FROM CONSULTATION TO DIAGNOSIS: A DATA-DRIVEN ANALYSIS OF LAB AND USG CONVERSION RATES AND TRENDS IN AN OPD SETTING AT COCOON HOSPITAL, JAIPUR

Dissertation Submitted to

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Master of Business Administration (MBA)

in

Healthcare Analytics

by

Adya Tiwari

Under the Supervision and Guidance of

Dr. Ritu Vashistha

2026

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CERTIFICATE

This is to certify that **Dr. Adya Tiwari** in partial fulfillment of the requirements for the award of the degree of MBA (Healthcare Analytics) from the IIHMR University, Jaipur has successfully completed her internship at **Cocoon Hospital, Jaipur** during **February 25-June 09, 2026.**

For Lineage Healthcare Ltd.
Authorised Signatory

Place: Jaipur
Date: 10.06.2026

Head of the Organization: Dr. Dilshad Khan
Name of the organization: Cocoon Hospital

IIHMR UNIVERSITY

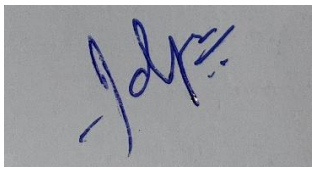
CERTIFICATE

This is to certify that dissertation titled "**From Consultation to Diagnosis: A Data Driven Analysis of Lab and USG Conversion Rates and Trends In OPD Setting at Cocoon Hospital, Jaipur"** is a record of the research work undertaken by **Dr. Adya Tiwari** in partial fulfillment of the requirements for the award of the degree of MBA Healthcare Analytics from the IIHMR University, Jaipur under my guidance and supervision and her approach to the research study has been sincere, scientific, and analytical.

Dr. Ritu Vashistha
Assistant Professor
IIHMR University, Jaipur
Date: 20/06/2026

DECLARATION BY STUDENT

I hereby declare that this dissertation titled **FROM CONSULTATION TO DIAGNOSIS: A DATA-DRIVEN ANALYSIS OF LAB AND USG CONVERSION RATES AND TRENDS IN AN OPD SETTING AT COCOON HOSPITAL, JAIPUR** is the Bonafide 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 Information derived from the published or unpublished work of others has been duly acknowledged in the text.



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This project focuses on the **conversion of OPD patients to USG and Laboratory investigations** within the OPD setup at Cocoon Hospital. The practical exposure gained through this study has significantly enhanced my understanding of healthcare analytics and hospital operations.

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Sincerely,
Dr. Adya Tiwari
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ABSTRACT

Title: From Consultation to Diagnosis: A Data-Driven Analysis of Lab and USG Conversion Rates and Trends in an OPD Setting at Cocoon Hospital, Jaipur

Author Name: Dr. Adya Tiwari

Advisor Name: Dr. Ritu Vashistha

Keywords: OPD Conversion, Diagnostic Leakage, Lab Conversion, USG Conversion, Patient Retention, Power BI

Background:
Continuity of care, operational effectiveness, and financial sustainability all depend on patients using in-house diagnostic services following OPD consultation. However, a significant percentage of patients fail to finish suggested laboratory tests or ultrasound scans while in the hospital, which leads to underutilisation of resources and diagnostic leakage. Finding operational gaps and enhancing patient retention require an understanding of these conversion trends.

Objective:
To measure and analyse OPD-to-Lab and OPD-to-USG conversion rates, identify diagnostic leakage, and provide data-driven recommendations to improve diagnostic service utilization at Cocoon Hospital, Jaipur.

Methodology:
The Retrospective observational descriptive analytical study was performed using secondary data from the Hospital Information System (HIS) of Cocoon Hospital, Jaipur. A total of 338 eligible OPD patients undergoing laboratory investigations and/or USG investigations were considered in the current study. The data analysis and visualization were done using MS Excel and Power BI, respectively. KPIs such as Lab Conversion Rate, USG Conversion Rate and Diagnostic Leakage Rate were calculated and analyzed.

Results/Findings:

This analysis showed that the Lab Conversion Rate was 81.3%, while the USG Conversion Rate was 87.9%. This means that there were higher compliance levels among the patients in regard to the use of USG services. The total Diagnostic Leakage Rate was 14.9%. This means that some percentage of the patients did not use the in-house diagnostic services after visiting the doctor.

Conclusions:

This research was able to identify the gap that exists between diagnostic recommendations and investigation completion, which provided an opportunity to improve the retention of patients and their continuity of care. Continuous monitoring of conversion and leakage rates using the data provided by health care analytics will assist in making decisions based on evidence, improve efficiency, increase retention, and better utilize in-house diagnostics facilities. The dashboard created using Power BI is a perfect tool for this purpose.

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CHAPTER 1
INTRODUCTION

1.1 Background and Rationale

The healthcare industry has seen a growing trend towards data-driven decision-making in recent years, with the aim of enhancing patient care, optimizing operations, enriching the patient experience, and boosting financial stability. Decision-making in healthcare organizations has evolved from just relying on clinical knowledge to incorporating healthcare analytics, allowing hospitals to leverage everyday operational data for actionable insights. With the increasing digitization of health records, Hospital Information Systems (HIS), and business intelligence solutions, there has been a rise in opportunities to assess healthcare processes and uncover ways for improvement. Diagnostic services are an important piece of the healthcare delivery system, contributing to clinical decision making. Laboratory investigations and ultrasonography (USG) are important pieces of information needed for detection, monitoring, treatment planning and follow up care for diseases. Diagnostic investigations are crucial to improving patient outcomes and the quality of care and are accurate and timely. As a result, the use of diagnostic services has emerged as a key measure of performance in healthcare.

Introduction

The Outpatient Department (OPD) is the interface point of patient and a health-care facility and is the first place of contact between the two. When the patient visits the OPD, the practitioner evaluates the patient's condition and may order lab tests or imaging studies, if necessary, to aid in the diagnosis and planning of the patient's care. Such investigations are valuable to making accurate clinical decisions. Not all patients who are recommended to undergo a diagnostic test undertake the test in the same hospital. This can create a lag in the diagnosis process, potentially causing delays between consultation and diagnosis.

This “leakage” is often referred to as diagnostic leakage or patient drop-off. When patients opt not to use the health facility where the consultation was given for the recommended investigations. These can negatively impact continuity of care, timely diagnosis and the hospital's ability to deliver on coordinated patient management.

Leakage of diagnostics also can lead to underuse of resources and lost revenue opportunities from a management perspective. Thus, knowing the patient journey from consultation to diagnostic services has become an area of interest for healthcare administrators.

A useful tool to measure the success of this process is conversion rates. In the healthcare industry, a conversion rate is the proportion of patients that successfully transfer to the next level of care. The OPD-to-Diagnostic Conversion Rate (OPCR) is the percentage of patients who finish the lab or imaging tests suggested in their visit to the OPD. The higher the conversion rate, the more likely that the patients are being retained, that the in-house diagnostic services are being utilized well, and that the patients are getting a good level of continuity of care. Lower conversion rates, on the other hand, suggest factors that may impede patients from undergoing recommended investigations.

Healthcare analytics is becoming more prevalent in the healthcare sector, and hospitals are more and more turning to data for performance monitoring and enhancing the delivery of services. Healthcare organisations can use analytical tools to analyse trends in their operations, understand the variation of use of services and analyse key performance indicators. With applications like Microsoft Excel and Power BI, it is possible to transform the everyday data from the hospital into valuable information that can be used for informed decision-making and quality improvement programs.

Cocoon Hospital, Jaipur is a speciality health care centre primarily dedicated to the treatment and care of women, gynaecology and obstetrics. Diagnostic investigations, especially laboratory tests and ultrasonography (USG), are a part of patient care in these environments. Consultation and diagnostic services are offered within the hospital making it an appropriate setting to evaluate the effectiveness of the transition from consultation to diagnostic completion.

Diagnostic facilities are provided in-house, but little information is available on how used these facilities are by patients after being referred by consultants. The identification of these trends can be useful not only for the betterment of clinical results but also for operational efficiency. Monitoring diagnostic conversion rates can help determine where patients are dropping off during the conversion process and help inform more efficient use of resources and service management.

In this backdrop, the present study, “From Consultation to Diagnosis: A Data-driven Approach to Lab and USG conversion rate and trend analysis for a patient in an OPD environment at Cocoon Hospital, Jaipur,” is conducted to understand the journey of the patient from consultation to diagnosis completion in the lab and USG department. This study emphasizes on conversion ratio of OPD to Laboratory, difference in performance of consultants in reduction of OPD to Laboratory, diagnostic leakage, and utilization trend. The results are anticipated to offer practical insights that could guide data-driven decision-making and enhance health service delivery in the hospital.

Rationale of the Study

Data is now becoming a key focus for healthcare organizations when it comes to assessing performance and enhancing patient care. Some indicators, like patient volume, revenues generated, and service utilization, are often tracked, but less often are measures taken after the diagnostic recommendation is made. The consultation to diagnosis process is important and vital in the care of patients but is not always systematically measured.

Several studies have focused on different facets of health services delivery, such as satisfaction of patients, availability of services, quality of services and diagnostic facilities. Yet, the research dedicated to assessing diagnostic conversion rates and patient leakage, based on routine hospital data, is rather rare. Furthermore, there is no evidence from private specialty hospitals in India especially those offering maternity and women's health care services.

The aim of this study was to fill that gap. The goal of the study is to gain insight into the usage pattern of the diagnostic service by the patients after an OPD consultation using healthcare analytics techniques in the operational data of Cocoon Hospital, Jaipur. Laboratory- and USG-conversion rates, consultant-wise performance, and monthly trends of utilization can be used for analyses to find out if improvements are needed.

The results of this study will be helpful for hospital management in patient retention, continuity of care, utilization of diagnostic services and overall efficiency. Moreover, the study illustrates how healthcare analytics can help to derive meaningful insights from the daily hospital data and thus assist in evidence-based management in healthcare institutions.

The study is not only relevant for practice but also builds on the existing healthcare analytics literature by showing how regularly collected hospital data can be converted to useful performance metrics to inform strategic decisions and quality improvement programs.

1.2 Research Questions

1. What are the OPD-to-Lab and OPD-to-USG conversion rates at Cocoon Hospital?
2. What is the extent of diagnostic leakage among patients advised laboratory and USG investigations?
3. What variations exist in diagnostic conversion rates across consultants and months?

1.3 Aim and Objectives

Aim

To analyse OPD-to-Laboratory and OPD-to-USG conversion rates and evaluate diagnostic utilization patterns at Cocoon Hospital, Jaipur.

Objectives

Primary Objective

To measure and analyse OPD-to-Laboratory and OPD-to-USG conversion rates among patients attending Cocoon Hospital, Jaipur during the study period.

Secondary Objectives

1. To assess the utilization of in-house Laboratory and USG services among OPD patients receiving diagnostic recommendations.
2. To identify and quantify diagnostic leakage between OPD consultation and completion of recommended diagnostic investigations.
3. To compare consultant-wise and month-wise variations in Laboratory and USG conversion rates.
4. To develop a dashboard-based performance monitoring framework using healthcare analytics tools for tracking diagnostic service utilization.

5. To provide data-driven recommendations for improving diagnostic conversion, patient retention, and utilization of in-house diagnostic services.

CHAPTER 2

LITERATURE REVIEW

S. No.	Author / Year	Title of the Study	Methodology / Study Design	Key Findings	Source / Link
1	Engel N. et al. (2017) Global Health Action, PMC	*How patients navigate the diagnostic ecosystem in a fragmented health system: a qualitative study from India*	Qualitative ethnographic study; in-depth interviews and observation of OPD patients navigating diagnostic services across multiple Indian settings	Cost, distance and turnaround time were key barriers to completing diagnostic journeys. When the care pathway became complex, patients opted out or switched to external providers - directly supports OPD-to-Lab and USG conversion drop-off studied at Cocoon Hospital.	https://pmc.ncbi.nlm.nih.gov/articles/PMC5645647/
2	Hollow ay B. et al. (2020) BMJ Open, PMC	*Utilisation of diagnostics in India: a rapid ethnographi c study exploring context and behaviour*	Rapid ethnographic study; patient tracking (n=129 OPD patients), qualitative observation and physician interviews at a teaching hospital in central India	46% of OPD patients prescribed diagnostics never returned after the recommendation. Physicians estimated ~50% completion rate. Cost and preference to treat without tests were key reasons - the single most directly comparable evidence for the conversion gap at Cocoon Hospital.	https://pmc.ncbi.nlm.nih.gov/articles/PMC7692986/
3	Jain R. & Rao B. (2019) Prim Health Care Res Dev, PMC	*Role of laboratory services in primary health centre (PHC) outpatient department performanc*	Case study analysis of PHC performance data; quantitative analysis of association between in-house lab	Strong positive association between in-house lab availability and OPD utilization. PHCs with in-house labs had significantly higher patient visits - directly supports the argument that in-	https://pmc.ncbi.nlm.nih.gov/articles/PMC6635801/

