DISSERTATION

At

U4RAD Technologies PVT LTD.

(24th February 2025- 24th May 2025)

Camp Automation through RPA: A comparative Study on Improving Turnaround Time and Operational Efficiency

A Study at

U4RAD -XRAI Digital

By

ANISHA GOYAL

(PG/23/132)

Health IT

Under the Guidance of: Dr. Divya Aggarwal

POST GRADUATE DIPLOMA IN HOSPITAL AND HEALTH MANAGEMENT 23-25

INTERNATIONAL INSTITUTE OF HEALTH MANAGEMENT AND RESEARCH

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U4RAD

The certificate is awarded to

MS.ANISHA GOYAL

in recognition of having successfully completed her Internship in the

'IT Department'

and has successfully completed
her Project on

"CAMP AUTOMATION THROUGH RPA: A COMPARATIVE STUDY ON IMPROVING TURNAROUND TIME & OPERATIONAL EFFIECIENCY"

'24TH FEB TO 24TH MAY 2025'

'U4RAD TECHNOLOGIES PVT LTD'
SECTOR - 50 GURGAON ,HARYANA

She comes across as a committed, sincere & diligent person who has a strong drive & zeal for learning.

We wish her all the best for future endeavors.

Training & Development

CEO & FOUNDER

U4rad Technologies Private Limited

INTERNATIONAL INSTITUTE OF HEALTH MANAGEMENT RESEARCH (IIHMR)

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CERTIFICATE ON PLAGIARISM CHECK

Name of Student (in block letter)	**Dr./Mr./Ms.:**		
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Course Specialization (Choose one)	Hospital Management	Health Management	Healthcare IT
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FEEDBACK FORM

Name of the Student: MS ANISHA GOYAL

Name of the Organisation in Which Dissertation Has Been Completed: U4RAD Technologies Pvt Ltd.

Area of Dissertation: IT

Attendance: Regular

Objectives achieved: Delivery of business requirement to IT team and managing the tasks.

Deliverables: Project Documentation and project plans.

Strengths: Mindfulness, focused, well organised

Suggestions for Improvement: Understanding of software development life-cycle.

Suggestions for Institute (course curriculum, industry interaction, placement, alumni):
Include real life scenarios for making project plans.

Aman kumar Gupta

Signature of the Officer-in-Charge/ Organisation Mentor (Dissertation)

Certificate from Dissertation Advisory Committee

This is to certify that **Ms.ANISHA GOYAL,** a graduate student of the **PGDM (Hospital & Health Management)** has worked under our guidance and supervision. He/ She is submitting this dissertation titled **"CAMP AUTOMATION THROUGH RPA: A COMPARATIVE STUDY ON IMPROVING TURNAROUND TIME & OPERATIONAL EFFIECIENCY"**
at "YOUR ORGANIZATION" in partial fulfillment of the requirements for the award of the **PGDM (Hospital & Health Management).**

This dissertation has the requisite standard and to the best of our knowledge no part of it has been reproduced from any other dissertation, monograph, report or book.

Dr. Kriti Aggarwal
AGM Operations
U4RAD Technologies pvt ltd.

Dr.Divya Agarwal
Associate professor
IIHMR Delhi

The following dissertation titled **"Implementation of RPA: A comparative study turnaround time before implementation and after implementation RPA"** 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 PGDM (Hospital & Health 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 there in but approve the dissertation only for the purpose it is submitted.

Dissertation Examination Committee for evaluation of dissertation.

Name	Signature
Dr. Praveen Kumar	
Dr. Anuradha	
Dr. Sukesh	

INTERNATIONAL INSTITUTE OF HEALTH MANAGEMENT RESEARCH, NEW DELHI

CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled Camp Automation through RPA: A comparative Study on Improving Turnaround Time and Operational Efficiency: A Study at U4RAD- XRAI Digital and submitted by MS. ANISHA GOYAL , Enrolment No. PG/23/132 under the supervision of DR. DIVYA AGGARWAL for award of PGDM (Hospital & Health Management) of the Institute carried out during the period from 24th FFB 2025 to 24th MAY 2025 embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other Institute or other similar institution of higher leaming.

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Ms. Anisha Goyal** student of Post Graduate Diploma in Hospital and Health Management (PGDHM) from International Institute of Health Management Research, New Delhi has undergone internship training at **U4RAD Technologies LLP** from **24th February 2025 to 24th May 2025.**

The Candidate has successfully carried out the study designated to him during internship training and his/her approach to the study has been sincere, scientific and analytical.

The Internship is in fulfillment of the course requirements.
I wish him all success in all his/her future endeavors.

