Summer Internship Report

ON

"Evaluating the Effectiveness of Contactless Patient Registration and Billing Using QR Code and Mobile Application Technology for improving patient satisfaction"

At

Marengo Asia Hospitals

HUMANE BY PRACTICE

(05th May–05th July 2025)

A Report

By

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(PG/24/104)

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PGDHM (Hospital and Health Management)

2024-26

IIHMR DELHI

International Institute of Health Management Research, New Delhi

ACKNOWLEDGEMENT

Over the past two months, this internship journey has been both intense and immensely rewarding. As I reflect on this transformative experience, I am `filled with gratitude for the people whose support and guidance have been crucial to its successful completion.

I would like to extend my sincere thanks to **IIHMR Delhi** for providing me with the opportunity to intern with **Marengo Asia Hospital**. I am especially grateful to my mentor, **Dr. Rupsa Banerjee**, for his continuous support, insightful guidance, and encouragement throughout this period.

My heartfelt appreciation goes to **Mr. Govind Kumar Jha**, **Mr. Vivek Verma**, and **Mrs. Nikita**, my managers and mentors at Marengo Asia Hospital. Their guidance, mentorship, and trust in my abilities have been instrumental in shaping my understanding of the digital health domain. Their willingness to involve me in meaningful projects and their dedication to nurturing my growth created an environment of learning that I will always value.

I am also thankful to my fellow interns, whose enthusiasm, collaboration, and positive energy enriched this experience. Working alongside them made each day more enjoyable and contributed to a dynamic and supportive learning environment.

I would be remiss not to mention the constant support of my friends and family. Their encouragement and belief in me served as a source of motivation, helping me navigate challenges and make the most of every opportunity.

This internship has not only broadened my knowledge but also strengthened my resolve to pursue a career in **digital health and hospitals.** I look forward to applying the insights and experiences I've gained as I continue to grow in this field.

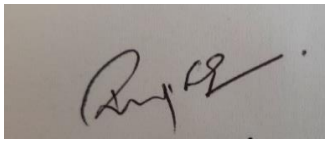
INTERNSHIP COMPLETE CERTIFICATE



CERTIFICATE OF APPROVAL

Certificate of Approval

The Summer Internship Project of titled **"Evaluating the Effectiveness of Contactless Patient Registration and Billing Using QR Code and Mobile Application Technology for improving patient satisfaction"** at **"Marengo Asia Hospital Gurugram"** is hereby approved as a certified study in management carried out and presented in a manner satisfactorily to warrant its acceptance as a prerequisite for the award of **Post Graduate Diploma in Health and Hospital Management** for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed, or conclusion drawn therein but approve the report only for the purpose it is submitted.



Dr. Rupsa Banerjee

Designation (Associate Professor)

IIHMR, Delhi

FEEDBACK FORM

(Organization Supervisor)

Name of the Student: Sudhir Gupta

Summer Internship Institution: Marengo Asia Hospital, Gurugram

Area of Summer Internship: Health IT, Operations (GRE)

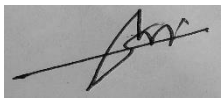
Attendance: Regular

Objectives met: Yes, all assigned objectives were met.

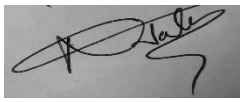
Deliverables:

Strengths:

Suggestions for Improvement:







Signature of the	Signature of the	Signature of the
IT Head	**Unit Head SDPE**	**Officer-in-charge, Internship**
(Govind Kumar Jha)	**(Vivek Verma)**	**(Nikita Jajodia)**

Date: 30th July 2025

Place: Gurugram, Haryana.

FEEDBACK FORM

(IIHMR MENTOR)

Name of the Student: Sudhir Gupta

Summer Internship Institution: Marengo Asia Hospital, Gurugram

Area of Summer Internship: Health IT, Operations (GRE)

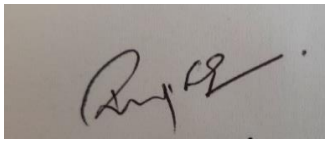
Attendance: Regular

Objectives met: Yes, all assigned objectives were met.

Deliverables: summer internship research project and report.

Strengths: sincere, eager to learn.