		e: an Indian case study	availability and OPD utilization across multiple facilities	house diagnostic service availability drives patient retention.	
4	Kaur R. et al. (2022) J Patient Exp, PMC	*Patient Satisfaction Among the OPD Attendees at a Secondary Care Hospital in Northern India*	Cross-sectional survey among OPD patients using structured questionnaire; multiple service dimensions assessed including diagnostic services	In-house diagnostic availability and waiting time at registration were the two lowest-scoring OPD parameters. Confirms that diagnostic efficiency and availability determine whether patients complete Lab and USG investigations in-house or seek external care.	https://pmc.ncbi.nlm.nih.gov/articles/PMC9380211/
5	Andersen R.M. (1995) J Health Soc Behav	*Revisiting the behavioural model and access to medical care: Does it matter?*	Theoretical/conceptual paper synthesising the revised Behavioural Model of Health Services Utilization	Healthcare use is shaped by predisposing, enabling, and need factors. Cost sensitivity, convenience of external labs, and prior habit are enabling-resource variables that explain why OPD patients may not complete in-house Lab and USG services after recommendation - core theoretical framework for this study.	https://www.jstor.org/stable/2137284?origin=crossref
6	Kumari R. et al. (2009) Indian J Community Med, PMC	*Study on patient satisfaction in the government allopathic health facilities of Lucknow district, India*	Cross-sectional exit interview study; n=561 OPD patients across tertiary care facilities in Lucknow, UP	Waiting time >30 minutes was a key dissatisfier for 62.5% of OPD patients. Dissatisfaction with diagnostic services was among the top reasons for care discontinuity - supports the link	https://pmc.ncbi.nlm.nih.gov/articles/PMC2763650/

				between operational delays and drop-off from in-house diagnostic pathways.	
7	Prasanna K.S. et al. (2009) Indian J Community Med, PMC	*Consumer satisfaction about hospital services: A study from the OPD of a private medical college hospital at Mangalore*	Cross-sectional descriptive study; structured questionnaire among 100 OPD attendees at a private medical college hospital	Cost and waiting time at diagnostic counters were major barriers to completing in-house investigations despite high satisfaction with clinical care - supports the operational bottleneck argument for low conversion rates at private OPDs.	https://pmc.ncbi.nlm.nih.gov/articles/PMC2781126/
8	Singh H. et al. (2020) J Family Med Prim Care, PMC	*Cross-sectional study of clients' satisfaction with outpatient and inpatient services of public health facilities of a North Indian state*	Cross-sectional study; 60-item validated questionnaire across all districts of Punjab (n=3278 OPD, 1614 IPD patients)	Dissatisfaction with laboratory and diagnostic services was among the top drivers of patients seeking external care. Long waiting time and inadequate attention during diagnostics were key dissatisfiers -directly supports patient leakage from in-house diagnostic services.	https://pmc.ncbi.nlm.nih.gov/articles/PMC7294374/
9	Nilakantam S.R. et al. (2021) Ann Afr Med, PMC	*Quality improvement project to assess patient satisfaction towards outpatient services of a tertiary care teaching hospital, South India*	Cross-sectional quality improvement study; structured questionnaire among 600 OPD patients at a private university hospital in Mysuru, India	Laboratory and diagnostic service experience was among the lowest-rated OPD parameters. Identified systemic need to improve diagnostic service delivery and patient communication to improve in-house utilization.	https://pmc.ncbi.nlm.nih.gov/articles/PMC8477280/
10	Ambade M. et al. (2022)	*Components of out-of-pocket expenditure*	Analysis of NSS 75th Round nationally	Diagnostic charges account for approximately 9.2% of total OPD out-of-	https://pmc.ncbi.nlm.nih.gov/articles/PMC9107026/

	JAMA Netw Open, PMC	*and their relative contribution to economic burden of diseases in India*	representative health expenditure data; descriptive and decomposition analysis across disease categories	pocket expenditure. Cost of diagnostics is a key driver of patients preferring cheaper external centres over in-house hospital Lab and USG services.	
11	Prinja S. et al. (2016) PLOS ONE, PMC	*Out-of-pocket spending on out-patient care in India: assessment and options based on results from a district level survey*	Cross-sectional survey using district-level household data from 12 Indian states; multivariable regression analysis	Drugs and diagnostics are the two largest components of OPD out-of-pocket spending. Private OPD visits entailed significantly higher diagnostic expenditure -directly explains cost-driven preference for external diagnostic centres over in-house hospital services.	https://pmc.ncbi.nlm.nih.gov/articles/PMC5115797/
12	Mahajan P. et al. (2025) Cureus, PMC	*Exploring patient satisfaction and determinants in outpatient services: a cross-sectional study*	Cross-sectional exit-interview study at OPD exit point; satisfaction determinants assessed across multiple service parameters including diagnostic services	Waiting time and diagnostic service availability were the strongest predictors of OPD dissatisfaction. Poor in-house diagnostic experience increased the likelihood of patients seeking external care on subsequent visits.	https://pmc.ncbi.nlm.nih.gov/articles/PMC11821282/
13	Makwana K. & Dave G. (2019) Journal of Management, SSRN	*A study of improving hospital OPD using queuing network analysis methodology*	Queuing network analysis of patient flow and waiting time data from a multi-specialty hospital OPD using simulation modelling	Significant patient accumulation at billing and diagnostic service counters was identified. Long waiting time at diagnostic desks was a primary driver of patient drop-off - supports the operational efficiency angle of	https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3525372

				improving in-house diagnostic conversion.	
14	Thakkar N. et al. (2023) PLOS ONE, PMC	*Factors associated with underutilization of antenatal care in India: Results from 2019–2021 National Family Health Survey*	Secondary analysis of NFHS-5 national survey data (2019–2021); binary logistic regression analysis across all Indian states	Cost of laboratory tests and ultrasound scans was a key barrier to completing recommended antenatal investigations. Women from poorer households had significantly higher odds of not completing USG and lab services -directly relevant to the maternity hospital OPD context of Cocoon Hospital.	https://pmc.ncbi.nlm.nih.gov/articles/PMC10166529/
15	Singh L. et al. (2022) Ann Glob Health, PMC	*Trends in quality of antenatal care in India: patterns of change across 36 states and union territories, 1999–2021*	Trend analysis of NFHS data across four time points (1999–2021); coverage and quality indicators analysed for 36 states and union territories	Non-compliance with laboratory tests and ultrasound scans was linked to user fees and absence of in-house diagnostic facilities. Charges for lab tests and USG were the most common financial barriers in antenatal care - directly relevant to the maternity OPD at Cocoon Hospital, Jaipur.	https://pmc.ncbi.nlm.nih.gov/articles/PMC11487464/
16	Srivastava A.K. et al. (2023) BMC Health Serv Res, PMC	*Utilisation of rural primary health centers for outpatient services — a study based on Rajasthan, India*	Cross-sectional study of OPD service utilization patterns across rural PHCs in Rajasthan; interviews and records analysis	Quality of care (59.4%) and availability of essential diagnostic services (41.8%) were primary reasons patients preferred private facilities over in-house OPD services in Rajasthan - directly explains patient diagnostic service behaviour in the Jaipur private	https://pmc.ncbi.nlm.nih.gov/articles/PMC10122341/

				maternity hospital context of this study.	
17	Pandey A.K. (2026) Curr Probl Diagn Radiol, PubMed	*Prevalence and impact of referral fees in diagnostic radiology in India: Insights from an online survey of practicing radiologists*	Online survey among 163 practicing radiologists across India on referral fee practices and their impact on quality and utilization	75.28% of radiologists believed referral fees reduced quality of radiology/USG services. Patients are directed to external diagnostic centres due to financial incentives rather than clinical need - directly supports patient leakage from in-house hospital radiology and USG services.	https://pubmed.ncbi.nlm.nih.gov/41558872/
18	Khan K. et al. (2014) J Clin Diagn Res, PMC	*Root cause analysis (RCA) of prolonged laboratory turnaround time in a tertiary care set up*	Observational RCA study on 100 OPD patients; time-interval analysis across stages of lab investigation from requisition to result collection	Maximum delay occurred between OPD prescription writing and the patient reaching the central laboratory. Poor navigation signage and absence of OPD-level sample collection counters were root causes of patient drop-off from in-house lab services -directly maps to the Lab conversion drop-off problem at Cocoon Hospital.	https://pmc.ncbi.nlm.nih.gov/articles/PMC4064846/
19	K G et al. (2026) Cureus, PMC	*Turnaround time of laboratory investigations and factors responsible for delays in a tertiary care teaching hospital in eastern India: a cross-*	Descriptive cross-sectional study; HIS-based timestamp analysis of 201,552 samples from OPD and IPD at AIIMS Patna (Jan–Mar 2022); patient and staff questionnaire	OPD patients frequently deferred sample collection to a subsequent day due to convenience - directly recording a real-world form of OPD-to-Lab drop-off. Pre-analytical delays were the major bottleneck. Improved HIS workflows and OPD sample collection counters were recommended to	https://pmc.ncbi.nlm.nih.gov/articles/PMC12863637/

		sectional study		improve in-house lab completion rates.	
20	Prasad C. et al. (2023) Cureus, PMC	*Monitoring and root cause analysis of clinical biochemistry turnaround time at a tertiary care institute*	Prospective observational study with monthly root cause analysis sessions; data from HIS and resident physician observations at a tertiary care institute	Pre-analytical delays were the dominant source of prolonged laboratory TAT. Delay in sample transportation from OPD to central lab was a key bottleneck contributing to patient dissatisfaction and drop-off from in-house lab services - directly supports the operational efficiency dimension of OPD-to-Lab conversion.	https://pmc.ncbi.nlm.nih.gov/articles/PMC10314370/
21	Jindal H.A. et al. (2020) J Family Med Prim Care, PMC	*Improvement of patient satisfaction by root cause analysis in healthcare services for urban slum community in North India*	Quasi-experimental study using root cause analysis and PDSA cycles; patient satisfaction surveys pre and post intervention at a community health facility, PGIMER Chandigarh	Diagnostic service waiting time was identified as the top driver of patient dissatisfaction and non-return for follow-up investigations. Simple interventions - signage, dedicated diagnostic counters - significantly improved in-house service utilization and patient retention.	https://pmc.ncbi.nlm.nih.gov/articles/PMC7346918/
22	Nair H. et al. (2019) Semin Perinatol, PMC	*Including ultrasound scans in antenatal care in low-resource settings*	Narrative review of evidence on routine USG utilization during antenatal care in low-income settings; synthesis of global and Indian evidence	Routine ultrasound was recommended in ANC guidelines, but utilization remained inconsistent. Cost, distance to USG facility, and equipment unavailability were key barriers to completion - directly supports understanding of USG conversion challenges in a maternity OPD	https://pmc.ncbi.nlm.nih.gov/articles/PMC6597951/

				setting like Cocoon Hospital.	
23	Mehta V. et al. (2019) J Family Med Prim Care, PMC	*Assessment of patient's satisfaction visiting a tertiary health care institute in north India*	Cross-sectional study; structured questionnaire among OPD and IPD patients across departments in Haryana (Jan–March 2019)	Average waiting time to see the doctor was 45 minutes. Only 26% of OPD patients were fully satisfied. Diagnostic service response time and availability were among the key dissatisfaction drivers - supports the operational efficiency and patient retention argument of this study.	https://pmc.ncbi.nlm.nih.gov/articles/PMC7574752/

2.2 Summary of Literature Review

The literature reviewed for this study has shown that diagnostic services are an integral part of the healthcare delivery process in that they facilitate the correct diagnosis, the planning of the treatment, monitoring of the patient and continuity of the care. The benefits of optimal use of laboratory and ultrasonography services have been consistently highlighted in previous studies in the area of patient outcomes and quality of healthcare. Research has also shown how cost, waiting time, access, availability of services, and efficiency of service use affect patient use of recommended diagnostic services.

There are several published studies that a significant proportion of patients fail to follow up with recommended diagnostic investigations after an outpatient consultation. Some of these gaps in transition may lead to diagnostic leakage, loss of continuity of care, and the non-use of health care resources. The Indian and international scenario has indicated that adequate and prompt in-house diagnostic facilities help in retaining the patients and prompt them to complete the investigations recommended.

The reviewed studies also suggest that factors such as cost, service convenience, delays in providing services and patient preferences can influence the use of laboratory and ultrasonography services. Antenatal and maternal health services have been a particular focus where research has highlighted the need to complete diagnostic investigations in

time, since this is critical to the appropriate clinical management and monitoring of these women.

The literature as a whole indicates that a crucial time taking-up a patient's care pathway occurs between the initial OPD consultation and the time of diagnostic completion. Previous studies have investigated diagnostic service use, and factors associated with diagnostic service access, but little research has measured diagnostic conversion rates and diagnostic leakage based on hospital operational data in private maternity and women's health care. This emphasizes the importance of the present study where an attempt to evaluate OPD-to-Laboratory and OPD-to-USG conversion rate, diagnostic leakage, variations according to consultants and month-wise utilization trend at the Cocoon hospital, Jaipur is done. The results should help to better understand the utilization of diagnostic services and strategies for better in-house diagnostic conversion and patient retention.

2.3 Research Gap

The existing literature emphasizes the role of diagnostic services in facilitating effective clinical decisions, continuity of care and overall patient outcomes. A few studies have looked at the use of health services, satisfaction, access to diagnostic services, laboratory functioning, waiting time, and factors affecting the use of health services. Other studies have found that cost and convenience, service availability and operational efficiency may also affect the use of recommended diagnostic investigations.

