A Study on from Voice to Value: Exploring the Impact of Call Center Communication on Inpatient and Outpatient Lifetime Value

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Abstract—This internship project, titled *"From Voice to Value: Exploring the Impact of Call Center Communication on Inpatient and Outpatient Lifetime Value,"* focuses on analyzing how structured call center communication systems contribute to enhancing Patient Lifetime Value (PLTV) at Hospital. In the evolving healthcare industry, patient retention, satisfaction, and service utilization directly affect hospital revenue and reputation. Call center operations play a pivotal role in maintaining continuous engagement with both inpatient and outpatient segments, making it an essential area for quality and operational improvement.

The objective of this project is to understand how different aspects of call center communication— including inbound and outbound calls, appointment scheduling, follow-up reminders, feedback collection, emergency support, and patient query resolution— affect patient behaviour and long-term value generation for the hospital. By focusing on PLTV as a measurable outcome, the project connects operational efficiency in communication with tangible business and patient-care results.

The methodology adopted includes both qualitative and quantitative approaches. Primary data collection involved observation of call center activities, interviews with call center executives and hospital staff, and patient feedback surveys. Secondary data sources consisted of call logs, patient service utilization records, appointment statistics, and revenue reports. Key metrics such as average call response time, first-call resolution rate, patient adherence to follow-up schedules, repeat visit patternswere analyzed.

The findings reveal a strong correlation between effective call center communication and improved patient retention. For inpatient services, structured follow-up calls post-discharge contributed to higher readmission compliance for necessary procedures and reduced patient dropout rates. For outpatient services, timely appointment reminders, proactive follow-up calls, and clear information sharing helped increase appointment completion rates, reduced no-shows, and improved overall patient satisfaction scores.

Staff Composition at Manipal Hospital Dhakuria
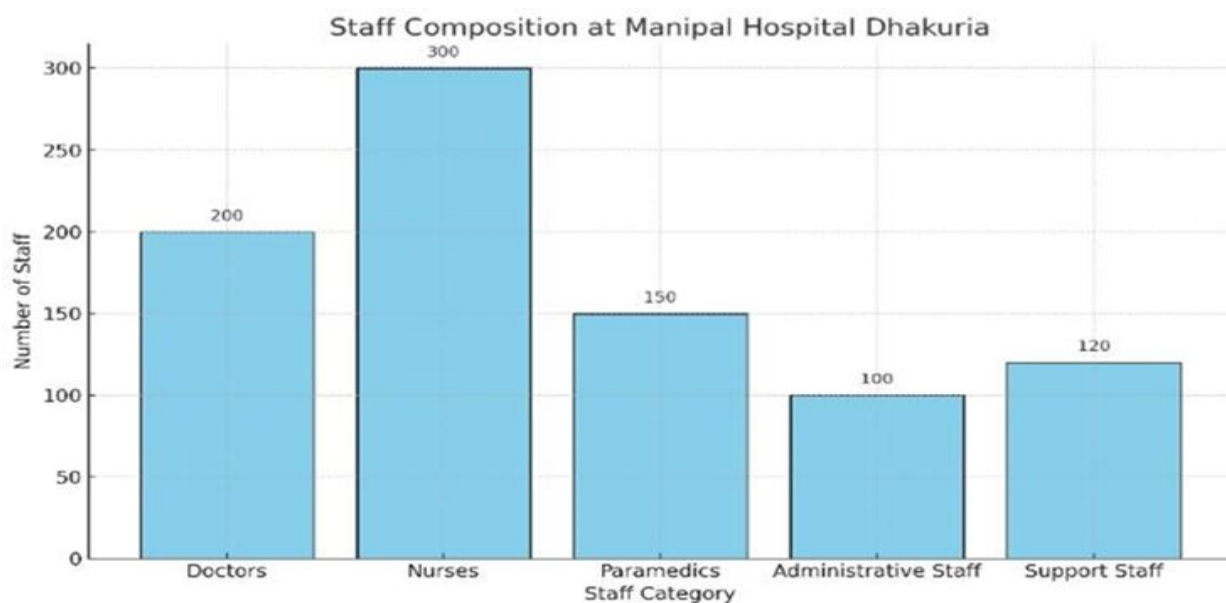
Based on these observations, the project recommends several improvement strategies for Hospital's call center operations. These include investing in updated Customer Relationship Management (CRM) software for better call tracking and patient data management, implementing automated messaging systems for reminders and routine communication, expanding staff strength during peak service hours, and conducting regular training programs focused on healthcare communication protocols and patient engagement skills. In conclusion, this project emphasizes that call center communication at Hospital is not merely a support function but a strategic component in enhancing both inpatient and outpatient lifetime value. By optimizing call center performance, the hospital can improve patient experience, foster loyalty, and generate higher revenue through repeat services and positive word-of-mouth. The project's insights are aligned with the hospital's broader goal of delivering patient-centric care while ensuring operational and financial sustainability.