Suggestions for Improvement:



Signature of IIHMR mentor

Sudhir Gupta ST

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LIST OF ABBREVIATIONS

ABBREVIATION	FULL FORM
ABDM	Ayushman Bharat Digital Mission
NHA	National Health Authority
UHID	Unique Health Id
OPD	Outpatient Department
IPD	Inpatient Department
HIS	Hospital Information System
IT	Information Technology
PSI	Patient Satisfaction Index
NPS	Net Promoter Score

OBSERVATIONAL LEARNING

Introduction

Marengo Asia Hospitals is an integrated network of multi-specialty hospitals dedicated to providing tertiary and quaternary care with patient-centricity at its core. The organization focuses on creating **'centers of excellence'** across various medical specialties that set new standards for healthcare quality, innovation, & measurable outcomes while prioritizing a 'patient-first' approach. Under the leadership of **Dr. Raajiv Singhal**, the Founding Member, Managing Director, and Group CEO, Marengo Asia Hospitals has rapidly expanded to a capacity of over 1,500 beds across four hospitals, supported by a team of more than 600 skilled doctors. The organization's goal is not just to provide healthcare services but to elevate the entire healthcare experience for patients & their families.

Marengo Asia Hospitals is built on the foundation of the **4 A's: Accessibility, Affordability, Awareness, and Accountability**. While the first three are widely emphasized in the healthcare industry, it is accountability that sets us apart. By ensuring that all stakeholders are responsible for patient care, the hospital upholds the highest standard of quality.

Marengo Asia Hospitals is also proud to advance the International Clinical Corridor—an innovative collaboration between its experts and the health ministries of partner countries to establish Centers of Excellence (COE) for specific medical specialties on the principles of **3T's—Teach, Train & Treat**. Through this initiative, doctors, nurses, and healthcare staff from partner countries receive comprehensive training in India, equipping them with advanced skills to enhance healthcare services in their home countries.

Marengo Asia Hospitals is committed to fostering an environment of healing, innovation, and trust, serving as a cornerstone of health and care in the communities it serves.

Marengo Asia Vision

To be the **premier network of centers of excellence**, where every decision prioritizes a **'patient-first' philosophy** and fosters **stakeholder collaboration**, setting the benchmark for **exemplary healthcare.**

Marengo Asia Mission

To make Healthcare Humane for every stakeholder—patients, Doctors, employees, and shareholders—with empathy

Marengo Asia Values and Ethos

- **Accountability—All** dealings with patients and stakeholders are done in a fair and transparent manner
- Usage of **technology** to enhance **clinical outcomes** and experience for patients
- Continuous **skill upgradation** of caregivers
- **Collaboration** amongst all stakeholders to drive mutual success

Learnings

During my internship at Marengo Asia Hospital Gurugram. I had the opportunity to work on various projects.

1. Got proper insight into the hospital operations and its workflow.
2. Attended the training program on the hospital HIS module.
3. Attended a workshop on the “hospital QR billing system.”
4. Contributed to and evaluated the conversions from OPD patients.
5. Learned about different departments established in the hospital.

Role in Marengo Asia Hospital

- First point of contact with patient at OPDs (guest relations executive).
- Helping them book a consultation appointment with the doctor via QR scanner and mobile app and without standing in a queue.
- To maintain Net Promoter Score (NPS) and Patient Satisfaction Index (PSI) via the MedBlaze feedback form.
- To identify and escalate problems related to QR scanner billing and the mobile app.
- To collect suggestions and improvements for the app and QR scanner from patients who have used them.

Conclusive learning

- Exposure to hospital operation (patient-centred services)
- Understanding the digitization of the process of registration, appointment, and billing for OPD patients.
- Implementation of QR scanner and mobile application in phases.
- Time management
- Communication skills
- Report writing
- Engaging with people from different departments and expertise.
- Making new connections with our colleagues.
- Maintaining work-life balance.

PROJECT REPORT

"Evaluating the Effectiveness of Contactless Patient Registration and Billing Using QR Code and Mobile Application Technology for improving patient satisfaction"

Introduction:

Digitization in India's healthcare sector has increased after the COVID-19 pandemic, radically altering how hospitals provide care and handle patients . The use of QR code, scanner, like mobile applications and QR code-based registration has been proved effective.(1,2)These solutions have become essential for lowering waiting times, minimizing physical contact, and improving patient satisfaction in outpatient departments (OPDs).(1,3) This Digitization process is aligned with the Ayushman Bharat Digital Mission (ABDM) with main focus on improving patient accessibility, patient affordability and accelerate hospital operations and provide patient-centric care.(4,5)

India's healthcare sector is being transformed by digital technologies. The use of digital health applications in hospital-based care, especially so in tertiary care centers, has become more integral to improve the productivity, availability and quality of health.(6) Innovations such as the contactless dynamic QR code-based patient registration and billing applications now play a critical role in the day to day running of modern hospitals.(1,7) Reducing interaction and wait times at the front desk of clinics by These technologies will also change how the traditional front-desk functions at each clinic by helping reduce physical interactions and patient waiting times, governors said in the release.(1)

