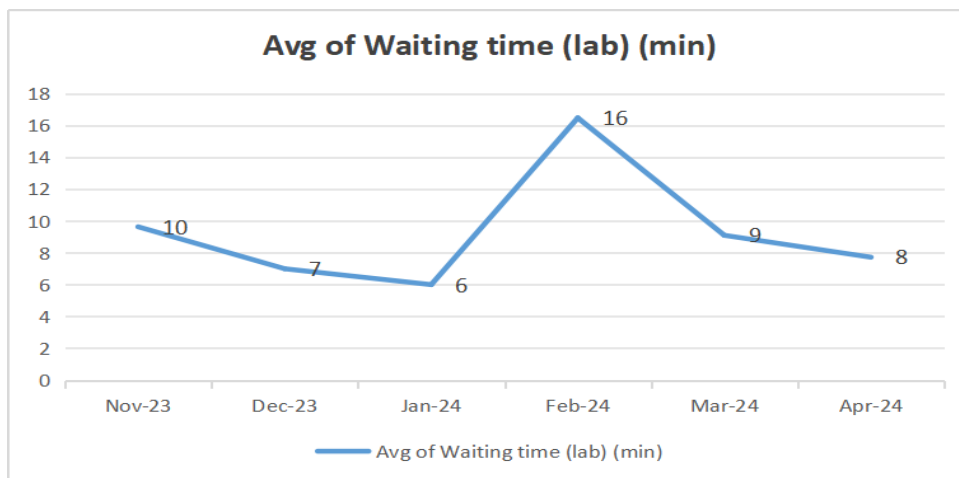


C. Waiting time for diagnostics :

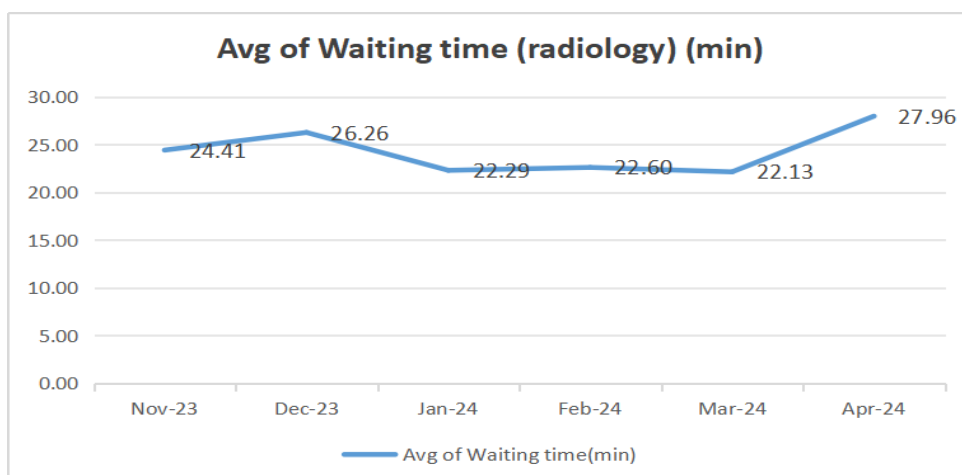
Laboratory



Benchmark : <30min



Radiology

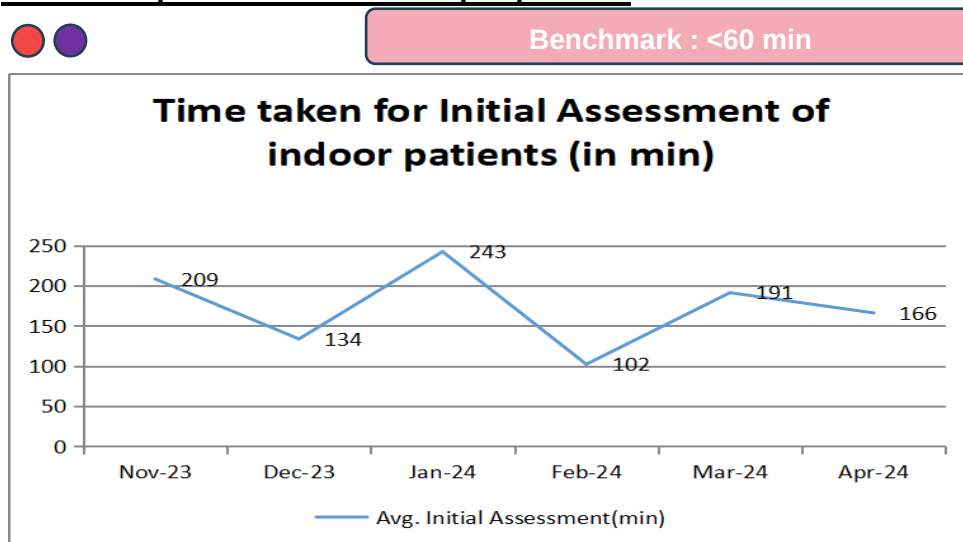


Though number of reporting errors per thousand has been working well, the adherence to safety precautions have been consistently crossing benchmarks in both the lab and radiology department.

Waiting time for diagnosis is not implemented but the analysis of the data shows good performance and low risk.