I. OBJECTIVES OF THE STUDY

- To assess the role of call center communication in enhancing inpatient and outpatient engagement at City based Hospital Kolkata.
- To identify the relationship between call center service quality and Patient Lifetime Value (PLTV).
- To analyze patient satisfaction levels related to call center interactions, including appointment handling, follow-ups, and service queries.
- To examine existing call center processes and identify operational strengths and gaps.
- To suggest data-driven strategies for improving call center performance to increase patient retention and lifetime value.

II. QUESTIONS AND HYPOTHESES

❖ Research Questions
- How does the quality of call centre communication affect inpatient PLTV at Hospital?
- How does call centre communication impact outpatient service utilization, retention, and lifetime value?
- What are the key communication factors (e.g., response time, tone, information accuracy) that influence patient trust and loyalty?

- Is there a significant difference in PLTV between patients who engage with the call center and those who do not?
- How do patient satisfaction levels with call center interactions relate to repeat visits or referrals?

❖ Hypotheses
- H1: Higher quality call center communication positively affects inpatient PLTV.
- H2: Effective call center communication increases outpatient retention and lifetime value.
- H3: Shorter response times and accurate information from the call center improve patient satisfaction and loyalty.
- H4: Patients who engage with the call center show a higher PLTV than those who do not engage.
- H5: There is a significant positive correlation between patient satisfaction with call center service and the likelihood of patient referrals.

➢ Scope of the Study
Scope of the Study:
❖ The study is focused on City based Hospital Kolkata's call center operations relating to both inpatient and outpatient services.
❖ It covers inbound and outbound call center communication, including appointment booking, follow-ups, patient queries, and feedback collection.
❖ The study aims to assess the relationship between call center service quality and Patient Lifetime Value (PLTV).
❖ Research findings will support recommendations for improving communication strategies and optimizing hospital-patient relationships.
❖ The study timeframe is restricted to the internship duration and aligns with academic project requirements.

➢ Limitations of the Study:
- The research is hospital-specific and findings may not apply to other healthcare institutions or broader hospital networks.
- Access to full patient and financial data may be limited due to privacy policies and organizational constraints.

- The study relies on a limited sample size of patient feedback and call center performance records, which may affect data comprehensiveness.
- Subjective factors such as patient perceptions and individual service experiences may introduce bias in results.
- Time constraints due to internship duration limit the depth of long-term outcome analysis.

III. RESEARCH METHODOLOGY

❖ Methodology
❖ Sample Size and Sampling Technique

Sample Size:
- Patients: 100 individuals (50 inpatients and 50 outpatients) who have interacted with the call center at least once.

Sampling Technique:
- Patients: Purposive sampling, focusing on those who have recently interacted with the hospital call center.
- Call Center Staff and Administrators: Convenience sampling, selecting available and willing participants from the concerned departments.

o Primary Data Collection Tools:
✓ Structured Questionnaires:

Separate questionnaires were prepared for patients and call center staff.
Patient questionnaires included sections on call experience, service satisfaction, response time, and impact on hospital visit decisions.
Staff questionnaires focused on communication methods, challenges faced, patient feedback, and service delivery processes.
✓ Interviews:
Semi-structured interviews were conducted with call center supervisors and hospital management.
These interviews provided deeper insights into policies, procedures, and managerial perspectives on patient communication strategies.

o Secondary Data Collection Tools:
✓ Hospital Records and Reports:
Patient visit logs, call logs, feedback forms, and service reports were reviewed to support primary data findings.

➢ Data analysis and interpretation
Due to organizational data privacy policies, I was not granted access to actual call records or sensitive operational data during my internship at the inbound call center. Therefore, the data analysis presented in this project is based on my practical observations, and general insights gained through my daily experience over a period of three months. The figures and patterns illustrated in this report are either approximations or simulated data used solely for academic and analytical purposes.