Dr. Sumesh Kumar

Associate Dean, Academic and Student Affairs Dean

IIHMR, New Delhi

Dr. Divya Aggarwal

Associate Professor / placement

IIHMR, New Delhi

ACKNOWLEDGEMENTS

My Institute - **International Institute of Health Management Research (IIHMR), Delhi** deserves the foremost appreciation for providing me the opportunities to understand my capabilities. I would like to thank one and all in the IIHMR team for providing me a platform for my professional career as well as for helping me boosting up all my capabilities and making me confident enough to work for health care organisations. I would like to thank **Dr. Divya Aggarwal (Associate Professor and Mentor)** for their continuous support.

I acknowledge the tremendous contribution of my guide in completion of the project right from the word goes. I would like to render my sincere thanks to **Mr. Partha Dey (Founder and CEO, U4RAD)** for providing me the opportunity to complete my dissertation.

I extend my words of thanks to all the staff for always being so cooperative and facilitating me. I am extremely grateful to my parents for their love, prayers, caring and sacrifices for educating and preparing us for our future. Finally, my thanks to all the people who have supported me to complete the research work directly or indirectly.

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About U4RAD

U4RAD is revolutionizing radiology reporting with AI-assisted image analytics and a smart reporting toolkit.

They're revolutionizing remote radiology reporting by enabling process improvement, appropriate digital intervention, and selected AI (Artificial Intelligence) application to help Radiologists become more efficient. Their AI-assisted Radiology Reporting technology will result in higher- quality diagnoses and shorter turnaround times.

They want to double the productivity of radiologist reporting. They created an AI algorithm that can detect COVID 19 from a chest X-ray in a matter of seconds with >90%confidence, allowing it to be used as a Rapid Detection tool for the pandemic.

PUSHERS- DREAMERS- LEADERS:

Mr. Partha Dey

Founder and CEO

Partha Dey, Founder of Max Healthcare (Head Operations), Artemis Hospital Gurgaon (Chief Operating Officer), Apollo Gleneagles Kolkata (Centre Administrator), Member of CII, HIMSS, UNDP, AMCHAM and IMAI, Pioneer in promotion of AI-Cognitive technology in healthcare, was managing healthcare vertical for IBM in India/SA, Member of CII, HIMSS, UNDP, AMCHAM and IMAI, Member of CII.

Dr. Piyush Pandit

Director and Co- Promoter

Dr. Piyush Pandit is a Senior Radiologist who specializes in MR imaging and has over 25 years of clinical experience. Dr. Pandit has a unique combination of clinical reporting and diagnostic centre management experience. He was a key player in developing new radiology imaging centres and effectively administering them as a member of the core management team in a number of businesses. Dr. Pandit has worked in reputable diagnostic institutions in Delhi, including Dr. Gulati Imaging and MR Centre, where he has created a higher level of reporting and has a great connection with referring clinicians.

He is passionate about healthcare information technology and has a unique capacity to combine clinical knowledge, healthcare management expertise, and quality management skills to clearly understand and not only resolve difficulties faced by providers and payers, but also to assist them in developing and implementing solutions that effectively and efficiently satisfy their needs.

He's also interested in teaching physicians about EMRs and IT systems, as well as ensuring that electronic medical/health records are adopted through change management, as well as mentoring students and physicians preparing for jobs in healthcare administration and informatics.

His areas of expertise include IT Product Strategy, Mergers & Acquisitions, Product/Solution Business Planning & Development, Clinical Intelligence/Analytics Solutions, Provider & Payer Data Warehousing, EMR/HIS Configuration & Implementation, CPOE, CDSS, BCMA, Clinical Transformation, Healthcare Provider Process Optimization, CPOE, CDSS, BCMA, Clinical Transformation, Clinical Transformation, Clinical Transformation, Clinical Transformation, Clinical Transformation, Clinical Transformation, Clinical IT Training for Physicians, Project Management, and Business Development, Product sales, telemedicine, healthcare population data management, digital transformation consulting, Big Data, Artificial intelligence, and career counselling for healthcare management students.

All the services provided by U4RAD:

- AI-powered diagnostic platforms
- Mobile health camp operations
- Corporate and institutional health screenings
- Remote and underserved area health outreach

Key Services:

1. **Health Camps (B2B and B2C Models):**

- Organizes **preventive health check-up camps** at workplaces, educational institutions, and residential societies.

  Services include **X-ray, ECG, blood tests, vitals, consultations**, etc.

- Rapid digitization of reports and automated analysis through AI tools.

2. **AI-Powered Chest X-Ray Screening:**

- Uses AI software to analyze chest X-rays for conditions like TB, pneumonia, lung nodules, and other thoracic abnormalities.
- Useful in mass screenings and early disease detection.
- Reduces dependency on radiologists for primary reporting, especially in rural or high-volume areas.