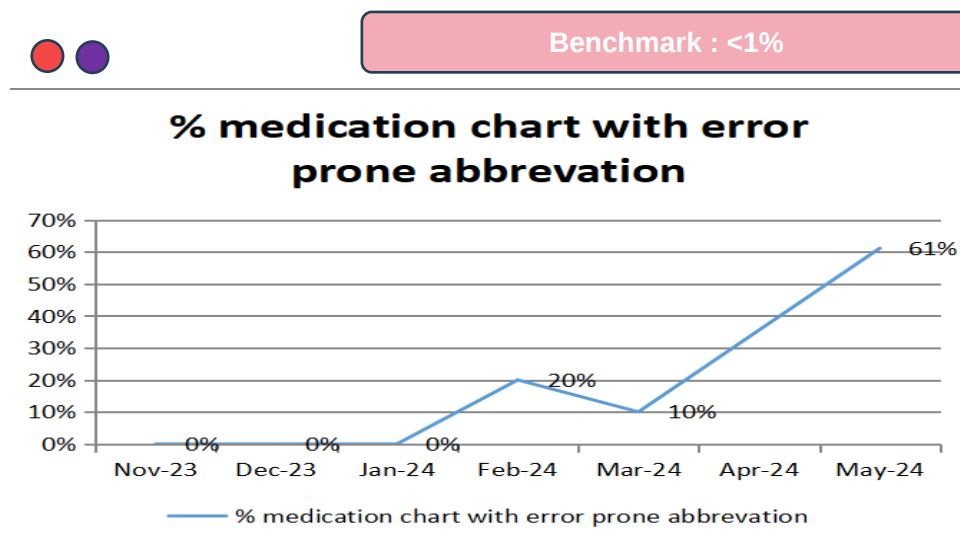
5. IPD (In-patient department)

A. Time taken for initial assessment of in-patients:



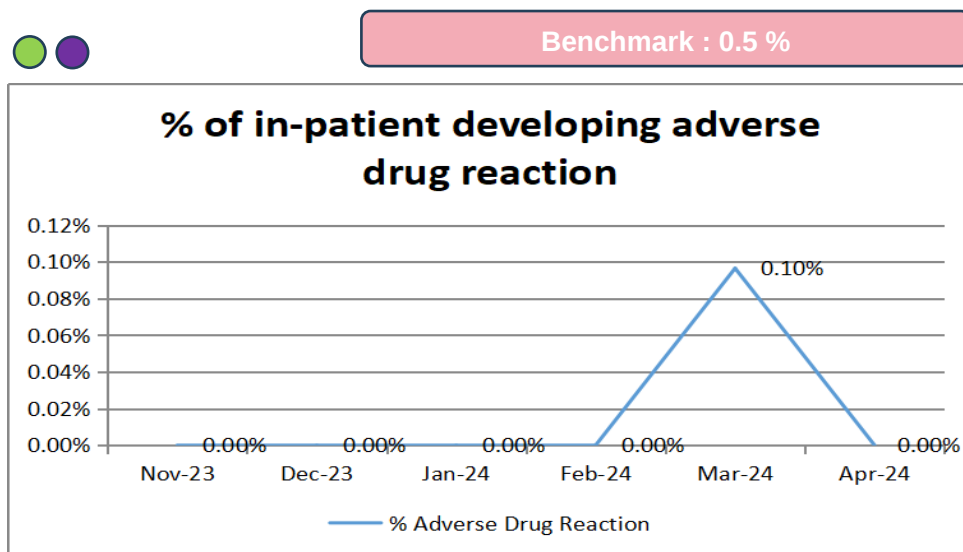
This indicator is consistently showing poor performance due to lack of streamlining of procedures and Lack of IT implementation.

B. Percentage of medication charts with error prone abbreviations :



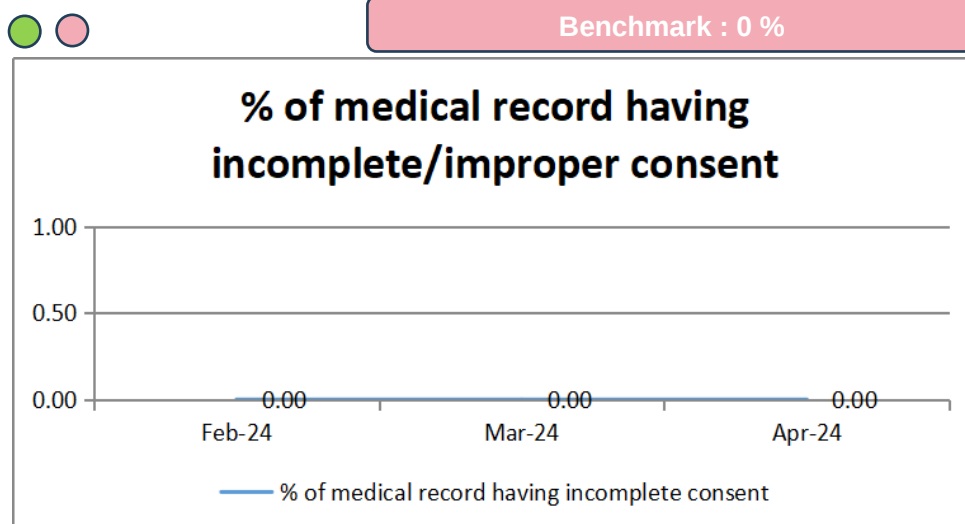
This indicator shows poor performance after data validation done through manual audits in the month of may.