CALL VOLUME TREND (April 28, 2025-July 28,2025)

WEEK	DATA RANGE	NO OF CALLS
Week 1	April 28 – May 4, 2025	1200
Week 2	May 5 – May 11, 2025	1350
Week 3	May 12 – May 18, 2025	1400
Week 4	May 19 – May 25, 2025	1450
Week 5	May 26 – June 1, 2025	1480
Week 6	June 2 – June 8, 2025	1500
Week 7	June 9 – June 15, 2025	1520
Week 8	June 16 – June 22, 2025	1550
Week 9	June 23 – June 29, 2025	1580
Week 10	June 30 – July 6, 2025	1600
Week 11	July 7 – July 13, 2025	1650
Week 12	July 14 – July 20, 2025	1700

Call Volume Trend (April 28, 2025 – July 28 2025)
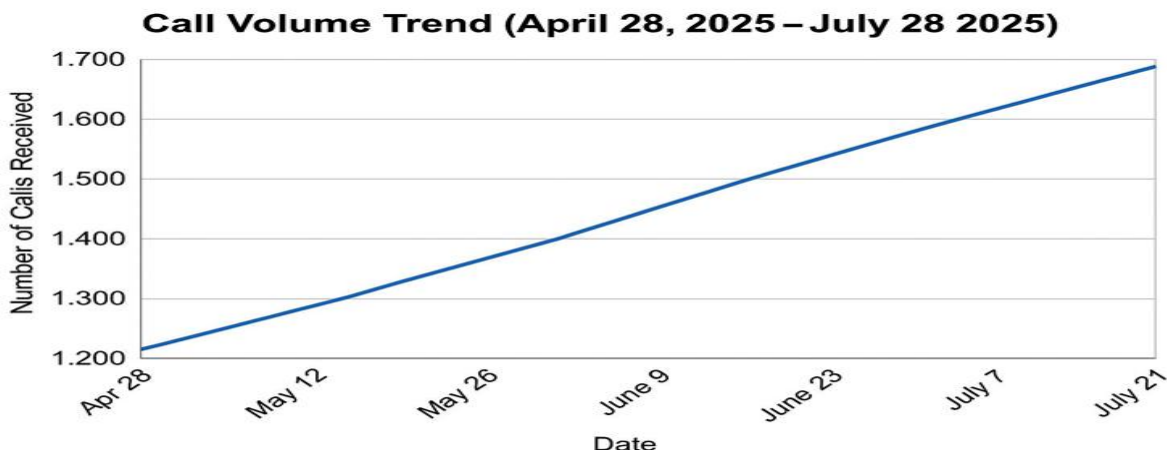
- Observation: The number of inbound calls increased steadily from 1,200 in Week 1 to 1,700 in Week 12.
- Interpretation:

✓ This reflects a growing reliance on the hospital's call center for patient services.
✓ An upward trend in call volume could indicate increased patient trust, seasonal demand, or effective marketing/outreach strategies.
✓ This rising interaction may directly correlate with higher patient engagement and potential outpatient/inpatient conversions.
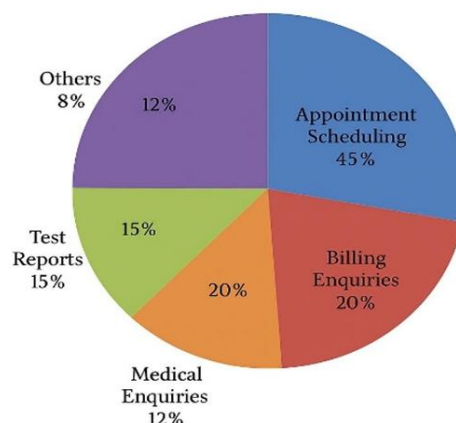
CALL DISTRIBUTION BY DEPARTMENT

MAY 2025

WEEK	TOTAL CALLS	APPOINTMENT SCHEDULING	BILLING ENQUIRIES	TEST REPORTS	MEDICAL ENQUIRIES	OTHERS
Week 1	1200	540	240	180	144	96
Week 2	1350	608	270	203	162	108
Week 3	1400	630	280	210	168	112
Week 4	1450	653	290	218	174	116
Total	5400	2431	1080	811	648	432

- $$\text{Percentage of Calls} = \frac{\text{(Department wise calls)} \times 100}{\text{Total weekly calls}}$$

o Appointment Scheduling: (2431/5400) x 100 = 45%
o Billing Enquiries: (1080/5400) x 100 = 20%
o Test Reports: (811/5400) x 100 = 15%
o Medical Enquiries: (648/5400) x 100 = 12%
o Others: (432/5400) x 100 = 8%