India's tertiary care hospitals which handle a huge number of patients with complicated health conditions, are leading this digital revolution.(6) The catalyst for this transition was strikingly and most forcefully brought home with the COVID-19 health crisis, which has revealed the unsustainability of traditional hospital systems and reiterated the importance of scalable, contactless and patient-centered solutions.(8,9) In turn, hospitals have sought to minimize human exposure through use of mobile health platforms, user of QR code technology, and seamless use of Hospital Information Systems (HIS) safer and more convenient access to patients.(10)

As with any other section of the workflow practice, there are difficulties in putting these diagnosis and therapeutic tools into practice. Tertiary care hospitals like marengo Asia hospital in India faces problems like a lack of infrastructure, a wide digital literacy gap, limited budget and funding, and an unwillingness to adopt changes among healthcare workers. Furthermore, in the context of broad digital health systems, maintaining interconnectivity, protecting patients' private information providing privacy and security and also safeguarding data remain critical.(6)

Regardless of the obstacles that need to be overcome, the opportunities resulting from the digitization of hospital processes are immense. It impacts overall efficiency, increased patient satisfaction index , more precise and timely capture of patient information and improved clinical decision-making, and timely data

capture. Initiative like Ayushman Bharat Digital Mission (ABDM) and other similar initiatives highlight the government's efforts towards building a collective digitized health system.(4,5) The Ayushman Bharat Digital Mission (ABDM) program seeks to improve healthcare services at all levels by using open, accessible, affordable and integrated digital health frameworks.(4,5)

The Objective of this project report is to analyse the use of QR codes and mobile applications for patient registration and billing in the outpatient department of Marengo Asia Hospital in Gurugram and provide essential insight for the organisation. Specifically, it aims to explore how such digital innovations are practically integrated and the value they bring in transforming patient participation and satisfaction and hospital operational workflows in the Indian healthcare ecosystem.

Ayushman Bharat Digital Mission :- (ABDM)

Under the Ayushman Bharat Digital Mission (ABDM), the National Health Authority (NHA)(11,12) is a flagship program under the Government of India which focuses on the enhancement of availability and delivery of healthcare services. "To build a national digital health ecosystem that facilitates universal health coverage as a digitally enabled system that is efficient, accessible, inclusive, affordable, timely, safe, ensures the security, confidentiality, and privacy of health-related personal information, and supports a comprehensive range of data, information, and infrastructure services," is the vision of ABDM. Its main objective is to digitize the entire healthcare system.(13) Its five key components are United Health Interface (UHI), ABHA Mobile app (PHR) , Health Facility Registry, ABHA number (Unique Health ID), and Health Care Professional Registry.

Rationale of the Study

With the increase in demand for effective and contactless healthcare services, especially in the aftermath of the post-COVID period, digitization is a necessity at our tertiary care facilities. Technologies such as QR code sign-up of patients and payment through mobile applications can potentially streamline processes, reduce waiting times, and enhance satisfaction with the healthcare experience. However, aspects such as infrastructure shortage, digital literacy, and integration of data into existing systems constrain adoption.

The research aim is to evaluate the viability of such technology in a practical environment at Marengo Asia Hospital, Gurugram, and present implications regarding its operation. The findings of the project report will offer valuable inputs in framing strategies for scaling such solutions for attaining national goals like those visioned under the Ayushman Bharat Digital Mission (ABDM).

So, this research is timely and pertinent because it address an important gap in the existing healthcare environment—assessing the operational efficiency, experiential, and systemic effects of contactless patient registration and billing application in a tertiary care hospital environment.

Objective:

Primary Objective:

- To evaluate the effectiveness of contactless patient registration and billing using QR codes and mobile application technology on patient satisfaction visiting the outpatient department (OPD) of a tertiary care hospital—Marengo Asia Hospital, Gurugram

Secondary Objectives:

1. To assess patient satisfaction and usability associated with QR code and mobile app-based hospital services through feedback collected using digital tools like MedBlaze.
2. To identify key challenges and barriers faced during the implementation and usage of contactless registration and billing technologies in a real-world tertiary care setting.
3. To explore opportunities for process improvement and provide strategic recommendations for scaling up digital registration and billing systems across similar healthcare institutions.

A. Methodology

This study employed a mixed-methods approach combining observational analysis, secondary data review, and patient feedback collection to evaluate the effectiveness of contactless patient registration and billing using QR codes and mobile application technology at Marengo Asia Hospital, Gurugram.

Study Design:

The research was conducted as an observational and evaluative study over a period of two months (May–July 2025) during a summer internship program.

Study Settings

Marengo Asia Hospsital, Gurugram, Haryana, 122011.