C. Percentage of in-patients developing adverse drug reactions :

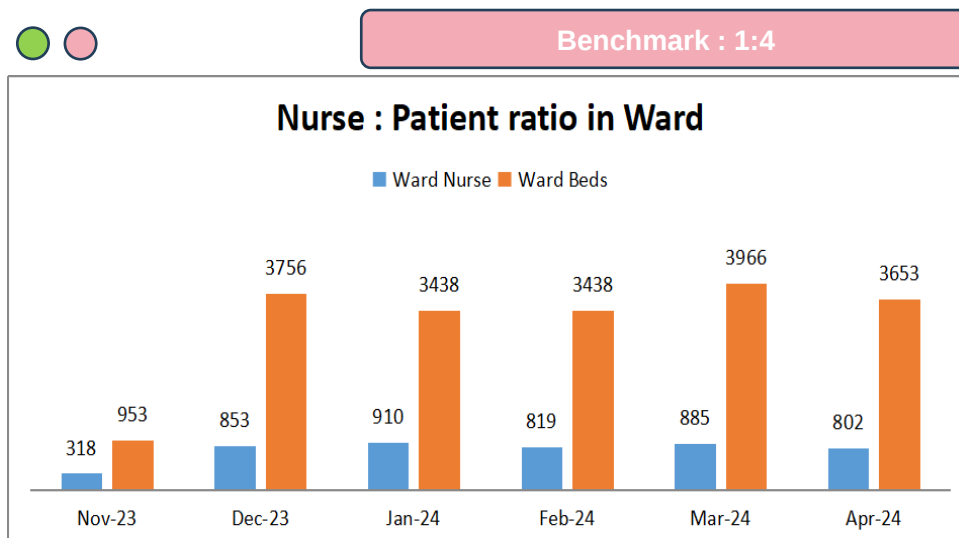


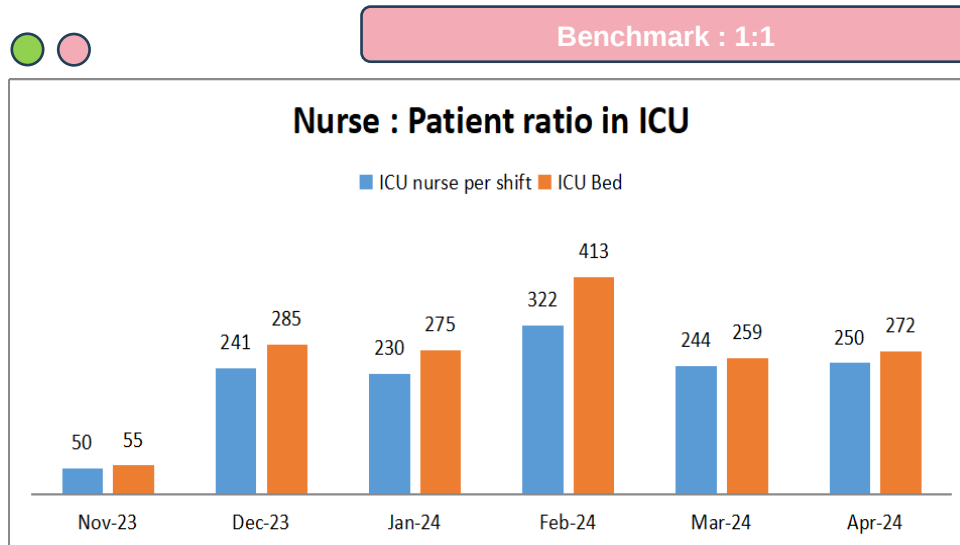
This indicator shows under-reporting after data validation was done.

D. Percentage of medications having incomplete or improper consent :



6. ICU, IPD :



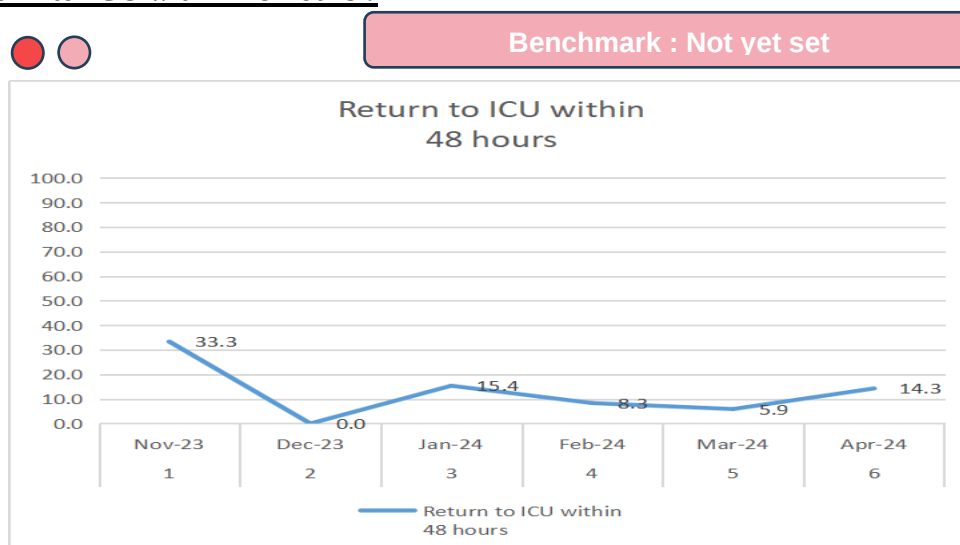


KPI ANALYSIS.xlsx

For a detailed ratio analysis visit the dashboard -

7. ICU (Intensive care Unit)

Return to ICU within 48 hours :