While there is a significant amount of literature on the utilization of health care services and diagnostic services, there is relatively limited research that has specifically addressed what occurs after a diagnostic recommendation has been made during an outpatient consultation. Previous studies have concentrated on patient satisfaction, ease of accessing healthcare, satisfaction with the quality of healthcare services received, or on overall healthcare utilisation, with few studies measuring the percentage of patients who have had the recommended investigations of laboratory and ultrasonography performed in the same health service facility.

Limited information is also available on the conversion rate of diagnostic tests and diagnostic testing leakage from in-house diagnostic facilities from private specialty hospitals, especially those providing services to women and maternity patients. This step in the patient care pathway from consultation to the completion of the diagnostic

process is of major importance but has been relatively under-researched in the existing literature.

With these lacunas, it is important to gain more insights into the process of patient transition from consultation in the OPD to completion of recommended diagnostic investigations and the utilisation of diagnostic services within the hospital. Hence, the present study is aimed at the analysis of conversion rate of OPD to Laboratory, diagnostic leakage, variation in the utilization trend of the consultants and month-wise utilization trend at Cocoon Hospital, Jaipur. The results are likely to give realistic inputs for effective patient retention, enhancement of the utilization of diagnostic services and minimisation of leakage from in-house diagnostic services.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Study Design and Setting

The present study was a **retrospective observational descriptive analytical study** conducted at Cocoon Hospital, Jaipur, Rajasthan. The study aimed to evaluate OPD-to-Laboratory and OPD-to-Ultrasonography (USG) conversion rates, assess diagnostic service utilization patterns, and identify diagnostic leakage among patients attending the Outpatient Department (OPD).

The study design was a retrospective study, as the analysis was based on the patients' information stored in the hospitals' Hospital Information System (HIS), consultant recommendation records, laboratory records, and ultrasound records already stored in the hospital. Data analysis was conducted after completion of patient consultation and diagnostic procedure and thus this study was retrospective in nature. This approach allowed the utilisation of hospital data generated on a regular basis to assess utilization of diagnostics without impacting the care procedures.

The study was observational in that the researcher did not make any changes or interventions. Hospital processes, diagnostic workflows, consultants' recommendations and current practices remained unchanged throughout the study period. The researcher observed and studied only the natural patterns of diagnostic referrals and investigation completion of patients who visited the OPD.

A descriptive approach was used to summarize and present the important operational indicators on the utilization of diagnostic services. Frequencies, percentages and graphical representation was used for the analysis of variables like OPD consultations, lab recommendations, recommendations of USG, completed investigations, conversion rates, diagnostic leakage, and consultant-wise utilization patterns. This provided for an overall picture of the use of diagnostic services in the hospital.

As part of the study, an analytical component was conducted looking at the difference in diagnostic conversion rates and patient leakage over consultant and month. Trends, patient drop-off locations, and chances to enhance patient retention and in-house diagnostic service utilisation were found by comparative analysis of diagnostic

utilisation patterns. Thus, the study went beyond description and resulted in analytical evaluation of the indicators of operational performance.

The study was conducted in the private speciality hospital "Cocoon Hospital" located at Jaipur, providing obstetric/gynaecological/maternity healthcare and women's healthcare services. The hospital offers laboratory tests, ultrasound, in-patient care, out-patient consultation as well as other diagnostic services. These diagnostic services are crucial for clinical decision-making, patient monitoring, disease identification, treatment planning, and continuity of care.

Outpatient Department (OPD) is the direct interface of the patient with the health care system. In OPD consultations, the consultants evaluate the clinical condition of the patient and may order laboratory tests, ultrasonography tests and/or both, as per the diagnostic needs. These investigations help the correct diagnosis and proper treatment plan.

Although the hospital provides its own diagnostic centers, not all the patients complete the proposed tests. Some patients may elect to utilize outside diagnostic facilities for various reasons, such as convenience, access, wait times, cost and/or patient preference. This issue, also known as patient drop-off or diagnostic leakage, can have an impact on continuity of care and service utilisation. Operational and administrative sense, it is important to understand the extent of diagnostic leakage.

The study aimed to identify the percentage of patients undergoing laboratory and ultrasonographic investigations as recommended in the OPD that completed the same investigations within the hospital. The number of completed investigations was used to determine conversion rates by dividing the number of completed investigations by the number of investigations recommended. The leakage and drop-off patterns were also analyzed for diagnostic services to determine areas for optimizing patient retention and diagnostic service utilization.

Patient records from March 2026 to April 2026 were used in the study. Data with respect to OPD consultation, diagnostic suggestions, and the status of investigation were extracted, cleaned and analysed. The results of the study are expected to help in improving the use of healthcare analytics in health system decision making and

strategies to boost utilization of the internal diagnostic services at Cocoon Hospital, reduce patient attrition and boost diagnostic conversion rates.

3.2 Study Population and Sampling

The study population comprised of all patients who visited outpatient department (OPD) of Cocoon Hospital, Jaipur during the study period and who were advised one or more diagnostic tests by the doctor consulted. One of the diagnostic investigations considered for this study is the laboratory test and hospital-based ultrasonography (USG).

The primary aims of the study were to identify the utilization of internal diagnostic services by users of OPD and the conversion of recommendations for investigations into completed investigations. As such, the research was limited to those patients who were recommended for laboratory tests and/or ultrasonography services.

The target population included patients visiting Cocoon Hospital for maternity and women's healthcare services. The population in this study was patients who visited Cocoon Hospital for maternity and women's health services. It was believed that analysis of utilisation patterns in these patients was the key to assessing the effectiveness of the diagnostic services and retention of patients within the hospital, because diagnostic investigations play a vital role in clinical decision making and treatment planning.

Inclusion Criteria

The study comprised the following patient records:

• Every OPD patient who was recommended for laboratory tests and/or ultrasound services in March and April of 2026.

• Patients whose completion data and recommendations for investigations were accessible through the Hospital Information System (HIS).

• Patients with comprehensive demographic and diagnostic utilization information necessary for analysis.

Exclusion Criteria

The study did not include the following records:

• Patients who were directed to outside diagnostic facilities because the hospital was unable to provide certain tests.

• Documents that contain missing, contradictory, or inadequate information about the status of an inquiry or diagnostic suggestions.
• During the data cleaning procedure, duplicate records were found.

Sample Size

All valid patient files available within the study period were included. The number of OPD patients involved in the study for the months of March and April 2026 was 338. Out of the 338 patients, 193 had laboratory suggestions while 256 had USG suggestions. Invalidation of the data and applying the inclusion and exclusion criteria resulted in the inclusion of all 338 eligible patient files in the analysis.

The conversion rates for OPD to Laboratory and OPD to USG were evaluated from this data set as the sample used for the study. The sample size used was adequate as it included all eligible patients with diagnostic suggestions in the study period.

Sampling Technique

A full **enumeration sampling** strategy was used in the investigation. This method included in the analysis all eligible patient records that met the inclusion criteria during the study period.
Considering that the total number of eligible records was relatively small and easily available via Hospital Information System, no additional sampling procedure had to be performed. The probability of any patient receiving diagnostic advice during research being included in the analysis was equal due to enumeration of all members of the target population.

To ensure the reliability of the results of the study, it was possible to conduct enumeration since there were not selected groups but the entire population of interest under consideration. Also, with the help of this sampling technique it was feasible to compute conversion rates, diagnostic service usage patterns, and patient leakage indices.

Given the fact that the main objective of the research was to assess the performance of a hospital, rather than make conclusions regarding the population based on a sample of observations, the applied sampling technique can be considered appropriate.

3.3 Data Collection Procedure

The secondary data collected through the internship at Cocoon Hospital in Jaipur formed the basis for this study. Data collection took place in a systematic way over a period of two months from March to April 2026. The collection of accurate and reliable data regarding OPD consultations, referrals for diagnostics, and completion of internal laboratory and ultrasound investigations was the objective of data collection.

Hospital Information System (HIS) of Cocoon Hospital was the major source of data collection. Patient registration, OPD consultations, physician referrals, and utilization of diagnostic facilities are detailed by Hospital Information System. In order to ensure the accuracy and reliability of the data collected, data from consultant prescriptions, investigation referrals, laboratory records, and ultrasonography records was also analyzed apart from the Hospital Information System.

Authorization of the concerned hospital authorities was obtained before data collection for its utilization for academic purposes. Only the data related to the study objectives was collected and analyzed. During the whole process of data collection, the confidentiality of patients' data was maintained and their identity did not come into picture at any stage.
Patients who visited the Outpatient Department (OPD) throughout the study period and were recommended laboratory tests and/or ultrasonography services by the consulting physician were identified as part of the data collection process. Information on each qualified patient's demographics, the consultant they were assigned, the diagnostic advice they received, and the status of their investigations were all documented.

The following variables were extracted from the hospital records:

• Patient UHID

• Age of the patient

• Date of OPD visit

• Consultant Doctor

• Laboratory investigation recommendation status

• Laboratory investigation completion status

• Imaging/USG recommendation status

• Imaging/USG completion status

All the data was merged into Microsoft Excel for further processing and analysis after being extracted from its respective source. There was a structured process of data cleaning employed on the gathered data in order to ensure consistency and improve data quality. The process of data cleaning involved removal of duplicate data, correction of any data formatting errors, validation of categorical variables, and deletion of incomplete cases that did not meet the inclusion criteria.

Consistency of the data in categorical variables like the status of diagnosis recommendations and investigation was given priority. In order to facilitate accurate analysis, variations in the data input in terms of formatting and capitalisation were corrected. Incomplete data and missing values were checked and deleted where necessary.

Other variables were then defined after data cleaning to ease the analysis process. The other variables include categorising the OPD attendance according to age category and month. In order to perform demographic analysis and compare the utilisation pattern of the services among different age groups, the patients were classified according to age categories predefined. For the purpose of analysing trends in the study period, attendance dates were also divided into monthly categories.

Microsoft Excel was used to carry out the descriptive analysis on the cleaned dataset. Pivot tables were created in order to determine the demographic information, diagnostic suggestions and diagnostic completions. The frequency and percentages of distribution of the patients according to age category, consultant and month were calculated. Conversion rate and utilisation trend were separately evaluated for laboratory and ultrasonography services.
Patients who finished recommended investigations within the hospital were compared to the total number of patients who were advised to do so in order to evaluate diagnostic conversion. For laboratory tests and ultrasound services, conversion rates were determined independently. Additionally, patients who did not finish suggested investigations within the hospital were identified to calculate patient leakage and drop-off rates.

Another tool that was used for the visualisation of data and generation of dashboards is Microsoft Power BI. Dashboard was generated through importing the cleaned data set in Microsoft Power BI. There are KPIs included in the dashboard for visualization which include OPD volume, lab conversion rate, USG conversion rate, diagnostic completion rate, and patient leakage rate.

Charts, graphs and visual summaries generated using Microsoft Power BI have simplified the understanding of trends in diagnostic utilization and consultant performance metrics. In addition to this, it provided a summary of diagnostics usage over the study period and comparison of monthly conversion rates.

After cleaning and validation process, there were 338 patient records included in the data set. Analysis conducted in the study was done on the basis of these patient records. Tables, graphs and some conclusions discussed in chapter four of the dissertation were generated from the collected data.

3.4 Operational Definitions

To guarantee clarity, uniformity, and consistent interpretation throughout the research process, a few essential terminology and ideas were operationally defined for this study. These definitions were created considering the study's goals and the characteristics of the variables taken from hospital records.

Outpatient Department (OPD) Patient

A patient who attended Cocoon Hospital in Jaipur for medical evaluation and consultation but was not admitted is referred to as an OPD patient. As the initial point of contact between patients and medical professionals, the OPD serves as the foundation for the diagnostic suggestions that are assessed in this study.

In-house Diagnostic Services

Diagnostic services provided within Cocoon Hospital, including laboratory investigations and ultrasonography services. In the present study, utilization of in-house diagnostic services refers to the completion of recommended investigations within the hospital rather than through an external diagnostic provider.

OPD Consultation

A clinical meeting between a patient and a consulting physician that includes a review of the patient's medical history, a clinical examination, and decisions about investigations, diagnosis, and therapy is referred to as an OPD consultation. Depending on the patient's clinical condition, recommendations for laboratory tests, ultrasound services, or other diagnostic procedures may be made after each session.

Laboratory Investigation Recommendation

Any laboratory test that the consulting physician recommends during an OPD appointment is referred to as a laboratory investigation referral. Regular blood tests, biochemical analyses, hormone evaluations, urine testing, and other diagnostic laboratory procedures necessary for clinical decision-making may be among these investigations.

For the purposes of this study, a patient was categorised as "Lab Recommended" if the consultant recommended at least one laboratory test and the results were recorded in the hospital's records.

Laboratory Investigation Completion

The effective use of the hospital's internal laboratory services by a patient who had previously recommended one or more laboratory investigations is referred to as laboratory investigation completion. When the suggested test was carried out and documented in the hospital system, the patient was deemed to have finished the laboratory investigation.

For the purposes of conversion analysis, patients who were recommended laboratory investigations but did not undertake testing within the hospital were categorised as non-completed cases.