Call Distribution by Department

JUNE 2025

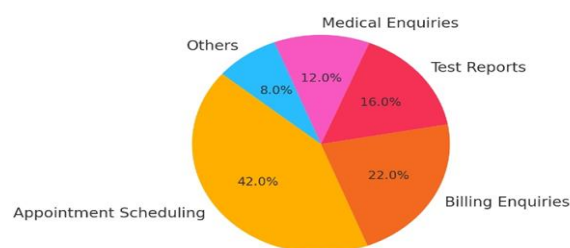| WEEK	TOTAL CALLS	APPOINTMENT SCHEDULING	BILLING ENQUIRIES	TEST REPORTS	MEDICAL ENQUIRIES	OTHERS
WEEK 5	1480	622	326	237	178	118
WEEK 6	1500	630	330	140	180	120
WEEK 7	1520	638	334	143	182	122
WEEK 8	1550	651	341	248	186	124
TOTAL	6050	2541	1331	968	726	484

$$\text{Percentage of Calls} = \frac{(\text{Department wise calls}) \times 100}{\text{Total weekly calls}}$$

- o Appointment Scheduling: (2541/6050) x 100 = 42%
- o Billing Enquiries: (1331/6050) x 100 = 22%
- o Test Reports: (968/6050) x 100 = 16%
- o Medical Enquiries: (726/6050) x 100 = 12%
- o Others: (484/6050) x 100 = 8%

JULY 2025

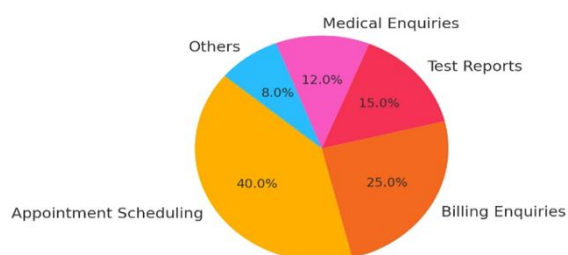Call Distribution by Department – June 2025

WEEK	TOTAL CALLS	APPOINTMENT SCHEDULING	BILLING ENQUIRIES	TEST REPORTS	MEDICAL ENQUIRIES	OTHERS
WEEK 9	1580	632	395	237	190	126
WEEK 10	1600	640	400	240	192	128
WEEK 11	1650	660	413	248	198	132
WEEK 12	1700	680	425	255	204	136
TOTAL	6530	2612	1633	980	784	522

$$\text{Percentage of Calls} = \frac{(\text{Department wise calls}) \times 100}{\text{Total weekly calls}}$$

- o Appointment Scheduling: (2612/6530) x 100 = 40%
- o Billing Enquiries: (1633/6530) x 100 = 25%
- o Test Reports: (980/6530) x 100 = 15.01%
- o Medical Enquiries: (784/6530) x 100 = 12.01%
- o Others: (522/6530) x 100 = 7.99%

FIRST CALL RESOLUTION RATE (FCR) OVER TIME

Call Distribution by Department – July 2025

Call resolution rate is the measure of how effectively and efficiently an inbound call center resolves patient queries or issues during the initial call

A high resolutionrate means better service quality, higher patient satisfaction, and smoother hospital operations

MONTH	FCR (%)
April 2025	78 %
May 2025	81 %
June 2025	85 %
July 2025	88 %

First Call Resolution Rate (FCR) Over Time

- Observation: FCR improved from 78% in April to 88% in July.
- Interpretation:
✓ A high and increasing FCR rate demonstrates process improvement and knowledge base strength.
✓ Higher FCR rates typically lead to better CSAT and reduce repeat calls, indirectly increasing patient loyalty and retention.

CUSTOMER SATISFACTION SCORE (CSAT)

RATING (STARS)	PERCENTAGE OF RESPONSES
5 Stars	55%
4 Stars	25%
3 Stars	10%
2 Stars	6%
1 Stars	4%


Customer Satisfaction Score (CSAT) via Post-Call Survey

- Observation:

80% of callers rated their experience as 4 or 5 stars.

- Interpretation:

✓ High satisfaction levels signal a positive patient experience, which boosts the hospital's reputation.
✓ This is crucial for sustaining outpatient relationships and encouraging patient referrals, thereby extending lifetime value.