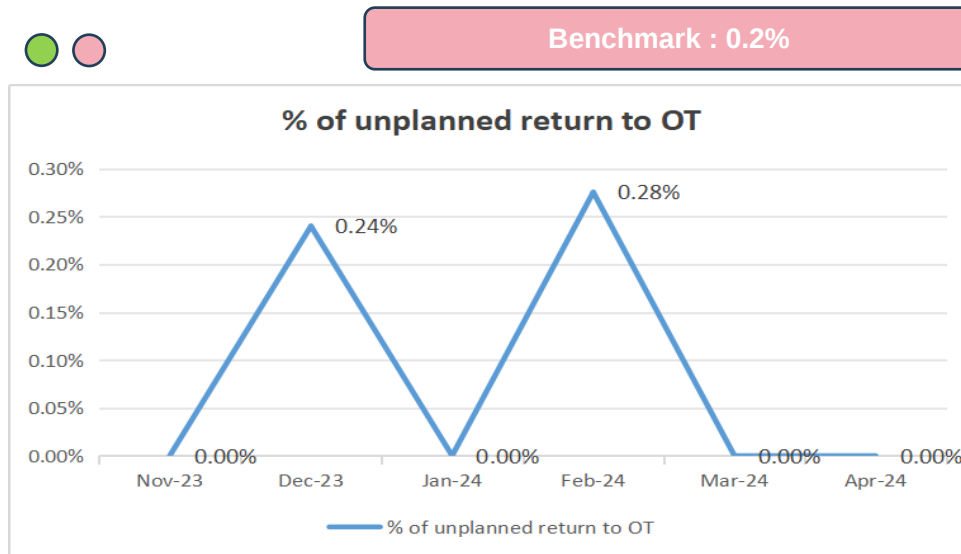


Due to consistent higher number of returns, return to ICU within 48 hours have been mandated by the organization this year, a benchmark needs to be set which would require data of more months.

Standard Mortality ratio for ICU have not been implemented yet since SOFI scoring is not implemented.

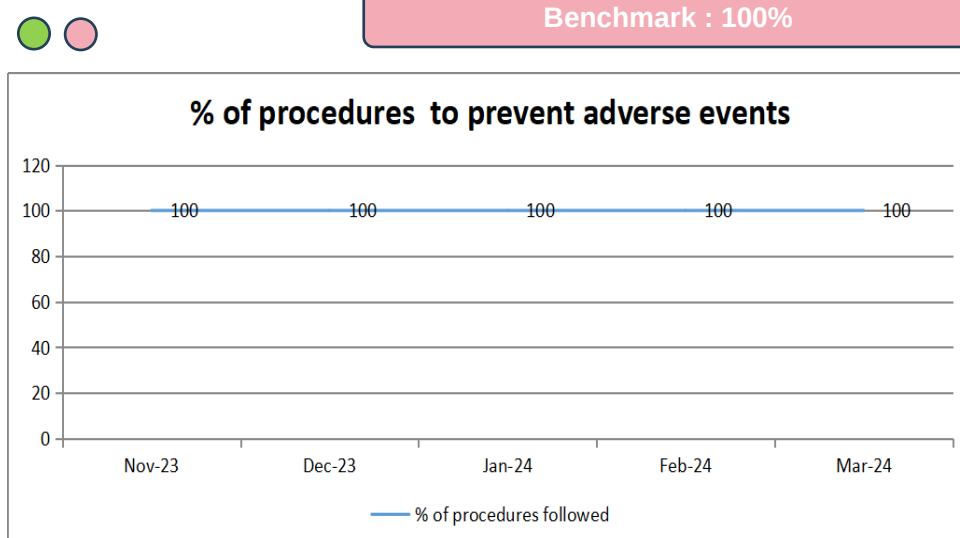
8. Operation Theatre (OT) :

A. Percentage of unplanned return to OT :



Though overall this indicator shows low risk but in two of the months it shows crossing of the benchmark so this indicator also needs to be in close attention to the administration.

B. Percentage of surgeries where the organization's procedure to prevent adverse events have been adhered to :



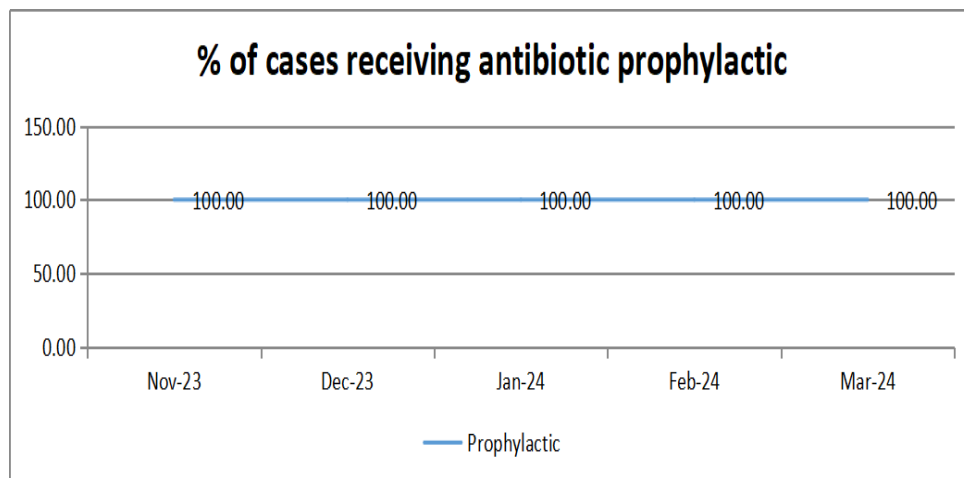
A standard procedure for reporting of adverse drug events have not been established yet, after various interviews with the stakeholders, this indicator turned out to be under reported.