Ultrasonography (USG) Recommendation

Any imaging test that the consulting physician recommends during an OPD appointment is referred to as an ultrasound referral. In the current study, ultrasonography mainly referred to obstetric and gynaecological imaging techniques that are often used in maternity and women's healthcare services.

When a consulting physician recorded a recommendation for ultrasonography in the hospital records, the patient was classified as “USG Recommended."

Ultrasonography (USG) Completion

The successful completion of a suggested USG examination at the hospital's internal imaging unit is referred to as ultrasonography completion. When the suggested imaging technique was carried out and documented in the hospital's diagnostic records, the patient was deemed to have finished the investigation.
For conversion analysis, patients who were recommended but did not use the hospital's USG services were regarded as non-completed cases.

Lab Conversion

The term "lab conversion" describes a patient who underwent one or more laboratory tests at the hospital's in-house laboratory facility after the consulting physician advised them. It shows that laboratory services were successfully used after a diagnostic suggestion.

USG Conversion

The term "USG conversion" describes a patient who, after the consulting physician recommended an ultrasonography (USG) examination, finished the inquiry at the hospital's internal radiology or USG unit. It shows that the patient used the suggested imaging service at the same medical facility.

Diagnostic Conversion Rate

The percentage of patients who finished a suggested diagnostic inquiry within the hospital out of all patients who got that recommendation is known as the diagnostic conversion rate.
Because it shows how well patients are retained within the diagnostic process, the conversion rate was chosen as the study's main performance metric.
The following formula was used to determine the conversion rate:

$$\text{Conversion Rate } (\%) = \frac{\text{Number of Completed Investigations}}{\text{Number of Recommended Investigations}} \times 100$$

For laboratory tests and ultrasound services, different conversion rates were computed.

OPD-to-Laboratory Conversion Rate

The percentage of OPD patients who finished suggested laboratory tests within the hospital following a laboratory suggestion from the consulting physician is known as the OPD-to-Laboratory conversion rate.
The effectiveness of patient retention within the diagnostic pathway and the use of internal laboratory services were evaluated using this indicator.

OPD-to-USG Conversion Rate

The percentage of OPD patients that underwent recommended ultrasonography investigations within the hospital following a consulting physician's referral is known as the OPD-to-USG conversion rate.
This metric was used to assess patient adherence to diagnostic suggestions and gauge the use of internal imaging services.

Patient Leakage / Drop-off

Patients who were recommended laboratory tests or ultrasonography services but did not finish those tests within the hospital are referred to as "patient leakage," also known as "diagnostic drop-off." Before using the hospital's internal diagnostic facilities, these patients are regarded as having left the intended diagnostic pathway.
Because it represents a possible loss of service utilisation and may reveal obstacles pertaining to accessibility, convenience, cost, or patient desire, patient leakage is a crucial operational indicator.

Patient Retention

The percentage of patients who chose and finished the suggested diagnostic tests within the hospital following a suggestion from the consulting physician is known as patient retention. Stronger continuity of care and improved usage of internal diagnostic services are indicated by higher patient retention.

Drop-off Rate

The percentage of suggested investigations that were not finished within the hospital is known as the "drop-off rate."

The following formula was used to get the drop-off rate:

$$\text{Drop-off Rate (\%)} = \frac{\text{Recommended Investigations - Completed Investigations}}{\text{Recommended Investigations}} \times 100$$

A lower drop-off rate denotes better conversion and increased diagnostic service utilisation, while a higher drop-off rate suggests lower patient retention and decreased diagnostic service utilisation.

3.5 Data Analysis Plan

The tools employed to analyse the data were Microsoft Excel and Microsoft Power BI. These tools were chosen based on their helpfulness in analysing statistical data and performing various tasks such as data cleaning, transformation, and visualization as well as developing dashboards. The measurements for diagnostic use cases, conversion rates and patient retention indicators were the major objectives in the descriptive analysis.

All the documents were then integrated into Microsoft Excel to prepare the data set and clean it. The consistency, validity and completeness of the data were checked. Inconsistencies, duplicates, and missing data were spotted and rectified. The data validation process was undertaken to ensure that the data used is valid and qualifies for analysis.

For ease of analysis, coding and classification of the variables were done after cleaning of the data set. In the case of demographic analysis, age variable was classified according to pre-set age ranges. For computation of conversion rate and drop off rate, diagnosis recommendation and completion variables were also classified in binary variables such as Yes and No.

The data was summarised through descriptive statistics. The variables such as patient demographics, patient distribution according to consultant, diagnostic recommendation, and trend in diagnostic completion were summarised through frequency and percentages. It was important to understand the relationship between the two diagnostic advice and service usage.

Pivot tables in MS Excel were popularly used for summarization and data analysis. Pivot tables facilitated the analysis of OPD consultations, lab suggestions, USG

suggestions, and completed investigations per consultant, per month, and per age. These analyses were done to calculate KPIs and make tables for the display of results.

Apart from descriptive statistics, a Chi-Square Test of Independence was done to analyze consultant-wise difference in diagnostic conversion rate. Two sets of Chi-Square tests were done - one for lab investigations and another for USG investigations. Categories having smaller number of patients among consultants were clubbed into one category, “Others,” to ensure that the expected cell frequency is sufficiently large for robustness of statistical test. The assumptions of the Chi-Square test (independence of observations, categoric variable, mutually exclusive categories, and expected frequencies) were assessed before interpreting the results. A level of significance of 5% ($p < 0.05$) was considered.

The collected data was cleaned, validated and analyzed using Microsoft Excel and Power BI. Statistical tools like frequencies, percentages, conversion rate and leakage rate were used for descriptive statistics to understand the usage of diagnostics. Comparison was done among consultants and per month basis for laboratory and USG conversion rates.

To check whether the difference found among consultants is significant statistically, two different tests called Chi-Square Test of Independence were carried out. One was carried out for the relationship between consultant category and the status of investigation completed or not for laboratory investigations. The following hypotheses were tested:

Hypothesis 1: Laboratory Investigation Completion

$H0_1$: There is no significant variation in laboratory conversion rates across consultant categories.

$H1_1$: There is a significant variation in laboratory conversion rates across consultant categories.

Hypothesis 2: USG Investigation Completion

$H0_2$: There is no significant variation in USG conversion rates across consultant categories.

$H1_2$: There is a significant variation in USG conversion rates across consultant categories.

For statistical analysis, consultants with comparatively lower patient volumes were grouped into an “Others” category. This approach ensured adequate expected frequencies and improved the validity of the Chi-Square test. A significance level of 5% ($p < 0.05$) was considered for statistical inference.

The following descriptive analyses were performed as part of the study.

Demographic Analysis

Age-group classification was used to evaluate patient demographics. To comprehend the distribution of patients among various age groups, frequencies and percentages were computed.

OPD Volume Analysis

To evaluate patient influx during the research period, the distribution of OPD patients by month and consultant was examined. An overview of OPD workload and patient volume trends was given by this analysis.

OPD-to-Laboratory Conversion Analysis

A comparison was made between the number of patients who underwent recommended laboratory tests and the number of patients who finished those tests while they were in the hospital. To evaluate the use of internal laboratory services, laboratory conversion rates were computed.

The laboratory conversion rate was calculated using the following formula:

$$\text{Lab Conversion Rate (\%)} = \frac{\text{Lab Completions}}{\text{Lab Recommendations}} \times 100$$

OPD-to-USG Conversion Analysis

The number of patients who finished the suggested investigations within the hospital was compared to the number of patients who were recommended ultrasonography services.

The USG conversion rate was calculated using the following formula:

$$\text{USG Conversion Rate (\%)} = \frac{\text{USG Completions}}{\text{USG Recommendations}} \times 100$$

Diagnostic Leakage Analysis

Patients who received diagnostic advice but did not finish the investigations within the hospital were identified to analyse patient leakage. Leakage analysis was carried out independently for ultrasound services and laboratory investigations.

The drop-off rate was calculated using the following formula:

$$\text{Drop-off Rate (\%)} = \frac{\text{Recommended Investigations} - \text{Completed Investigations}}{\text{Recommended Investigations}} \times 100$$

Consultant-wise Diagnostic Analysis

To assess variations in the use of diagnostics among doctors, conversion rates by consultant were examined. For laboratory research and ultrasound services, different analyses were carried out. This made it easier to spot differences in consultants' patient conversion rates.

Data Visualization and Dashboard Development

Visual reports and interactive dashboards were made with Power BI. Charts, graphs, and KPI cards were used to create visual representations of the cleaned dataset after it was loaded into Power BI. Key performance indicators (KPIs) included:

• Total OPD Patients

• Total Lab Recommendations

• Total Lab Completions

• Total USG Recommendations

• Total USG Completions

• Lab Conversion Rate

• USG Conversion Rate

• Diagnostic Leakage Rate

Various visualizations such as bar charts, column charts, trend charts and KPI cards were developed to present findings in an easily interpretable format. The Power BI dashboard provided a comprehensive overview of diagnostic service utilization and supported effective interpretation of study results.

The results generated through the above analyses were presented using tables, charts and dashboards in Chapter 4 of the dissertation.

3.6 Ethical Considerations

During the entire process of research, ethical principles have been strictly adhered to in order to ensure proper handling of medical data and confidentiality of patients. No direct contact with patients and treatment has been carried out during the course of this study due to the use of secondary data.

Permission had been sought beforehand before using the data collected from Cocoon Hospital, Jaipur. The data collected was used solely for academic purposes only.

Patient confidentiality and privacy have been maintained throughout the course of the study. The analytical data set and the research paper lacked all kinds of personal identifiers like name, address, phone number, or even the medical record number of the patient. To ensure the anonymity of the patients, the data was anonymized before analyzing.

No one apart from the researcher had any access to the safely kept data. The data collected for the research was not used for any purpose other than scholarly research purposes.

The study fulfilled the ethical requirements for data security and privacy. Throughout the entire process of research, all efforts were taken to protect the interests of the patients.

3.7 Implications of Research

This study has several implications for the workings of hospitals, healthcare analytics, and healthcare management. This study will provide some valuable insights into patient

behavior, diagnostic service utilization, and patient retention in a hospital setting through the determination of OPD-to-Laboratory and OPD-to-USG conversion rates.

Findings from this study will be useful in helping hospital management identify patient leakage areas and understand factors that may influence the use of diagnostic services. Understanding conversion patterns is likely to enable the formulation of specific strategies designed to enhance the utilization of diagnostic services offered within the hospital.

Operational performance can be measured in terms of conversion rates, drop-off rates, and patient retention rates. Operational performance measures such as conversion rates and drop-off rates can be employed to assess the effectiveness of delivery of diagnostic services.

Moreover, this research provides an example of how healthcare analytics software, including Microsoft Excel and Power BI, can be applied in practice to conduct an analysis of hospital data and support decision making based on evidence. Using dashboards and performance indicators, healthcare organizations can make use of routine operational data to gain useful insights for management and planning.

Moreover, through helping healthcare providers detect barriers that prevent patients from taking advantage of their in-house diagnostic services, the results of the study can help enhance the experience of patients. By eliminating these barriers, the accessibility of services, patient satisfaction, and treatment continuity can be improved.
By offering empirical data on diagnostic conversion rates at a private maternity and women's healthcare facility, the study adds to the body of knowledge already in existence. Future research on diagnostic utilisation, patient retention, and healthcare service performance in comparable healthcare environments may use the findings as a guide.

CHAPTER 4

RESULTS AND ANALYSIS

4.1 Patient Demographic and OPD Profile

A total of 338 patients visited the Outpatient Department (OPD) of Cocoon Hospital, Jaipur during the study period and were included in the analysis. The age-wise distribution of patients is presented in **Table 4.1**.

Table 4.1: Age-wise Distribution of Patients.

Age group	Frequency	Percentage
<20	2	0.6%
20-29	111	32.8%
30-39	186	55.0%
40-49	30	8.9%
50+	9	2.7%
Grand Total	**338**	**100.0%**

As shown in **Table 4.1**, most patients belonged to the 30–39 years age group (55.0%), followed by the 20–29 years age group (32.8%). Patients aged below 20 years and above 50 years constituted only a small proportion of the total study population

Table 4.2: Month-wise Distribution of OPD Patients

Month	No. of patients
March	170
April	168
Grand Total	**338**

The month-wise distribution of OPD patients is presented in **Table 4.2**. A total of 170 patients visited the OPD in March, while 168 patients visited in April. The distribution indicates a relatively stable patient inflow across the two-month study period.

Table 4.3: Doctor-wise Distribution of Patients

Doctor	No. of Patients
Dr. Himani	122
Dr. Priya	117
Dr. Mitul	68
Dr. Preeti	18
Dr. Anupama	11
Dr. Susheela	2
Grand Total	**338**

Doctor-wise patient distribution is presented in **Table 4.3**. Among the consultants, Dr. Himani managed the highest number of patients (122), followed by Dr. Priya (117) and Dr. Mitul (68). Dr. Preeti, Dr. Anupama and Dr. Susheela accounted for comparatively lower patient volumes.

Overall, the findings indicate a consistent OPD patient load during the study period, with a significant proportion of patients requiring diagnostic investigations. The observed patient distribution provides the foundation for analysing OPD-to-Lab conversion, OPD-to-USG conversion and diagnostic leakage in subsequent sections.