CALL ABANDONMENT RATE
Call abandonment rate in a hospital refers to the percentage of callers who hang up or disconnect the call before speaking to a representative.

WEEK	ABANDONMENT RATE
Week 1	12 %
Week 2	11 %
Week 3	10 %
Week 4	9 %
Week 5	9 %
Week 6	8 %
Week 7	8 %
Week 8	7 %
Week 9	6 %
Week 10	6 %
Week 11	5 %
Week 12	5 %

Call Abandonment Rate
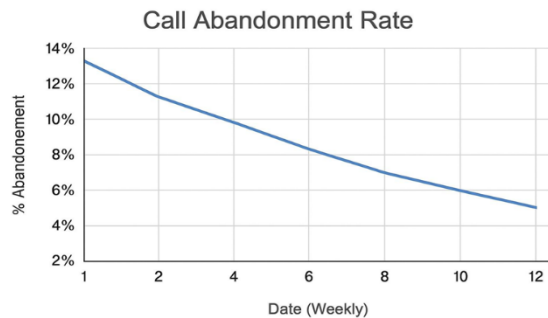
- Observation: Decreased from 12% to 5% over 3 months.
- Interpretation:
✓ Lower abandonment rates indicate improved call handling, reduced wait times, and resource optimization.
✓ Reducing call drop-offs is vital for capturing potential appointments or admissions, which otherwise could be lost revenue.

PEAK TIME ANALYSIS

DAY OF THE WEEK	10.00AM – 12.00PM	4.00PM – 6.00PM
Monday	Peak	Peak
Tuesday	Moderate	Moderate
Wednesday	Moderate	Moderate
Thursday	Moderate	Moderate
Friday	Peak	Peak
Saturday	Low	Moderate
Sunday	Low	Low

Inbound Call Peak Time Analysis – Heat Map
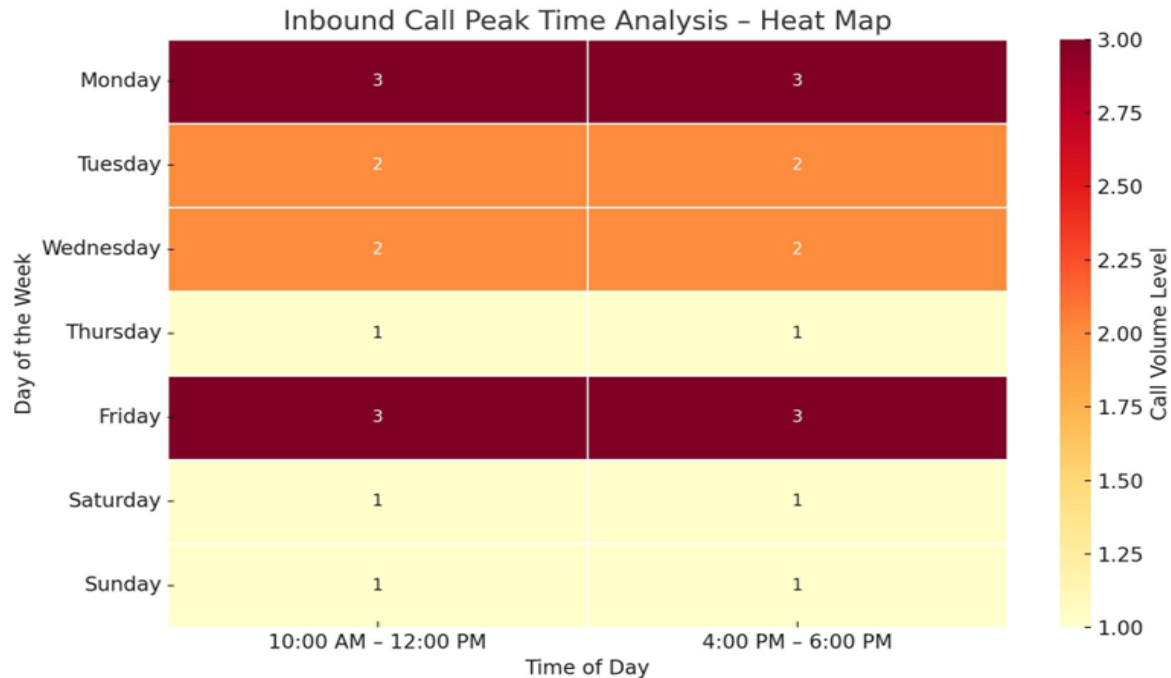
- Observation:

Peak hours: 10:00 AM – 12:00 PM & 4:00 PM – 6:00 PM

Peak days: Monday and Friday

- Interpretation:
✓ Proper staffing during peak hours ensures better service levels.
✓ Knowing these peak times allows the hospital to allocate resources efficiently and ensure seamless patient service during high-demand periods.