It has been noticed that there is form which is supposed to be filled by the nurses in case of such kind of events, Training for which is recommended.

C. Percentage of cases who received appropriate prophylactic antibiotics within specified time frame :



Benchmark : 95%

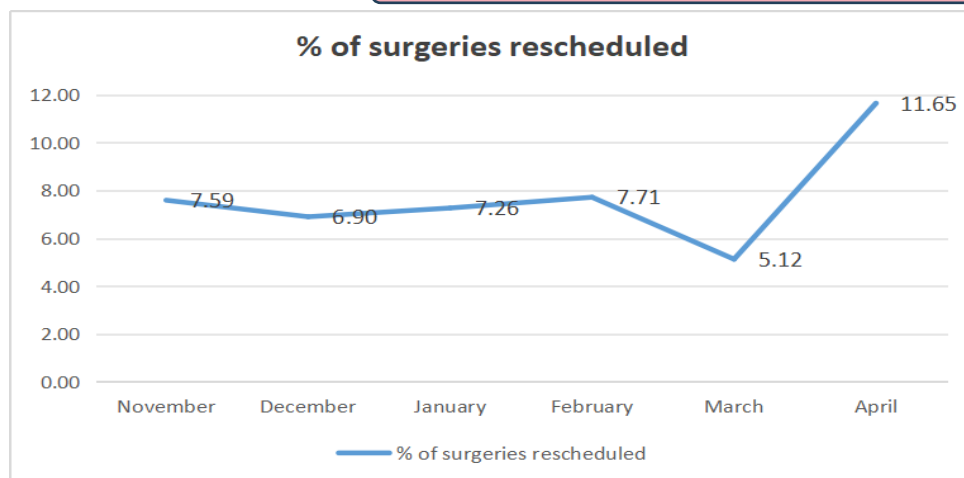


This indicator also after data validation have been turned out to be improperly reported by the clinicians.

D. Percentage of rescheduling of surgeries :



Benchmark : <3%

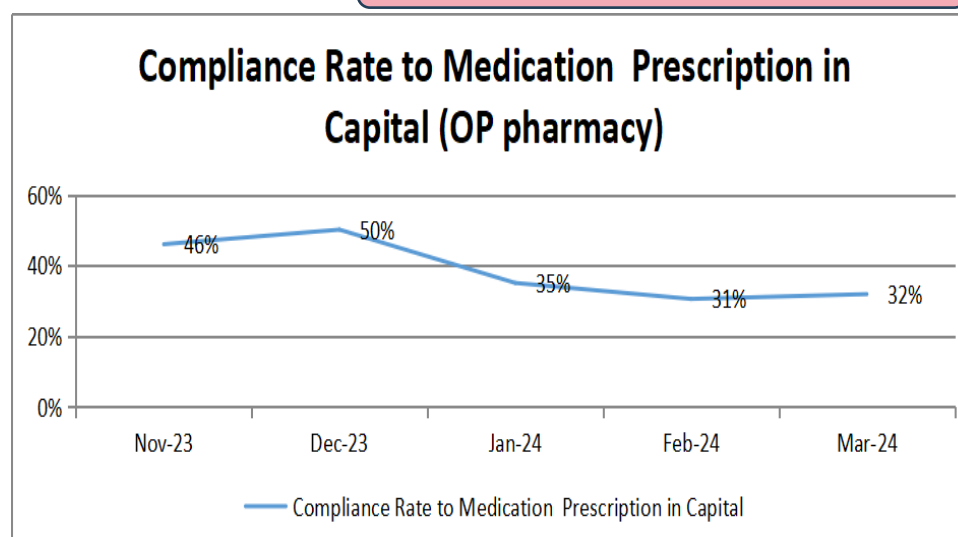


This indicator has been consistently crossing the benchmark and showing poor performance due unavailability of space.

9. Pharmacy :



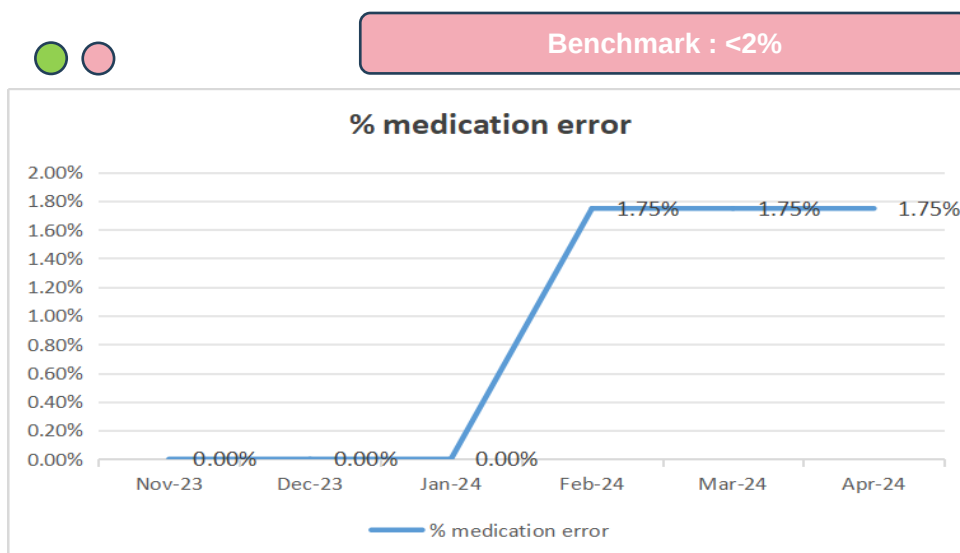
Benchmark : >90%



Stock out of emergency drugs has been implemented from may 2024 after being conveyed to the pharmacy HOD so analysis was not possible for this indicator, Compliance rate to medication prescription in capital has only been implemented for OP pharmacy and not for IP pharmacy because there is no clinical pharmacist in the unit for the reporting of this indicator.