4.2 Diagnostic Recommendation Profile

Table 4.4 Diagnostic Recommendations

Service	Recommended	% of Total OPD
Laboratory	193	57.1%
USG	256	75.7%

USG investigations were recommended more frequently than laboratory investigations. Nearly three-fourths of patients required USG examinations, highlighting the importance of imaging services in maternity care.

4.3 OPD-to-Laboratory Conversion Analysis

The OPD-to-Lab Conversion Rate measures the proportion of patients who completed the recommended laboratory investigations within the hospital after receiving a diagnostic recommendation from the consulting physician.

Table 4.5: OPD-to-Lab Conversion Rate

Month	Lab Recommended	Lab completed	Conversion Rate%
March	94	75	79.8
April	99	82	82.8
Overall	193	157	81.3

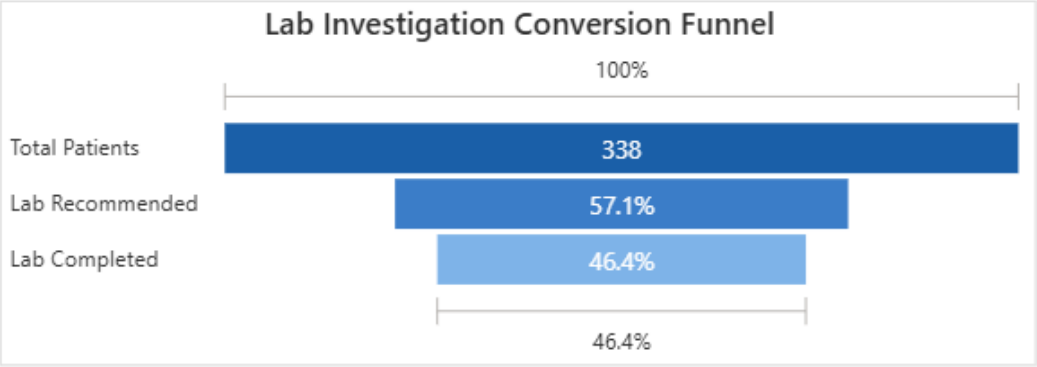
The monthly Lab Conversion Rate is shown in Table 4.5. Out of 94 patients advised laboratory investigation in March, 75 underwent the test recommended by the hospital and thus, the conversion rate was 79.8%. In April, 99 patients were advised laboratory investigations and 82 of them underwent the tests; consequently, the conversion rate was 82.8%.

On average, of 193 patients advised laboratory investigation during the period of the study, 157 completed the investigations within the same hospital. Therefore, the overall Lab Conversion Rate was 81.3%.

It is seen from the above results that the majority, i.e., over four-fifths of patients used the laboratory services offered by the hospital after the recommendation. At the same time, 36 patients did not undergo the investigation recommended to them within the hospital.

While the overall conversion rate was quite high, there were some cases where the patients refused to undergo the investigation. Thus, there is room for improving the process of patients' retention through the improvement of counselling techniques and other measures aimed at making the services easier to use.

Figure 4.1- OPD-to-Lab Conversion Funnel



4.4 OPD-to-USG Conversion Analysis

The OPD-to-USG Conversion Rate measures the proportion of patients who completed the recommended ultrasound (USG) examinations within the hospital after receiving a diagnostic recommendation from the consulting physician.

Table 4.6: OPD-to-USG Conversion Rate

Month	USG Recommended	USG Completed	Conversion %
March	126	115	91.3%
April	130	110	84.6%
Overall	256	225	87.9%

The USG Conversion Rate per month is shown in Table 4.6. In March, 126 patients had been recommended USG, out of which 115 performed USG and hence the USG Conversion Rate was found to be 91.3%. In April, 130 patients had been recommended USG, out of which 110 patients had done USG and hence the USG Conversion Rate was 84.6%.

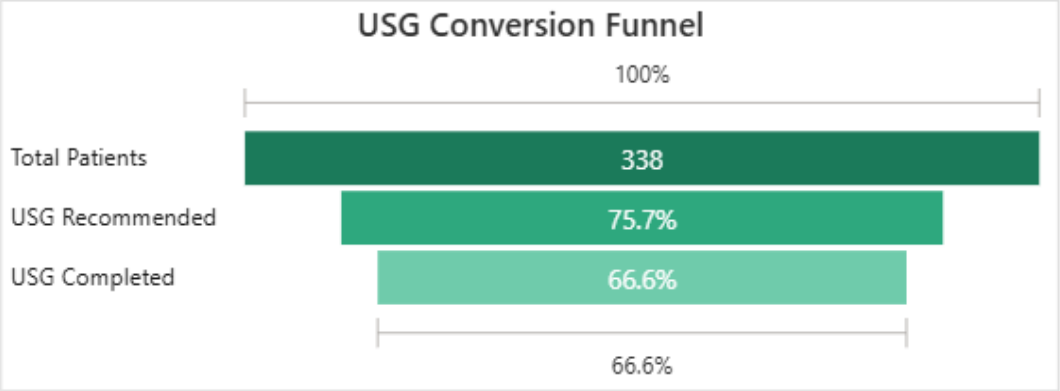
In all, out of 256 patients recommended for USG, 225 patients conducted USG examination in the hospital and hence the USG Conversion Rate was 87.9%.

It is found that the use of USG facility in the in-house setting was quite high with nine out of every ten recommended patients having done USG. As compared to laboratory investigation, USG had shown comparatively high conversion rate.

The higher USG Conversion Rate may be attributed to factors such as immediate availability of imaging services, greater perceived importance of ultrasound

examinations in maternity care and convenience of receiving diagnostic services within the same facility. However, 31 patients did not complete the recommended USG investigations, indicating scope for further improvement in diagnostic retention.

Figure 4.2- OPD-to-USG Conversion Funnel



4.5 Drop-off and Patient Leakage

Patient leakage implies the percentage of patients who were advised on diagnostic investigations but did not undertake them in the hospital. It is a vital performance indicator because it affects the continuity of care, use of diagnostic equipment, and profitability of the hospital.

The patient leakage of diagnostic investigations is provided in Table 4.7. In respect of laboratory investigations, 193 patients were advised to have the tests done; however, only 157 patients had the investigation performed at the hospital. As such, 36 patients did not undertake the suggested lab investigation, hence a drop-out rate of 18.65%.

For USG investigations, 256 patients were advised to have the ultrasound investigation done, of which 225 undertook it. A total number of 31 patients failed to undertake the advised USG investigation, hence a drop-out rate of 12.11%.

The findings indicate that laboratory services experienced a higher level of patient leakage compared to USG services. This suggests that patients were more likely to complete recommended USG examinations than laboratory investigations. Factors such as cost considerations, waiting time, convenience and preference for external diagnostic providers may contribute to this drop-off behaviour.

Overall, approximately 67 recommended diagnostic investigations were not completed within the hospital during the study period. Reducing this leakage presents a significant opportunity for improving patient retention, enhancing utilization of in-house diagnostic services and strengthening operational efficiency.

Table 4.7 (Diagnostic Leakage Analysis)

Diagnostic Service	Recommended	Completed	Not Completed	Drop-off Rate (%)
Lab	193	157	36	18.65%
USG	256	225	31	12.11%

Figure 4.3- Doctor-wise Diagnostic Leakage

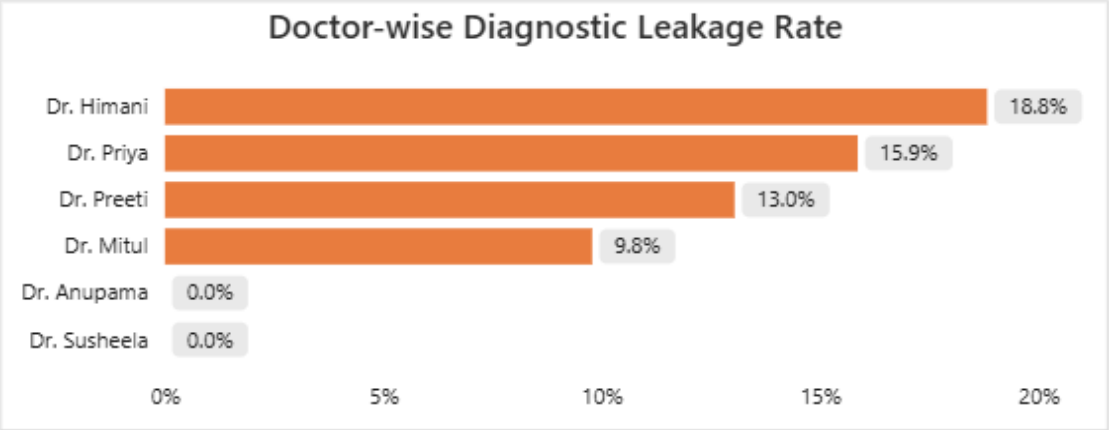
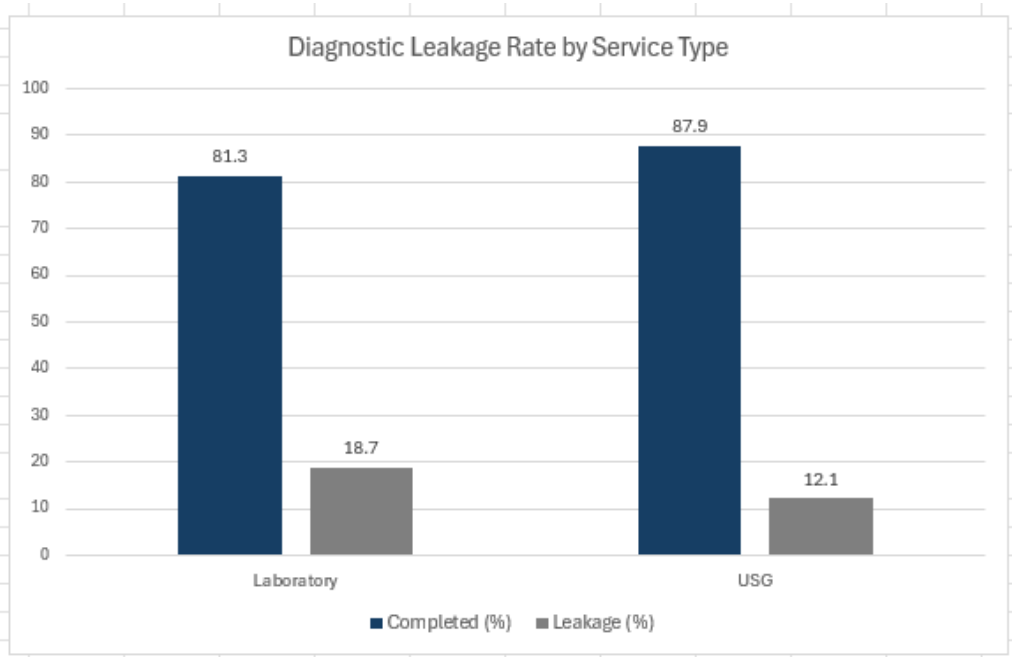


Figure 4.4- diagnostic leakage by service type

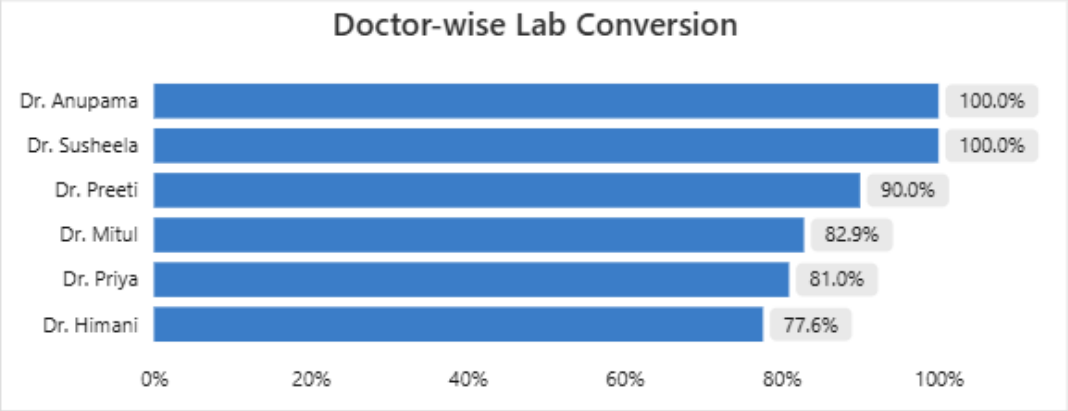


4.6 Consultant-wise Diagnostic Performance

Table 4.8: Doctor-wise Lab Conversion Rate

Doctor	Lab Recommended	Lab Completed	Conversion Rate (%)
Dr. Himani	76	59	77.6%
Dr. Priya	63	51	81.0%
Dr. Mitul	35	29	82.9%
Dr. Preeti	10	9	90.0%
Dr. Anupama	8	8	100.0%
Dr. Susheela	1	1	100.0%
	193	**157**	81.3%

Figure 4.5- Doctor-wise Lab Conversion



The doctor-wise analysis showed variations in laboratory investigation completion among consultants. Among the major consultants, Dr. Preeti recorded the highest Lab Conversion Rate (90.0%), followed by Dr. Mitul (82.9%) and Dr. Priya (81.0%). Dr. Himani had the lowest Lab Conversion Rate (77.6%), indicating relatively higher patient drop-off for laboratory investigations. Overall, the Lab Conversion Rate was 81.3%, suggesting that most patients completed their recommended laboratory tests within the hospital.