Marengo Asia Hospital is a tertiary care hospital with multispecialty facilities.

There are a total of 34 OPD departments, like Orthopaedics, neurology, Oncology, internal medicine, urology, pulmonology, cardiology, etc.

Study Population

Patient who are visiting the hospital OPD.

Inclusion Criteria:

- Patients below of age 60 - (age < 60).
- Age group of : 18-60 yrs

Exclusion Criteria:

- Patient above (Age> 60) Patients above age of 60 were given senior citizen discount, which can only be availed via front desk billing.
- CGHS cardholder patient (central government health scheme)
- Those who do not own smartphones cannot be enrolled in the study.
- Emergency, anesthesia, and diagnostic services are available to patients, like 2D ECHO and ECG.
- Patient for hemodialysis.
- International patient.
- Patient has a gold card membership at Marengo Asia Hospital.
- Patient has corporate empanelment and health insurance.

Sample Size Calculation:

Parent study is

https://www.simbo.ai/blog/the-importance-of-mobile-check-in-applications-in-modern-healthcare-reducing-wait-times-and-improving-patient-satisfaction-595868/

Sample size required for estimating proportion/percentage

$$\mathbf{n = z\alpha^2 pq/d^2}$$

were,

Z_α = standard normal deviate (for an α level of 5%, the value of z is 1.96)

p = expected proportion/prevalence

q = (1 – p)

d = precision

Estimating Sample Size: Based on past research, the expected success rate was

Improved patient satisfaction percentage = 20%

A. Calculating sample size with absolute precision

$$n = \frac{(1.96)^2 . (0.2) . (0.8)}{(0.1)^2} = \mathbf{61.4 \approx 62}$$

B. Calculating sample size with absolute precision

$$n = \frac{(1.96)^2 . (0.8)}{(0.2) . (0.1)^2} = \mathbf{1536.64 \approx 1537}$$

Based on the feasibility and patient load a sample size of 62 was selected for study.

Required Sample Size

Total sample size = 62 participants

This sample size will ensure a statistically significant comparison between the two groups with 95% confidence and 80% power.

Sampling Techniques: Random Sampling.

Out of 514 OPD Patient who used QR scanner and mobile application in month of May date starting from 01-May to 31-may.

Out of these 514 OPD patient feedback of 62 patients were recorded.

- Total no of sample collected

Data Collection Methods:

1. **Secondary Data Source:**
   - Data were extracted from the hospital's **Hospital Information System (HIS)** and operational dashboards.
   - Existing patient records and process flow documentation were reviewed to understand pre- and post-implementation workflows.
2. **Patient Feedback Analysis:**
   - Feedback was collected from OPD patients using the **MedBlaze tool**, which measures patient experience through Net Promoter Score (NPS) and Patient Satisfaction Index (PSI).
   - Both quantitative scores and qualitative comments were considered.

Patient feedback link:

https://qms.marengoasia.com/p/botomate/search?channel=qr&name=OP%20Feedback

Registration/Billing

Registration/Billing Experience


Excellent


Good


Average


Poor

Time taken for registration/billing

- ○ Within 5 mins
- ○ 5-10 mins
- ○ More than 10 mins

Competence of the staff in responding to the your queries


Excellent


Good


Average


Poor

Courtesy & behaviour of the registration/billing staff

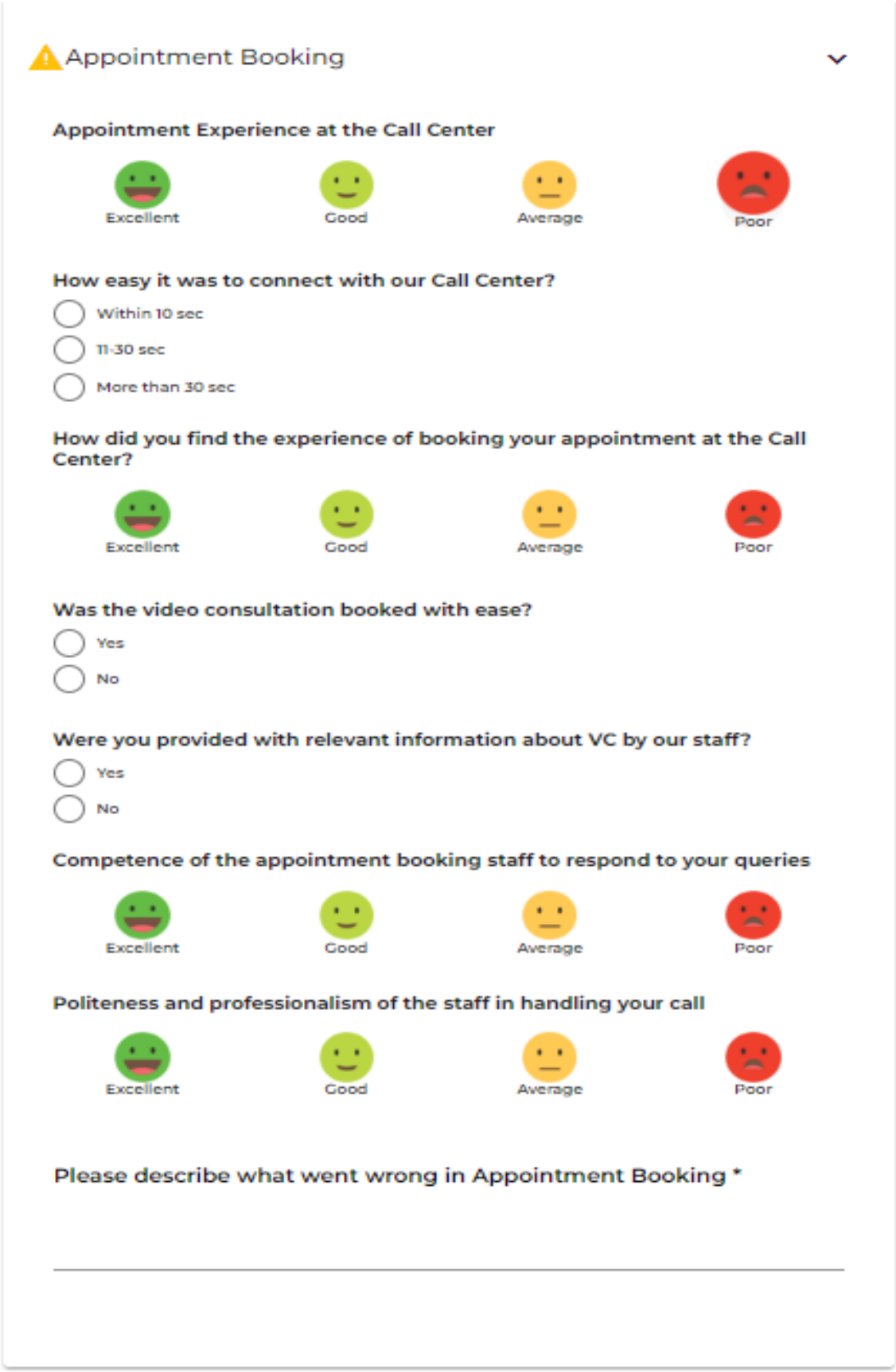

Excellent


Good


Average


Poor

Please describe what went wrong in Registration/Billing *



3. **Observational Insights:**
    - Direct observation of OPD registration and billing processes (both traditional and digital) was conducted.
    - Observations included time taken, patient interaction, queue lengths, and system usability.
4. **Staff and Intern Interaction:**

- Informal discussions were held with front-desk staff and IT personnel to identify practical challenges in implementing the contactless system.

Analysis Approach:

- analysis was performed between the digital and manual systems to assess in turnaround time, patient flow, and satisfaction levels.
- Descriptive statistics were used to summarize feedback metrics and operational performance.

Limitations:

- The study was limited to a single hospital unit and a short duration.
- Data may be influenced by the novelty effect, as the technology was recently introduced.

Result:

Total of 62 responses were collected from the patient via online feedback tool which us

To establish the relation between registration/appointment/billing the **medblaze app** use a statistical formula to calculate PSI (Patient Satisfaction Index).

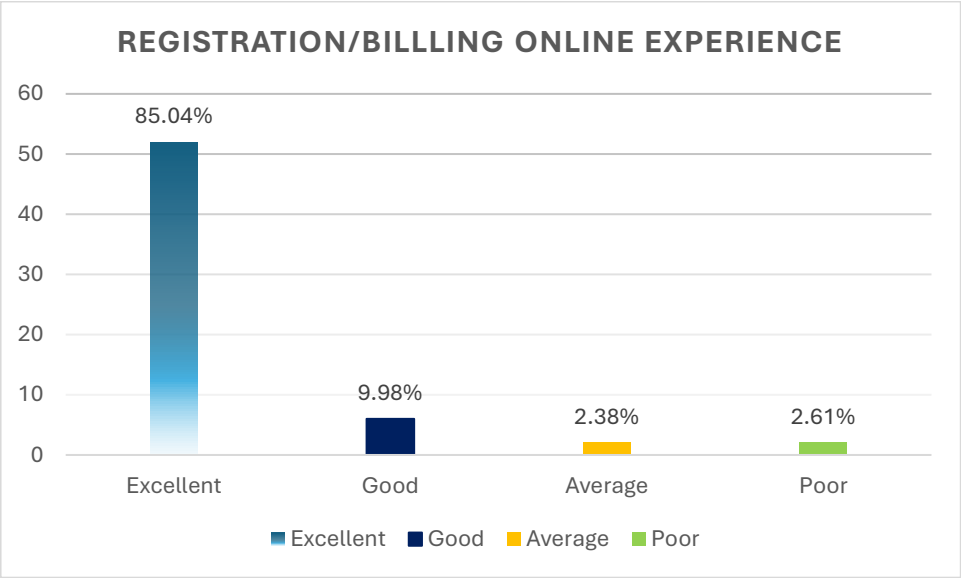
The overall Patient Satisfaction index for month of the May is