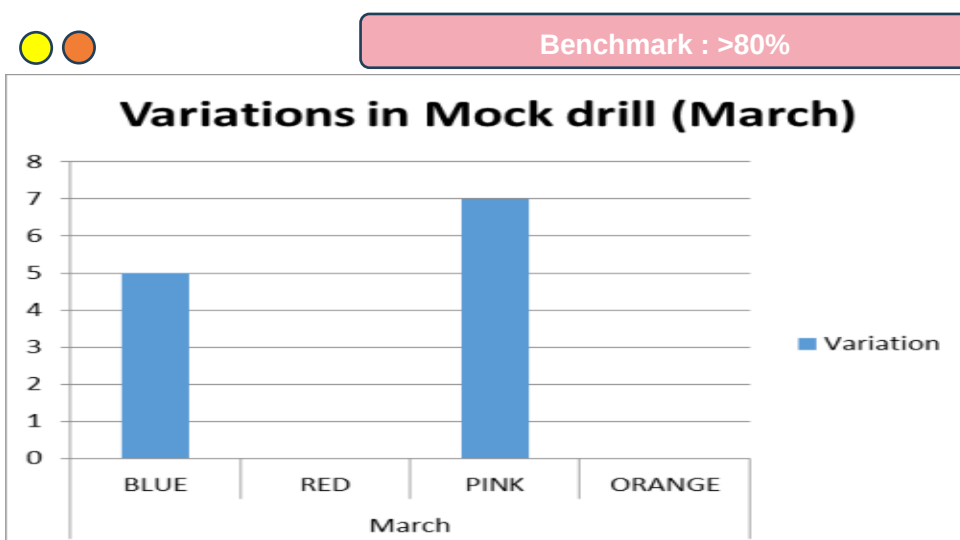
10. Others :

A. Medication error rate :



This indicator also has been noticed to be under-reported.

B. No. Of variations observed in mock drills :

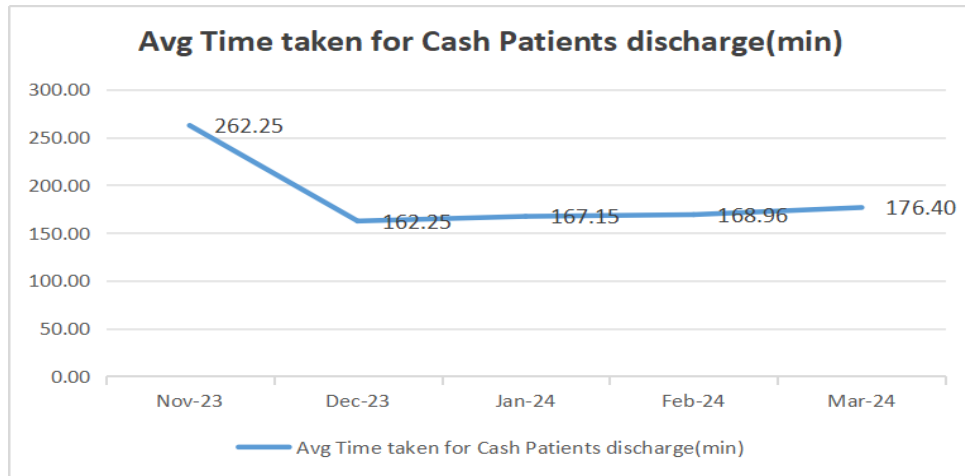


Benchmark being in percentage, the analysis couldn't be done because the reporting is not done in the way it should be, there is no checklist established for the audit for each mock drill yet. Also, after observing few mock drills, it has been established that the protocols are not being followed for closing a mock drill.

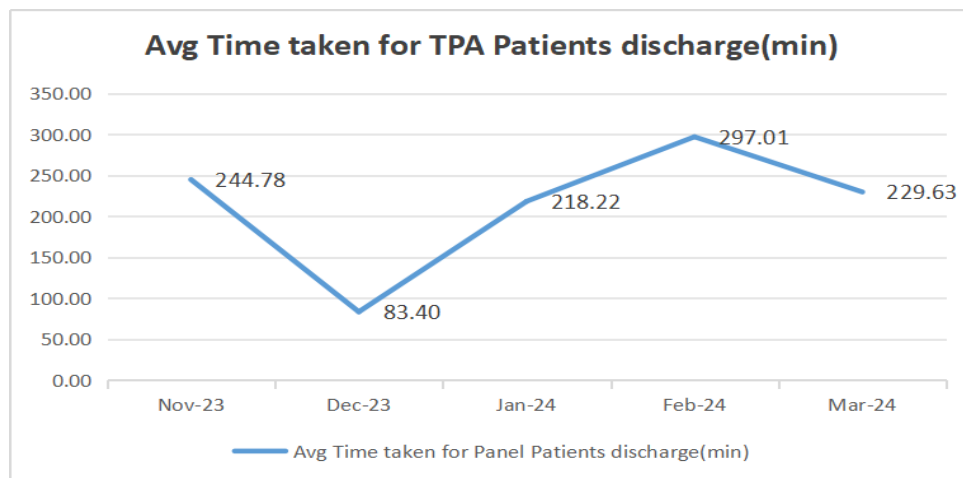
C. Time taken for discharge :