Table 4.9 – Doctor-wise USG Conversion Rate

Doctor	USG Recommended	USG Completed	Conversion Rate (%)
Dr. Himani	8	8	100.0%
Dr. Priya	94	79	84.0%
Dr. Mitul	57	54	94.7%
Dr. Preeti	13	11	84.6%
Dr. Anupama	82	71	86.6%
Dr. Susheela	2	2	100.0%
	256	225	87.9%

The doctor-wise analysis showed variations in laboratory investigation completion among consultants. Among the major consultants, Dr. Preeti recorded the highest Lab Conversion Rate (90.0%), followed by Dr. Mitul (82.9%) and Dr. Priya (81.0%). Dr. Himani had the lowest Lab Conversion Rate (77.6%), indicating relatively higher

patient drop-off for laboratory investigations. Overall, the Lab Conversion Rate was 81.3%, suggesting that most patients completed their recommended laboratory tests within the hospital.

Table 4.10 Consultant-wise Diagnostic Performance Summary

Doctor-wise Diagnostic Performance Summary

Doctor_Assigned	Total Patients	Lab Conversion %	USG Conversion %	Leakage %
Dr. Himani	122	77.6%	84.0%	18.8%
Dr. Priya	117	81.0%	86.6%	15.9%
Dr. Preeti	18	90.0%	84.6%	13.0%
Dr. Mitul	68	82.9%	94.7%	9.8%
Dr. Anupama	11	100.0%	100.0%	0.0%
Dr. Susheela	2	100.0%	100.0%	0.0%
Total	**338**	**81.3%**	**87.9%**	**14.9%**

Among the consultants with higher patient volumes, clear differences were observed in diagnostic conversion and leakage rates. Dr. Mitul showed the strongest overall performance, with a Lab Conversion Rate of 82.9%, USG Conversion Rate of 94.7%, and the lowest Leakage Rate (9.8%), indicating better patient retention and diagnostic uptake.

Dr. Preeti achieved the highest Lab Conversion Rate (90.0%) among the major consultants, while Dr. Priya recorded moderate conversion rates with a Leakage Rate of 15.9%.

Although Dr. Himani managed the highest number of patients (122), she recorded the lowest Lab Conversion Rate (77.6%) and the highest Leakage Rate (18.8%), suggesting greater patient drop-off after consultation.

Overall, the results indicate that diagnostic utilization varied across consultants, with Dr. Mitul demonstrating the most effective conversion performance, while higher leakage rates among some consultants highlight opportunities to improve patient retention and in-house diagnostic service utilization.

4.7 Monthly Trend Analysis (March–April 2026)

Table 4.11: Month-wise Diagnostic Performance Summary

Month	OPD Patients	Lab Conversion Rate (%)	USG Conversion Rate (%)
March	170	79.8	91.3
April	168	82.8	84.6
Overall	338	81.3	87.9

The month-wise analysis was conducted to identify variations in OPD volume, diagnostic recommendations and conversion rates during the study period. The results indicate relatively stable patient inflow and diagnostic utilization across both months.

As is clear from Table 4.2, there were 170 patients at the OPD in March, whereas there were 168 patients at the OPD in April.

The conversion rate for the laboratory based on the month-wise analysis as shown in Table 4.5 improved from 79.8% in March to 82.8% in April. The higher conversion rate indicates better compliance with lab investigations by patients in April.

Likewise, the conversion rate of USG based on the month-wise analysis as shown in Table 4.6 dropped from 91.3% in March to 84.6% in April. However, even after the drop, the conversion rate of USG was higher as compared to the conversion rate of the laboratory in both months. Diagnostic leakage analysis indicates that more number of patients dropped out from the laboratory service line as compared to USG service line during the period of the study.

Overall, the monthly trend analysis demonstrates stable OPD activity with relatively consistent diagnostic service utilization. Monitoring these trends regularly can help hospital management identify operational issues early and implement targeted interventions to improve patient retention and diagnostic service performance.

Figure 4.6- USG Month-wise Conversion and Leakage

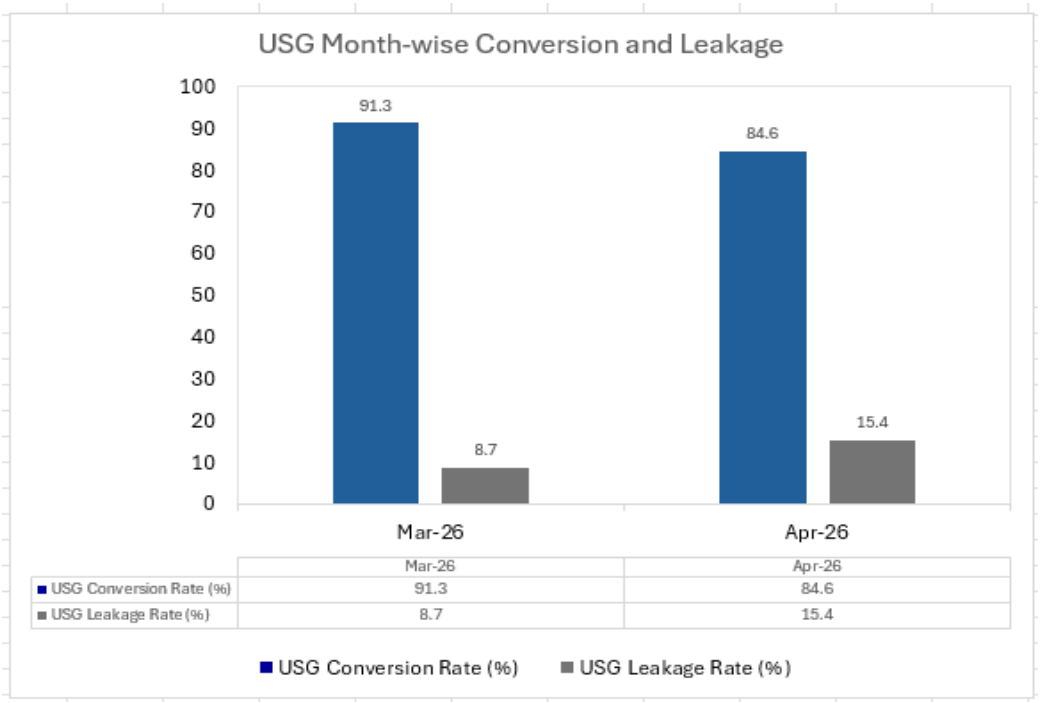


Figure 4.6 shows that the USG Conversion Rate decreased from 91.3% in March to 84.6% in April, while the USG Leakage Rate increased from 8.7% to 15.4%. Despite this decline, the conversion rate remained high in both months, indicating strong utilization of in-house USG services.

Figure 4.7- Laboratory Month-wise Conversion and Leakage

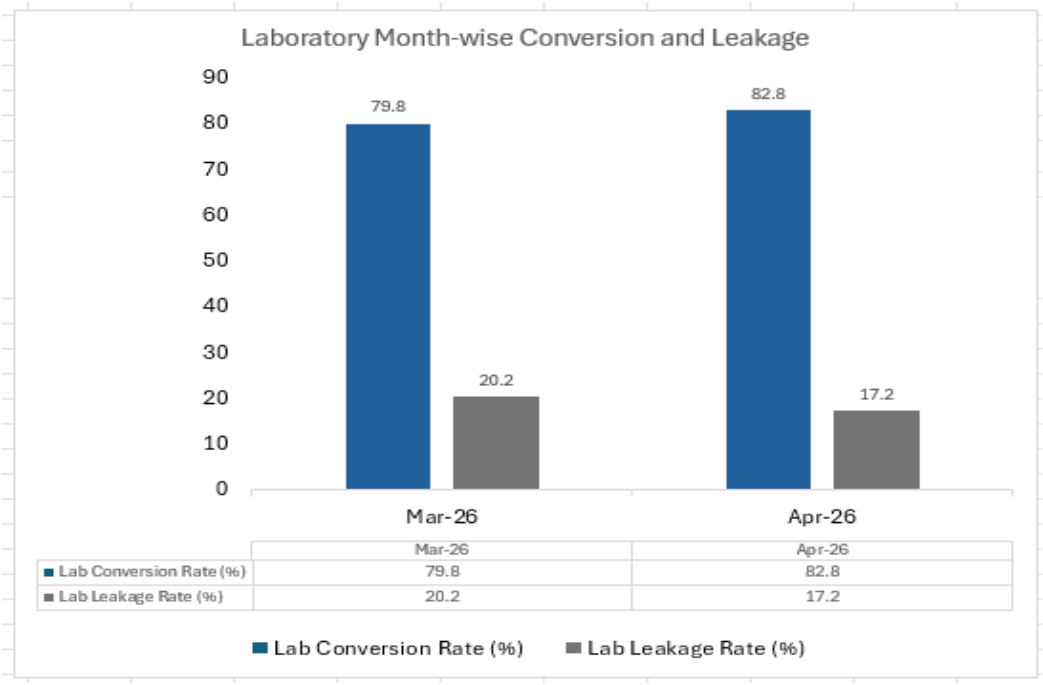


Figure 4.7 illustrates a slight improvement in the Lab Conversion Rate from 79.8% in March to 82.8% in April, accompanied by a reduction in the Leakage Rate from 20.2% to 17.2%. These findings suggest improved patient compliance with recommended laboratory investigations during April.

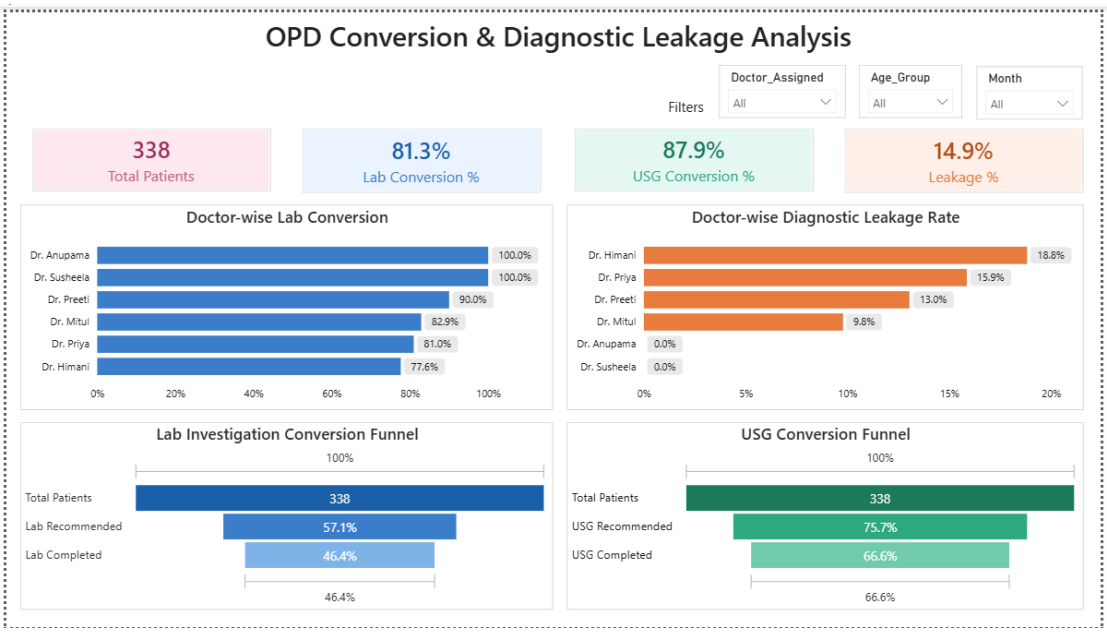
4.8 Dashboard-Based KPI Summary

Table 4.12 - Diagnostic Journey Summary

Indicator	Count
Total Patients Analysed	338
Lab Recommendations	193
Lab Completions	157
Lab Leakage	36
USG Recommendations	256
USG Completions	225
USG Leakage	31
Lab Conversion Rate	81.3%
USG Conversion Rate	87.9%
Overall Diagnostic Leakage Rate	14.9%

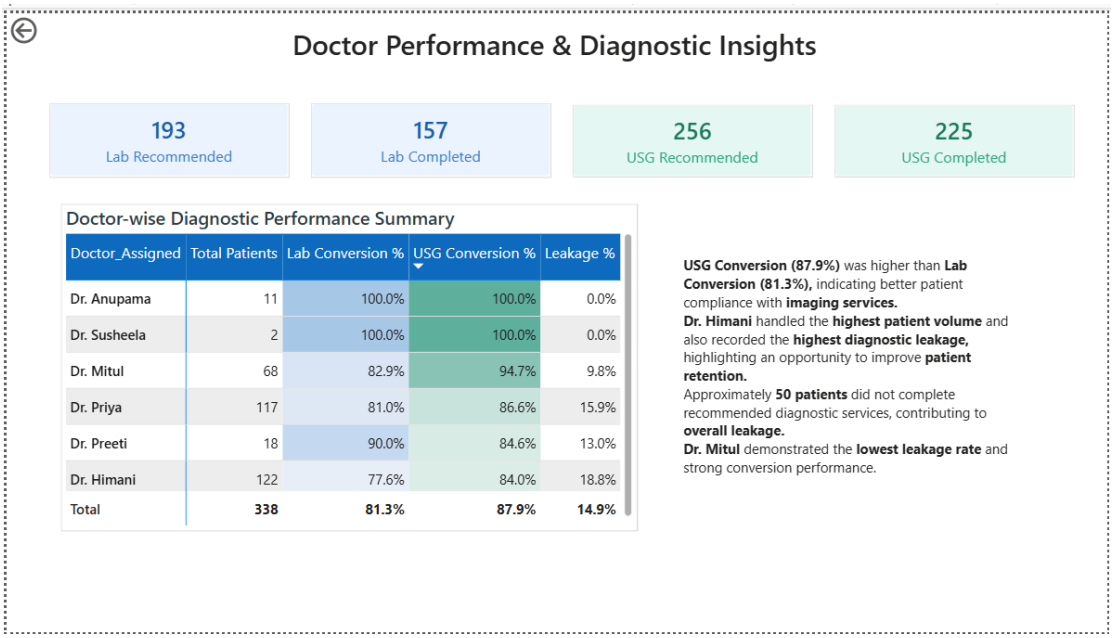
Table 4.12 provides an overall summary of the diagnostic journey of patients included in the study. Out of 338 patients analysed, 193 were recommended laboratory investigations and 256 were recommended USG examinations. The overall Lab Conversion Rate was 81.3%, while the USG Conversion Rate was higher at 87.9%, indicating better utilization of in-house USG services. Despite satisfactory conversion rates, an overall Diagnostic Leakage Rate of 14.9% was observed, suggesting that a proportion of patients did not complete the recommended investigations within the hospital. These findings highlight opportunities to further improve patient retention and maximize the utilization of in-house diagnostic services.