1. The overall performance of online billing user/patient is

85.04% of the respondents rated their online registration and billing experience as **Excellent**, indicating a very high level of satisfaction.

9.98% rated it as **Good**, which, when combined with the "Excellent" category, shows that **95.02%** of users had a *positive experience* overall.

Only **2.38%** of patients rated the experience as **Average**, and **2.61%** rated it as **Poor**, representing a very small proportion of dissatisfaction.



2. Patient satisfaction index

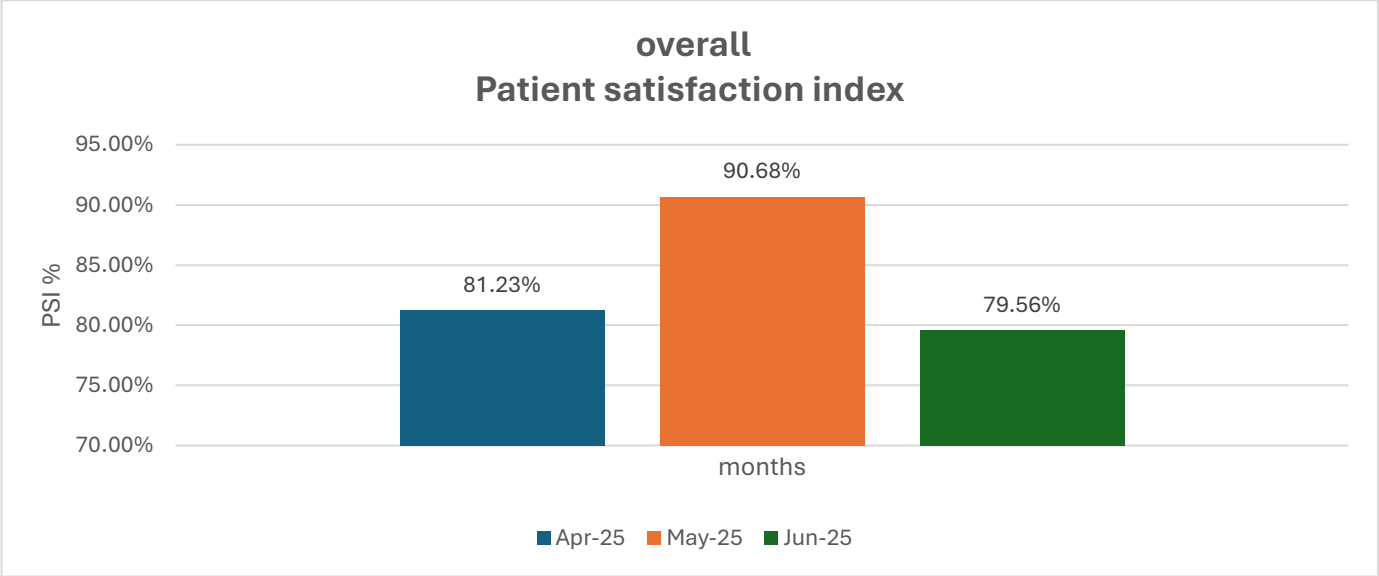
Patient Satisfaction Index = (Sum of ratings x 100)_(Count of rating x Maximum achievable score)

The medblaze app of hospital uses this equation to calculate PSI in all the department of hospital consisting

- Appointment Booking
- Registration/Billing
- Experience with doctor
- Lab services
- Radiology services

- Hospital Services
- Hospital experience
- Parking
- Hospital Cleanliness
- Other services