Benchmark : 90-120 min



Benchmark : 180-240 min

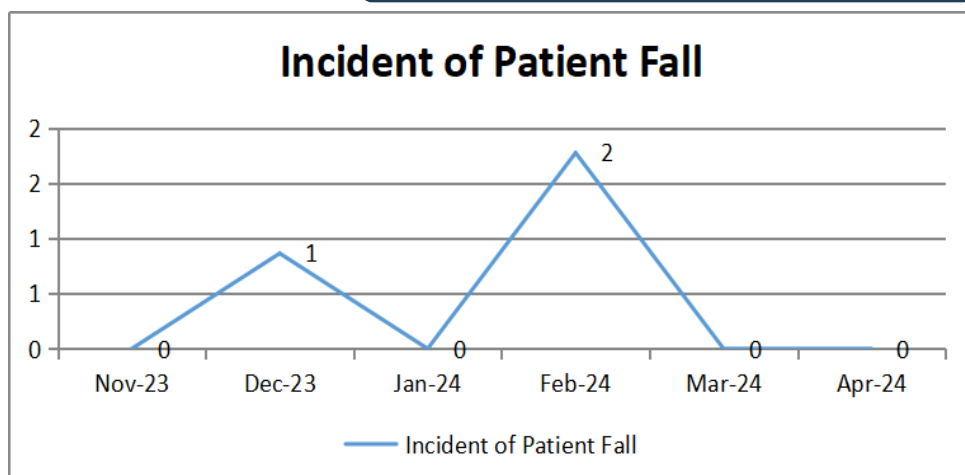


Though discharge time for TPA patients have been showing good performance, the TAT for cash patients have been consistently high due to lack of streamlining of procedures.

D. Patient Fall rate :

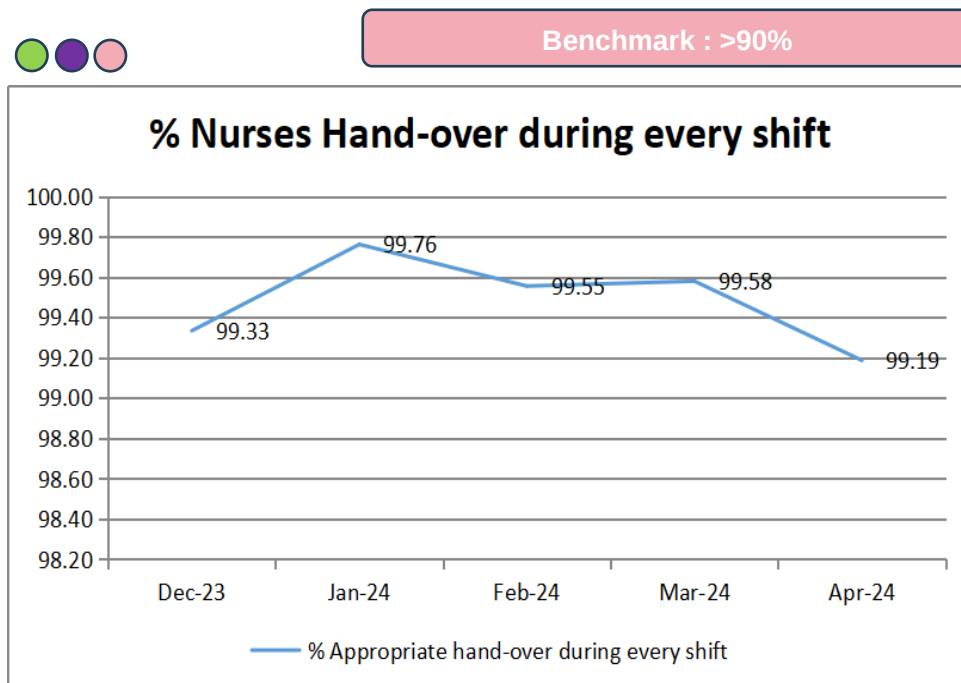


Benchmark : 2/1000



This indicator shows good performance throughout all the months the analysis was conducted.

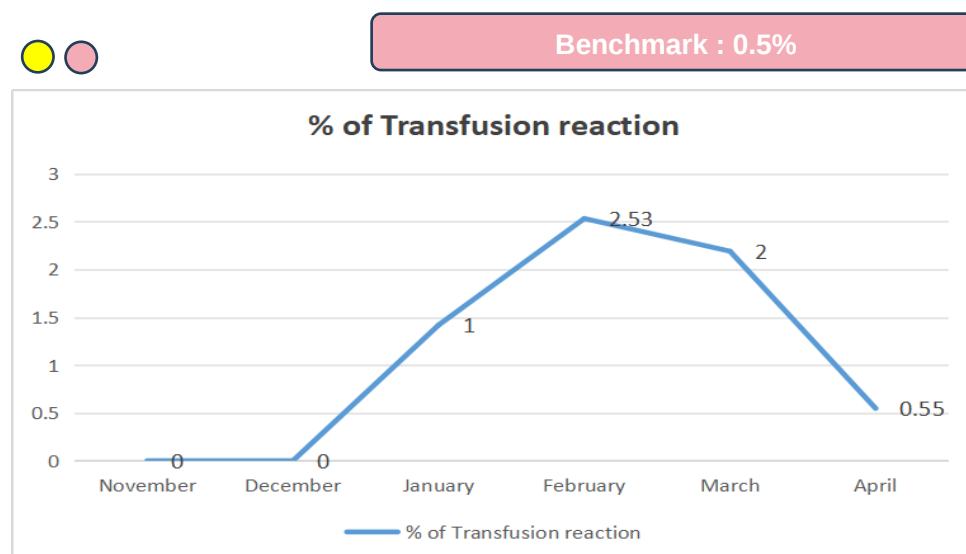
E. Appropriate handover during shift change (for doctors and nurses) :



There is no protocol for recording **near misses** in the hospital yet. Also, there is no protocol of handover by doctors in the hospital even in the major departments like OT & ICU.