Figure 4.8- OPD Conversion & Diagnostic Dashboard (Page 1)



Dashboard 1 gives an overall picture of diagnostic service utilization at Cocoon Hospital during the study period. The dashboard shows that most patients completed their recommended investigations, with USG conversion (87.9%) being higher than Lab conversion (81.3%). However, an overall leakage rate of 14.9% indicates that some patients did not continue with in-house diagnostics, highlighting an opportunity to further improve patient retention and service utilization.

Figure 4.9: Dashboard (Page 2)



Dashboard 2 highlights differences in diagnostic performance across consultants. While conversion rates were generally satisfactory, Dr. Mitul demonstrated strong patient retention with the lowest leakage rate, whereas Dr. Himani recorded the highest leakage despite handling the largest number of patients. These findings suggest that monitoring consultant-wise conversion patterns can help identify best practices and areas where additional efforts may improve diagnostic completion rates.

4.9 Chi-Square Analysis of Consultant-wise Laboratory Conversion Rate

To determine whether consultant-wise variations in laboratory conversion rates were statistically significant, a Chi-Square Test of Independence was performed.

Hypothesis Tested

$H0_1$: There is no significant variation in laboratory conversion rates across consultant categories.

$H1_1$: There is a significant variation in laboratory conversion rates across consultant categories.

Table 4.13: Observed Frequency Table - Consultant Category and Laboratory Investigation Completion Status

Consultant Category	Completed	Not Completed	Total
Dr. Himani	59	17	76
Dr. Priya	51	12	63
Dr. Mitul	29	6	35
Others	18	1	19
Total	157	36	193

Table 4.14: Expected Frequency Table

Consultant Category	Expected Completed	Expected Not Completed
Dr. Himani	61.82	14.18
Dr. Priya	51.25	11.75
Dr. Mitul	28.47	6.53
Others	15.46	3.54

Table 4.15: Chi-Square Test Results - Laboratory Investigation Completion

Parameter	Value
Chi-Square Statistic (χ^2)	2.9955
Degrees of Freedom	3
p-value	0.3923
Significance Level	0.05
Decision	Fail to Reject $H0_1$

The Chi-Square test was conducted to assess whether laboratory investigation completion varied significantly across consultant categories. The analysis yielded a Chi-Square statistic of 2.9955 with 3 degrees of freedom and a p-value of 0.3923. Since the p-value was greater than the significance level of 0.05, the null hypothesis was not rejected.

This finding indicates that although laboratory conversion rates differed numerically among consultants, the observed differences were not statistically significant. Therefore, consultant category was not found to have a significant influence on laboratory investigation completion during the study period. The variation observed across

consultants is more likely to reflect routine operational differences rather than a systematic pattern.

4.9.1 Chi-Square Analysis of Consultant-wise USG Conversion Rate

To determine whether consultant-wise variations in USG conversion rates were statistically significant, a separate Chi-Square Test of Independence was performed.

Hypothesis Tested

$H0_2$: There is no significant variation in USG conversion rates across consultant categories.

$H1_2$: There is a significant variation in USG conversion rates across consultant categories.

Table 4.16: Observed Frequency Table - Consultant Category and USG Investigation Completion

Consultant Category	**Completed**	**Not Completed**	**Total**
Dr. Priya	79	15	94
Dr. Mitul	54	3	57
Others (including Dr. Himani)	92	13	105
Total	225	31	256

Table 4.17: Expected Frequency Table

Consultant Category	**Expected Completed**	**Expected Not Completed**
Dr. Priya	82.62	11.38
Dr. Mitul	50.10	6.90
Others	92.29	12.71

Table 4.18: Chi-Square Test Results – USG Investigation Completion

Parameter	Value
Chi-Square Statistic (χ^2)	3.8253
Degrees of Freedom	2

p-value	0.1477
Significance Level	0.05
Decision	Fail to Reject $H0_2$

The Chi-Square analysis yielded a statistic of 3.8253 with 2 degrees of freedom and a p-value of 0.1477. Since the p-value exceeded the significance level of 0.05, the null hypothesis was not rejected.

The findings suggest that consultant-wise differences in USG conversion rates were not statistically significant during the study period. Although certain consultants demonstrated higher conversion rates than others, the variation observed was within the range expected by chance and therefore cannot be considered statistically meaningful.

Table 4.19: Summary of Chi-Square Test Results

Parameter	**Laboratory Analysis**	**USG Analysis**
Sample Size	193	256
Chi-Square Statistic	2.9955	3.8253
Degrees of Freedom	3	2
p-value	0.3923	0.1477
Decision	Fail to Reject $H0_1$	Fail to Reject $H0_2$

The Chi-Square analyses were conducted to evaluate whether consultant category significantly influenced diagnostic investigation completion. For both laboratory and USG investigations, the p-values were greater than the significance level of 0.05. Therefore, the study did not find sufficient statistical evidence to conclude that consultant category significantly affected diagnostic conversion rates.

While consultant-wise differences in conversion percentages were observed in the descriptive analysis, these differences were not statistically significant. The findings indicate that diagnostic conversion behaviour may be influenced by multiple operational and patient-related factors rather than consultant category alone.

CHAPTER 5
DISCUSSION

The present study was conducted to analyse OPD-to-Lab Conversion, OPD-to-USG Conversion and Diagnostic Leakage among patients attending the Outpatient Department (OPD) at Cocoon Hospital, Jaipur. The study also aimed to evaluate the utilization of in-house diagnostic services and identify opportunities for improving patient retention and diagnostic service uptake. The findings were analysed using healthcare analytics tools and compared with evidence from previous studies.

5.1 Discussion on OPD-to-Laboratory and OPD-to-USG Conversion Rates

Finding

The study revealed an overall Laboratory Conversion Rate of 81.3% and a USG Conversion Rate of 87.9%. These findings indicate that a majority of patients completed the investigations recommended during their OPD consultation. However, the higher conversion observed for USG services suggests that patients were more likely to undergo ultrasonography than laboratory investigations within the hospital.

Comparison with Literature

The findings have been in line with other research done previously where the inconsistencies between diagnostic guidelines and utilization of services were observed. Holloway et al. (2020) found out that not all patients follow the prescribed diagnostic tests due to issues related to convenience, cost, accessibility, and choice. In the same line, Engel et al. (2017) observed that patients tend to switch providers during their diagnostic process.

While earlier studies primarily emphasized diagnostic drop-off, the conversion rates observed in the present study were comparatively high. This suggests that Cocoon Hospital has been relatively successful in retaining patients within its diagnostic pathway.

Possible Explanation

One of the observations drawn from this study is the consistent superiority of USG conversion rates compared to those of laboratory tests. This could be attributed to the way patients view various diagnostic services in terms of importance. In a gynecology clinic environment, patients see ultrasonography as an integral part of treatment since it gives them direct insight into the progress of pregnancy and the health status of their babies. As such, patients will be motivated to undertake USG diagnostics without delay.

The laboratory tests, while equally vital from a clinical point of view, may not attract the same level of importance as USG services. Patients will select external laboratories depending on convenience, costs, closeness to their homes or because they are familiar with certain diagnostic centers.

Implication for Cocoon Hospital

With regard to the management of hospitals, there is a point of strength and one area for improvement revealed by the study. Firstly, the success rate in terms of converting USGs means that the hospital has been successful in utilizing its own diagnostic facilities and that the patients trust the diagnostics provided by the hospital.

Secondly, although the conversion rate in the laboratory is relatively low, it indicates that some patients are being lost after consultation. Improvement in the laboratory conversion rate, even by just a little bit, can yield great improvements in terms of operational continuity, patient follow up, coordination among different departments, and better utilization of diagnostic facilities available within the hospital.

5.2 Discussion on Diagnostic Leakage and Patient Retention

Finding

The study identified an overall Diagnostic Leakage Rate of 14.9%, indicating that a proportion of patients who were advised investigations did not complete them within the hospital. Although the majority of patients utilized in-house diagnostic services, the presence of leakage highlights a gap between recommendation and completion of investigations.

Comparison with Literature

The problem of diagnostic leakage is very well-known among health care organizations. According to the results of the studies conducted by Kumari et al. (2009), Singh et al. (2020), and Mahajan et al. (2025), it has been established that accessibility, waiting time, convenience of the service, and patients' preferences can influence the process of utilization of diagnostics. Furthermore, such studies show that the negative effect of diagnostic leakage can be on the continuity of care and efficiency of the health care delivery system.

In contrast to many other health care organizations, the level of diagnostic leakage in Cocoon Hospital is rather low; thus, a large number of patients remain within the diagnostic chain of the hospital.

Possible Explanation

However, diagnosis leakage might depend on many other factors apart from recommendations made by the clinicians. For example, the patients might prefer using the diagnostic centers that are located outside because of convenience, cheaper prices, less wait time or location closer to their home. Some patients might be postponing tests or using the clinics that were recommended by relatives or referring physicians.

The patient’s perception is another factor worth considering. It is true that for the clinicians, investigation plays an important part in the treatment process; however, it might not necessarily be the case for patients.

Implication for Cocoon Hospital

Diagnostic leakage represents both a clinical and operational concern. From a clinical perspective, incomplete investigations may delay diagnosis and treatment decisions. From a management perspective, leakage reduces utilization of available resources and limits opportunities for integrated patient care.

The findings suggest that regular monitoring of leakage indicators should become part of routine hospital performance evaluation. Identifying departments, services, or patient groups with higher leakage rates can help management implement targeted interventions aimed at improving patient retention and continuity of care.

5.3 Discussion on Consultant-wise Variations in Diagnostic Utilization

Finding

The study revealed noticeable differences in diagnostic conversion and leakage rates across consultants. Among the major consultants, Dr. Mitul demonstrated stronger conversion performance and lower leakage rates, whereas Dr. Himani recorded comparatively higher leakage despite managing the highest patient volume.

Comparison with Literature

A number of research works have pointed to the impact of provider-patient communication on the use of health services. The Behavioural Model of Health Services Utilization developed by Andersen states that healthcare seeking behavior is determined not only by the clinical need but also by the behavioral and enabling elements. It has been proven that better communication and patient involvement contribute to compliance with medical guidance.

The results obtained during this research confirm this general idea by indicating that diagnostic services may differ even in the same health facility.

Possible Explanation

The variability is not an indication of difference in clinical expertise but can result from other variables like mode of communication, patient counseling approaches, workload, and patient profile among others. Patients managed by consultants with a higher number of patients can have difficulties in spending enough time with every patient hence the compliance with investigations.

Patients who get clear explanation about the necessity of investigations tend to follow the procedure. This means that even the slightest difference in communication and counseling can make a difference in the conversion results.

Implication for Cocoon Hospital

The consultant-wise findings provide valuable insights for quality improvement initiatives. Rather than focusing solely on overall hospital performance, management can use consultant-level indicators to identify successful practices and encourage their adoption across departments.

The use of dashboards to monitor consultant-wise conversion and leakage rates can support data-driven performance management while also promoting greater consistency in patient retention outcomes.

5.4 Discussion on Month-wise Trends in Diagnostic Utilization

Finding

The month-wise analysis demonstrated stable OPD attendance during the study period, with 170 patients in March and 168 patients in April. Laboratory Conversion Rate increased slightly from 79.8% to 82.8%, while USG Conversion Rate decreased from 91.3% to 84.6%.

Comparison with Literature

Previous studies examining healthcare utilization patterns have reported that short-term fluctuations in service utilization are common. Operational factors, patient scheduling patterns, seasonal variations, and changes in healthcare demand can all influence monthly performance indicators.