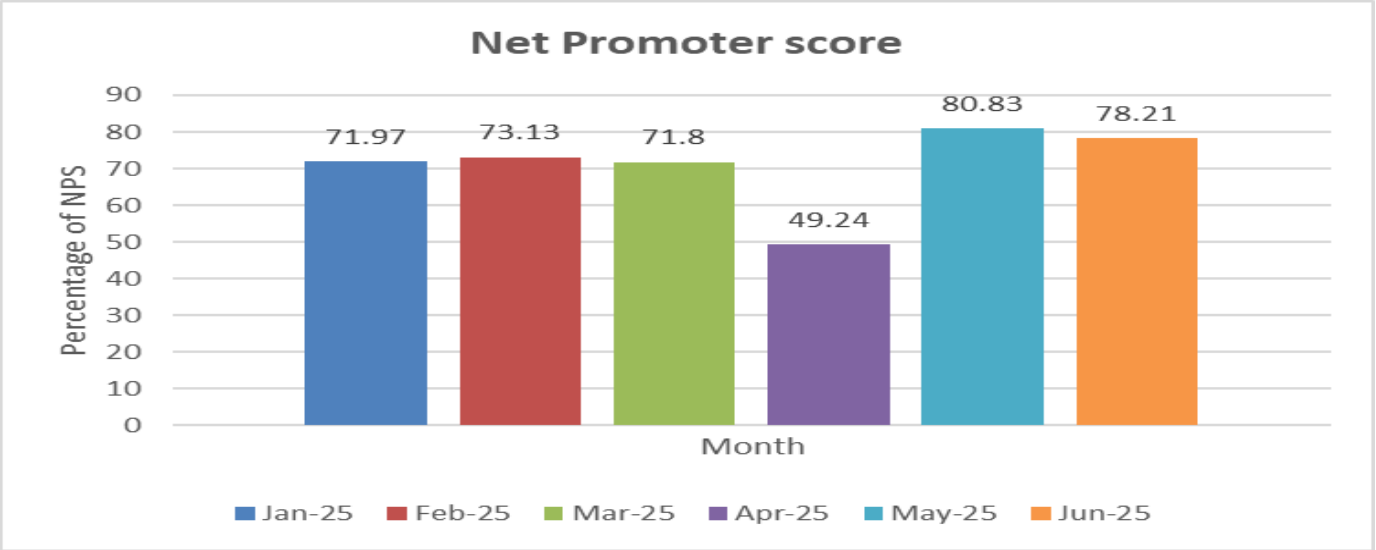
But this PSI include only appointment, registration and billing.



The patient satisfaction index saw significant fluctuation over these three months. It started at 81.23% in April 2025, then jumped impressively to 90.68% in May 2025, showing high patient satisfaction. However, it decreased in June 2025, settling at 79.56%.

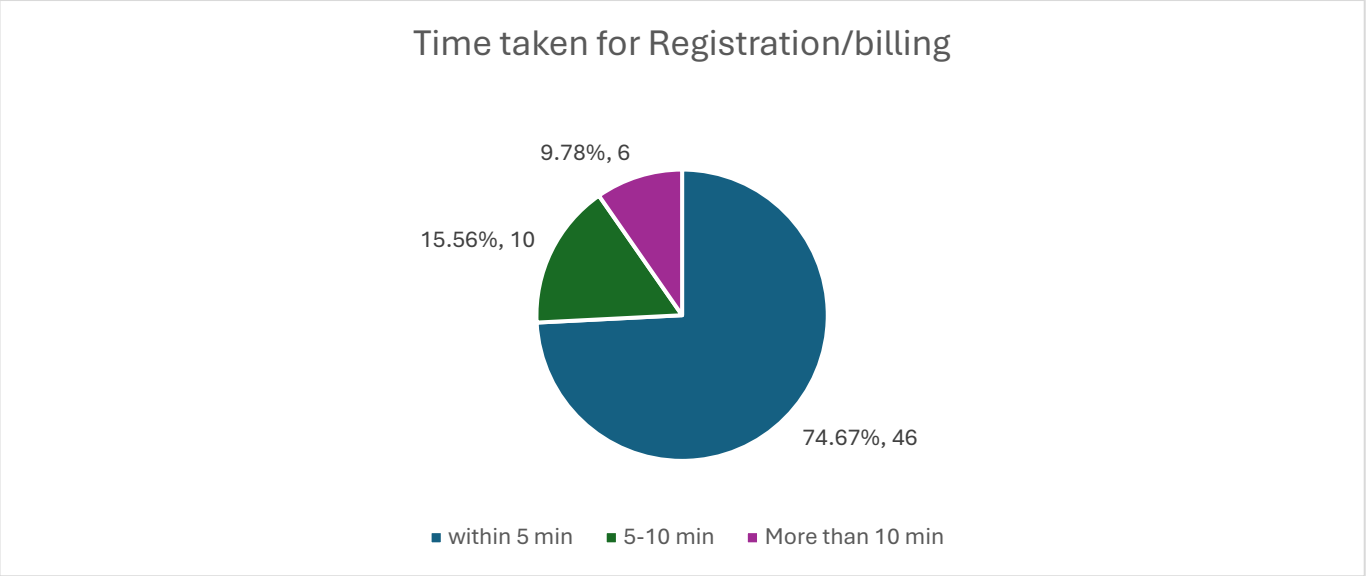
3. Net promoter score (NPS)

Net Promoter Score i.e. (NPS) were generally remained high from month of January to month of June 2025, consistently above 70% for most of the months. April 2025 saw a dip in NPS to 49.24%, but it again bounced back significantly in month of May 2025, reaching its highest point at 80.83% (during the time of the study).