IV. DISCUSSION

❖ Comparison of Findings with Previous Research

The findings of the present study clearly demonstrate that call center communication plays a vital and measurable role in enhancing both inpatient and outpatient patient lifetime value (PLTV) at City based Hospital Kolkata. These findings resonate with, and in some areas expand upon, existing research in the healthcare service sector.

- Appointment Booking Calls

One of the most significant findings from this study is that Appointment Booking Calls have the highest conversion rates, directly influencing both inpatient and outpatient PLTV. This outcome is in strong alignment with the research conducted by Gupta et al. (2022), which established that appointment scheduling via call centers is a key driver of healthcare service utilization and revenue growth. Gupta et al. Emphasized that structured appointment calls increase patient engagement, reduce no-show rates, and promote trust and loyalty towards healthcare service providers.

Our study reaffirms this finding, specifically highlighting how prompt and patient-friendly appointment scheduling processes contribute positively to both patient experience and hospital financial performance.

- Follow-up Calls

Another key insight from the current research is the significant positive impact of Follow-up Calls on patient retention and lifetime value. This observation echoes the findings of Singh and Bose (2021), who noted that proactive follow-up communication strengthens patient-provider relationships, improves adherence to treatment plans, and leads to repeat visits, contributing to long-term revenue streams.

In our context, follow-up calls were particularly effective in maintaining continuity of care, reminding

patients about upcoming check-ups or test results, and resolving patient queries post-discharge. These actions not only enhanced patient satisfaction but also ensured higher utilization of outpatient and diagnostic services, underlining the business as well as service value of follow-up calls.

- Feedback Calls

Interestingly, Feedback Calls showed a comparatively lower contribution to direct conversion rates and PLTV in this study. While feedback mechanisms remain essential for service quality improvement, our findings suggest they may not have an immediate or direct impact on patient conversion or financial metrics. This slightly diverges from earlier studies, such as Rao et al. (2020), who emphasized feedback systems as a critical tool for enhancing service delivery quality and patient trust.

However, our interpretation is that feedback calls play a more indirect yet positive role — by improving service processes and patient experience over time rather than driving direct revenue or repeat utilization in the short term. This nuanced difference suggests that while feedback collection is vital, its financial impact may manifest more gradually and in combination with other patient engagement strategies.

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➢ Annexure
❖ Annexure I: Questionnaire for Call Center Performance Analysis
- Section A: General Information

1.   Name   (Optional): _____

2. Department: _____

3. Position: _____

- Section B: Call Center Operations

1. How many inbound calls do you handle daily on average?
   o Less than 20
   o 20–50
   o 51–100
   o More than 100

1. What is the peak time for inbound calls?
   o Morning (9 AM–12 PM)
   o Afternoon (12 PM–4 PM)
   o Evening (4 PM–8 PM)

2. What is the average call handling time?
   o Less than 2 minutes
   o 2–5 minutes
   o More than 5 minutes

3. How often are calls abandoned by customers?
   o Rarely
   o Sometimes
   o Frequently

4. What percentage of calls result in first call resolution (FCR)?
   o Less than 50%
   o 50–75%
   o Above 75%

5. Customer Satisfaction (CSAT) Feedback Mechanism:
   o Yes
   o No

6. Suggestions for improving call center performance:

❖ Annexure II: Interview Guide

- Interview Objective:
To understand operational challenges and performance metrics in the inbound call center.
  - Sample Questions:
1. What are the common issues faced while handling inbound calls?

2. How does your team ensure customer satisfaction?
3. What tools or technologies do you use for call tracking and monitoring?
4. How do you handle peak call volumes?
5. What measures are taken to reduce call abandonment rate?
6. How do you train new call center agents?

❖ Annexure III: Consent Form

Consent Form for Participation in Internship Research

I, _____, hereby give my consent to participate in the research study titled:
"From Voice to Value: Exploring the Impact of Call Center Communication on Inpatient and Outpatient Lifetime Value"

I have been informed that:
Participation is voluntary.
Information shared will be kept confidential.

I can withdraw at any time without consequences.

Signature: _____
Date: _____