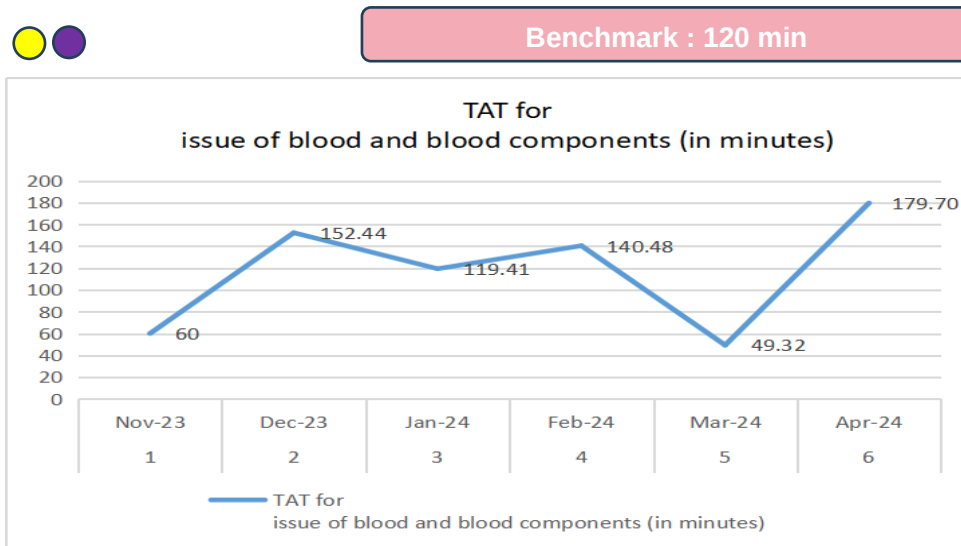
11. Blood & blood components:

A. Percentage of transfusion reaction :



This indicator has been crossing the benchmark every month due to staff negligence in maintaining temperature before blood transfusion. Transfusion reactions in ICU are more common compared to the other departments.

B. TAT for issue of blood and blood components:



Issue TAT for blood and components shows poor performance consistently, the department being outsourced.

CHAPTER 5 RECOMMENDATIONS

Time-frame for NABH accreditation to be finalized by Top management keeping following in mind-It is suggested to be completed by December 2024 as set by the organization, Milestone based action plan defining maximum time frame for implementation of each indicator is required. Minimum 2 audit cycles of 3 months each to be ensured before NABH is engaged. Responsibility allocation to be done for NABH implementation and monitoring.

Written & documented SOP to be established for each indicator. SOP for each indicator to include Designated personnel for monitoring and responsibility to be mapped, Timeline for annual/semi-annual revision of SOP to be included therein. Annual/ Semi-annual training of staff regarding NABH Awareness and implementation.

HIS improvement to be undertaken keeping following in mind- Immediate implementation required in 4 indicators, Issue in HIS reporting of indicator components to be reported by department owner, Responsibility mapping of IT personnel to be ensured along and Timeline for periodic assessment of HIS output for indicators to be established

Specific Recommendations -

Space enhancement in OPD, OT & Emergency department to be addressed by Top management, **Adequate staff** to be ensured in Emergency, OPD and Pharmacy, Staffing needs in action plan (mentioned in recommendation 1) to be considered and **Implementation of SOFI scoring** in ICU to calculate Standard Mortality Ratio.

CHAPTER 6 CONCLUSION

NABH Accreditation seems favourable because >50% indicators are already implemented. It is pertinent to note that out of the Implemented indicators, 70% are performing well and display low risk. Immediate action to be undertaken for implementation of 7 indicators. Attention is required over 6 indicators which have been improperly implemented and indicate high risk.

Limitations of the study and scope for future research :

- 1) Stock out rate of emergency drugs, standardized mortality ratio for the intensive care unit, appropriate handover of doctors, compliance of writing prescriptions in capital letters in the In patient department and near misses percentage could not be analyzed at all due to lack of SOPs and unavailability of data in the organization.
- 2) Sample size for time taken for first assessment of the admitted patients has been taken as 6 % due to time and data constraint.

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HR Rubin, P Pronovost, GB Diette. "From a process of care to a measure: the development and testing of a quality indicator," *International Journal for Quality in Health Care*. 2001; 13(6): pp.489-96.

Hamed R, Zahra K, Payam S, Erfan K (2017). "Key performance indicators in hospital based on balanced scorecard model," *Shiraz university of medical sciences : Health informatics and management journal*, Vol 4, Issue 1

Mohamed Khalifa & Parwaiz Khalid (2015). "Developing strategic healthcare KPIs for a tertiary hospital," *King Faisal Hospital & Research Center : Jeddah, Saudi Arabia*

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