4.Time Taken for Registration and Billing

graph shows the time taken for registration and billing. A large majority of people, 74.67% (46 individuals), complete the process within 5 minutes. Only a small percentage, 9.78% (6 individuals), take more than 10 minutes to finish.



Discussion:

A major advancement in the way healthcare administration functions is the shift to contactless patient registration and billing, which is facilitated by QR codes and mobile applications.(1,2)The inconvenience of lines, the possibility of mistakes from manual data entry, and the risk of germ transmission—a concern brought to light by the COVID-19 pandemic and other recent events—are all long-standing problems with traditional systems that this method directly addresses.

These implementations has resulted in a number of significant benefits:

- ***Increased operational Speed and Efficiency***: Contactless systems like QR scanner and hospitals mobile applications has streamlined the administrative services and significantly reduce patient waiting times by eliminating the need of standing in long ques for registration appointment and billing. Whether the patient is at home or already at the facility, patients can use their smartphones for registrations, update their medical histories, and manage payments. The patient can choose his/her preferred doctor from the speciality , their convenient time slot , mode of payment. This results in a smoother workflow and quicker check-ins.
- ***Better Patient Experience and Convenience***: Registration and payment single handedly provide unparalleled convenience to the patient firmly at the center of their own healthcare process. (1)particularly the younger generations, place strong emphasis on expediency and hassle-free processes, which are easily facilitated through contactless payments. Patients enjoy the lessened need for physical touch and the ease of dealing with formalities without touching paper or common touchpoints.(3)
- ***Improved Accuracy and Data Protection:*** patient health data is one of the most crucial data amongst all. By mobile health application patient himself is a administrator of their health data record. Electronic records and QR code integration reduce the risk of basic human error like spelling mistakes etc. in data entry of registration and billing resulting in more accurate and cleaner patient records. Also, safe QR code technology can encrypt confidential patient information enhancing data privacy and reduce the chances of data breaches. These system can be easily integrate with any existing healthcare tools (**HMIS)** without any issues, providing seamless interoperability and instant access to information to healthcare provider and patient both.
- ***Health and Safety Emphasis:*** By the nature of the thing, contactless interactions create a healthier and safer environment because they limit physical contact and the tendency to touch shared surfaces—a critical part of infection control.
- ***Financial Advantages and Operational Efficiency:*** from the perspective of healthcare provider these systems could reduced operating expenses through minimal paper use, less human resources and administrative costs. Billing and payment processes can also be automated to achieve higher accuracy in payment reconciliation as well as better collection rates.(1,11)

There are always challenges and key considerations, though:

Where the advantages are evident, effective adoption will necessitate close scrutiny in assuring that all patient segments feel at ease with the digital tools, providing additional methods of registration for those with no smartphone facilities, and having strong cybersecurity protocols in place to protect sensitive health

information. Most importantly, integration with legacy Hospital Information Management Systems (HIMS) and Electronic Health Records (EHR) in an effortless manner is necessary to build an integrated and effective system.(14)

Conclusion and Recommendations

The affirmative effect on Patient Satisfaction Index (PSI), with a total PSI of 90.68 for May reflected in this report excerpts, quite clearly illustrates the real benefits of such systems. Secondly, the strong average scores in fields such as "Registration/Billing" (4.58 out of 5) and "Appointment Booking" (4.54 out of 5) point to just how popular these online solutions have proved to be with patients. Although there may be a temporary "new technology" effect on the data, the underlying advantages—speed, hygiene, and accessibility—imply a sustained positive impact on healthcare service delivery.(1,2)

1. Senior citizen discount can be utilized while making payments via the online or mobile app so that they won't need to sand in que only for senior citizen discount. This initiative can effectively reduce patient waiting time and boost PSI (Patient Satisfaction Index).

2.facility for Registered patients to use gold card and reap the advantages for OPD consultation these thing would reduce patient satisfaction and less waiting time.

3. To provide permanent payment link applicable with 10% discount in the marengo asia application, hence it can further ease the process of appointment, billing and registration.

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