The relatively small differences observed between March and April are consistent with the normal variation expected in healthcare service utilization.

Possible Explanation

The changes seen within the study duration were minor and not likely to signal any major problems with operations. Improvement in lab conversion can be due to increased compliance on the part of patients or normal changes in service demand. The same applies to the reduction in USG conversion, which can be attributed to short-term changes in service demand.

Due to the short study duration, which was just two months, it is crucial to analyze these results with caution..

Implication for Cocoon Hospital

The findings reinforce the importance of continuous monitoring rather than relying on isolated observations. Tracking conversion rates and leakage indicators on a monthly

basis can help hospital management identify emerging trends early and take corrective action when required.

Regular review of these indicators can support proactive decision-making and contribute to sustained improvements in diagnostic service utilization.

5.5 Discussion on the Role of Healthcare Analytics and Dashboard-Based Monitoring

Finding

An important outcome of the study was the successful use of Microsoft Excel and Power BI to analyse diagnostic utilization patterns and develop interactive dashboards for monitoring key performance indicators.

Comparison with Literature

Healthcare institutions have turned more to using analytics and business intelligence systems for making decisions regarding their operations. Literature shows that dashboards are useful for increasing the visibility of performance indicators and making quicker diagnoses of problems facing the institution.

This current research supports this trend as it shows how data collected in hospitals can be used as decision making tool.

Possible Explanation

A lot of operational data is produced daily by the health organizations; however, the usefulness of such data will depend on its effective analysis and presentation. Dashboards help simplify data and enable managers to detect trends, patterns, and underperformances in an efficient manner compared to other means of data presentation.

The dashboard designed in this study simplified the process of diagnosing utilization through visualization of the rate of conversion, leakage patterns, and consultant wise performance.

Implication for Cocoon Hospital

The dashboard developed during this study can serve as a practical performance management tool for hospital administrators. Regular review of conversion and leakage indicators can support evidence-based decision-making, improve accountability, and help optimize utilization of diagnostic services.

The study demonstrates that healthcare analytics is not only a reporting tool but also a strategic resource that can support quality improvement and operational excellence within healthcare organizations.

5.6 Discussion on Consultant-wise Diagnostic Performance

The consultant-wise analysis revealed observable variation in both laboratory and USG conversion rates across consultants. To determine whether these differences were statistically meaningful, Chi-Square Tests of Independence were conducted separately for laboratory investigations and USG investigations.

For laboratory investigations, the analysis yielded $\chi^2(3) = 2.9955$ with a p-value of 0.3923. Similarly, for USG investigations, the analysis yielded $\chi^2(2) = 3.8253$ with a p-value of 0.1477. In both cases, the p-values exceeded the significance threshold of 0.05, indicating that the observed consultant-wise differences were not statistically significant.

These results imply that the category of consultant alone does not play any role as a critical factor determining the completion of diagnostic investigations in this study period. While some consultants showed high conversion rate compared to other consultants, the difference could have been caused by the difference in the number of patients seen, their case mix, patient preference, access to the service, and operational factors.

It further highlights the importance of looking at the diagnostic conversion process from an operational perspective. The use of healthcare dashboards in the continuous process of monitoring will help understand the diagnostic utilization pattern and identify areas where patient retention can be improved.

5.7 Overall Discussion Summary

This study revealed that Cocoon Hospital had high rates of diagnostic conversion, especially when it came to USG services, but a relatively low rate of diagnostic leakage.

The results of the study align with the current literature and confirm that patients' behaviour, importance of investigation procedures, operational issues, and communication patterns impact diagnostic service utilization. What is more important, this research proves that health care analytics may serve as an instrument for transforming regular hospital information into valuable analytics.

Thus, it is clear that there is a need in monitoring of diagnostic conversion and diagnostic leakage indicators. The use of health care analytics and dashboards might be helpful for improving patient retention and diagnostic service utilization.

CHAPTER 6
CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The present study was conducted to understand how effectively patients at Cocoon Hospital, Jaipur moved from OPD consultation to completion of recommended diagnostic investigations. The focus of the study was on evaluating OPD-to-Laboratory and OPD-to-USG conversion rates, identifying diagnostic leakage, and assessing the utilization of the hospital's in-house diagnostic services through a healthcare analytics approach.

The analysis was based on 338 OPD patient records collected during March and April 2026. Of these patients, 193 were advised laboratory investigations and 256 were recommended ultrasonography (USG) examinations. The findings showed that a majority of patients completed their recommended investigations within the hospital, resulting in an overall Laboratory Conversion Rate of 81.3% and a USG Conversion Rate of 87.9%. The comparatively higher USG conversion rate reflects the important role of ultrasound services in a maternity and women's healthcare setting and indicates strong utilization of the hospital's imaging facilities.

At the same time, the study identified the presence of diagnostic leakage, indicating that a proportion of patients did not complete the recommended investigations within the hospital. While the overall conversion rates were encouraging, the existence of leakage highlights that the journey from consultation to diagnosis is not always completed as intended. This finding emphasizes the importance of continuously monitoring patient movement through the diagnostic pathway and identifying opportunities to strengthen patient retention.

Insights on Operations in terms of Consultant Wise and Month Wise analysis were also gained through this exercise, which showed that there could be difference in the usage of diagnostics by consultants in varying environments. These differences cannot be used as a measure of performance; rather, they should be seen as a trend in the usage of services which could help in future quality improvement initiatives.

The other important contribution of this research work is that it moves the focus away from merely counting patients and looks into the results achieved after making a diagnostic recommendation to a patient. In most of the healthcare facilities, the effectiveness of any consultation largely depends on the patient's ability to get his tests done after that consultation.

The Power BI dashboard designed during the research served as another example of how the hospital's data could be turned into actionable information. The combination of conversion rate, diagnostic leakage, and utilization measurements in one monitoring system helps to provide a tool for decision making through data analytics.

In general, it can be noted that the analysis of the research conducted proved that Cocoon Hospital managed to achieve a satisfactory level of utilization of the hospital diagnostic services. However, there were also areas where the hospital needs to work on improving patient retention and decreasing diagnostic leakage. What is more important, the research proved how powerful healthcare analytics may be as a tool for decision making.

6.2 Recommendations

Based on the findings of the present study, the following recommendations are proposed to improve diagnostic service utilization, reduce patient leakage, and strengthen continuity of care within the hospital.

1. Strengthen the Transition from Consultation to Diagnostic Completion

Although the study observed satisfactory conversion rates for both laboratory and USG services, a proportion of patients did not complete the recommended investigations within the hospital. Strengthening coordination between OPD consultations and diagnostic services may help ensure that patients progress smoothly through the intended care pathway and reduce diagnostic leakage.

2. Establish Routine Monitoring of Diagnostic Conversion Indicators

OPD-to-Laboratory Conversion Rate, OPD-to-USG Conversion Rate, and Diagnostic Leakage Rate should be monitored regularly as key operational performance indicators. Continuous monitoring can help identify utilization trends, evaluate service

performance, and support timely corrective action whenever a decline in conversion rates is observed.

3. Improve Utilization of In-House Laboratory Services

The study found that laboratory services experienced a comparatively higher level of leakage than USG services. Hospital management may therefore focus on identifying operational opportunities to improve laboratory utilization and encourage completion of recommended investigations within the hospital.

4. Strengthen Patient Engagement and Follow-up Practices

Structured patient follow-up mechanisms such as reminder calls, SMS notifications, and appointment reminders may encourage patients to complete recommended investigations. Improved patient engagement can contribute to higher diagnostic completion rates and better continuity of care.

5. Integrate Dashboard-Based Performance Monitoring into Routine Operations

The Power BI dashboard developed during the study can be utilized as a routine management tool for monitoring diagnostic utilization patterns, conversion rates, leakage trends, and consultant-wise performance indicators. Regular use of analytics dashboards can support data-driven decision-making and operational improvement initiatives.

6. Promote a Culture of Continuous Quality Improvement

Regular review of diagnostic utilization indicators should be incorporated into operational performance discussions. Sharing best practices, monitoring trends, and identifying areas requiring intervention can support continuous improvement in diagnostic service delivery, patient retention, and overall healthcare efficiency.

7. Continue Strengthening In-House Diagnostic Capabilities

The study period included a transition from outsourced laboratory services to in-house laboratory operations. Continued strengthening of in-house diagnostic capabilities may improve convenience for patients, support continuity of care, and enhance utilization of hospital-based diagnostic services.

6.3 Limitations of the Study

Although the present study provides valuable insights into diagnostic service utilization and patient retention within a healthcare setting, certain limitations should be acknowledged while interpreting the findings.

One of the primary limitations of the study is its relatively short duration. The analysis was conducted using data collected over a two-month period (March–April 2026), which provided a snapshot of diagnostic utilization patterns during that time. While the study successfully captured OPD-to-Laboratory and OPD-to-USG conversion trends, a longer observation period could have provided a more comprehensive understanding of how these patterns change over time and across different patient volumes or seasonal variations.

Another limitation relates to the study setting. The research was conducted at a single private specialty hospital focused primarily on maternity and women's healthcare services. As healthcare organizations differ in terms of patient demographics, service delivery models, operational processes, and diagnostic infrastructure, the findings may reflect the unique characteristics of the study setting. Therefore, caution should be exercised while extending the findings to other hospitals or healthcare environments.

An important contextual factor during the study period was the transition in laboratory service operations. During March 2026, laboratory investigations were managed through an outsourced laboratory service provider, whereas from April 2026 onwards, laboratory services became available within the hospital. This operational change may have influenced patient convenience, accessibility, and utilization of laboratory services. Consequently, month-wise differences in laboratory conversion rates may not be attributable solely to patient behaviour and should be interpreted in light of this organizational transition.

The study was based entirely on routinely generated hospital records, including data obtained from the Hospital Information System (HIS), consultant records, and diagnostic service records. While such data provide valuable real-world operational insights, the analysis was dependent on the completeness and accuracy of the information recorded within these systems. Any inaccuracies or omissions in the source records could potentially influence the study findings.

A further limitation is that the study focused on measuring diagnostic conversion and leakage patterns rather than exploring the reasons behind them. The analysis was able to identify how many patients completed or did not complete recommended investigations within the hospital; however, it could not determine why these decisions were made. Factors such as affordability, waiting time, accessibility, convenience, patient awareness, personal preferences, referral practices, and perceptions regarding diagnostic services were beyond the scope of the study. As a result, the findings should be interpreted as indicators of utilization patterns rather than explanations of patient behaviour.

Similarly, consultant-wise variations in conversion rates were examined from an operational perspective to understand differences in diagnostic utilization patterns. However, the study did not account for factors such as clinical complexity, disease severity, patient case mix, or diagnosis-specific requirements, all of which may influence diagnostic recommendations and completion rates. Therefore, these findings should not be interpreted as measures of consultant effectiveness or performance.

Despite these limitations, the study offers a practical and data-driven assessment of diagnostic conversion patterns within a real-world healthcare environment. By examining OPD-to-Laboratory and OPD-to-USG conversion rates, diagnostic leakage, and utilization of in-house diagnostic services, the study contributes meaningful operational insights that can support evidence-based decision-making, improve patient retention, and strengthen continuity of care within the hospital.

6.4 Scope for Future Research

The current research was able to obtain information about OPD-to-Laboratory and OPD-to-USG conversion rates, diagnostic leakage, and usage of diagnostic facilities within the hospital. However, it also raises many questions and points out some areas where further research may yield interesting results that could be used to better understand patient behavior and service utilization.

One such area is the motivation behind diagnostic leakage. The current study has identified the percentage of patients who failed to undergo tests as per the recommendations but has not delved into the reasons why this happens. In order to

understand if it is due to issues of convenience, wait time, costs, accessibility, or other issues, it would be necessary to conduct patient surveys or interviews.

Further research could also focus on analyzing the effects of completed diagnosis on the performance of both clinical and administrative activities. It would be interesting to find out whether the patients who have undergone the recommended tests while staying in the hospital receive better continuity of care, quick access to treatment, better follow-up, or more patient satisfaction overall.

An innovative field of research might include the development of models which help to predict the likelihood of non-compliance in completing tests. Using healthcare analytics techniques, the hospitals can establish certain patterns which would help them to take preventive actions like counseling or following up with the patient regarding the matter.Future studies may also evaluate the impact of operational changes on diagnostic utilization. The transition from outsourced laboratory services to in-house laboratory services observed during the present study highlights the importance of service accessibility and convenience. Further research could assess how changes in service delivery models influence patient behaviour, diagnostic conversion rates, and overall healthcare utilization.

Moreover, future research could be conducted not only on laboratory and ultrasonography diagnostic tests but also on other diagnostic tests and healthcare services. The examination of the whole process of patient flow throughout the healthcare pathway would offer more insight into the patterns of patients' service usage and leakage spots.

Thirdly, the implementation of the real-time dashboards and healthcare analytics offers plenty of promising research directions for the future healthcare management research. The continuous tracking of diagnostic conversion rates, patterns of leakage and service usage could assist in making informed decisions for healthcare organizations in terms of increasing efficiency and retaining patients.

Overall, the current paper is a beginning point for more sophisticated research on diagnostic utilization and patient retention.

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