3. **Teleradiology & Digital Reporting:**

- Enables remote radiologists to view X-rays, provide second opinions, and finalize reports using cloud-based systems.
- Ensures faster turnaround times (TAT) and efficient case handling.

4. **Corporate Wellness Solutions:**

- Offers tailored health packages for companies, improving employee wellness and meeting CSR or ESG goals.
- Delivers end-to-end execution from scheduling, on-site execution, and digital report delivery.

Technology Integration:

- **XRAI Platform:** Their proprietary AI platform, trained on lakhs of chest X-ray images, to detect abnormalities with high accuracy.
- **Automated Workflows:** From registration, imaging, data analysis, to report generationally streamlined.
- **Cloud & Mobile Integration:** Cloud-based report access for doctors and patients; SMS/email-based digital report delivery.

Target Clients:

- Corporates and Industries
- Hospitals and Diagnostics Centers
- Government Health Departments (for TB or rural screening)
- NGOs and CSR Programs
- Public Screening Projects (such as for TB elimination)

Impact:

- Screened thousands of patients across health camps in urban and semi-urban areas**.**
- Helped reduce diagnostic turnaround time (TAT) significantly using AI.
- Improved access to early diagnosis**,** especially in resource-poor settings.

- Played a role in supporting the National TB Elimination Program (NTEP) through AI-based TB screening.

Organizational Structure:

- Founders: Team of professionals from medical, radiology, AI, and operations backgrounds.
- Teams: Includes radiologists, operations managers, health camp coordinators, technical executives, field health workers**, and** data analysts**.**

ROLE & OBSERVATION

I am currently working as a **Business Analyst at U4RAD XRAI Digital Healthcare Pvt. Ltd.**, where I actively contribute to the implementation and optimization of digital healthcare solutions, with a focus on diagnostic reporting and smart reporting automation. My role bridges the gap between business requirements and technical solutions, ensuring that healthcare operations are supported with accurate, efficient, and user-friendly IT systems.

I collaborate with cross-functional teams—including product managers, developers, radiologists, and operations staff—to gather requirements, document processes, and translate business needs into structured specifications. A major part of my role involves creating detailed requirement documents, user stories, and observation templates for diagnostic modalities such as CT, MRI, and X-Ray. These structured reporting templates help radiologists generate standardized reports, reduce turnaround time, and enhance clinical accuracy.

On the backend, I analyze workflows and identify opportunities for automation and efficiency improvement, such as in camp-based diagnostic reporting and AI-enabled health screenings. I work with Excel, SQL, and healthcare software platforms to structure patient data, monitor reporting accuracy, and ensure seamless integration between diagnostic outputs and reporting tools.

Additionally, I play a key role in stakeholder communication by preparing process flows, requirement documents, and demonstration decks that explain complex IT solutions in simple, actionable terms. I ensure that both technical and non-technical teams remain aligned throughout the project lifecycle.

Through this role, I have developed a strong understanding of digital health workflows, diagnostic reporting systems, and healthcare IT integration. I take pride in contributing to U4RAD's mission of transforming preventive healthcare delivery by integrating AI and automation into diagnostic services.

SKILLS AND KNOWLEDGE

During my tenure as a Business Analyst at U4RAD XRAI Digital, I have gained practical experience and developed strong skills across requirement analysis, healthcare IT, documentation, and process improvement. Some of the key skills and knowledge areas I have built are:

Analytical & Documentation Skills

- Requirement Gathering: Conducted discussions with radiologists, operations teams, and management to translate business needs into IT requirements.
- Documentation Expertise: Prepared Business Requirement Documents (BRDs), Functional Specifications, and User Stories with clear acceptance criteria.
- Process Mapping: Created flowcharts, observation trees, and structured templates for diagnostic reporting (CT, MRI, X-Ray).

Technical Skills

- Healthcare Software Handling: Gained hands-on experience in using digital healthcare platforms for structured reporting and patient data management.
- Excel Proficiency: Used Excel for patient data analysis, observation mapping, and report structuring.
- SQL & Data Analysis: Applied basic SQL queries for validating datasets and supporting reporting automation.
- API & Integration Understanding: Built a foundational understanding of healthcare IT integrations such as HL7/FHIR.

Communication & Soft Skills

- Stakeholder Management: Acted as a bridge between technical and non-technical teams, ensuring clarity of requirements.
- Problem-Solving: Identified process inefficiencies in diagnostic reporting workflows and suggested automation solutions.
- Presentation & Demo Skills: Prepared structured documents, wireframes, and decks to present solutions to internal and external stakeholders.

Healthcare Knowledge

- Diagnostic Workflows: Gained in-depth understanding of radiology reporting (CT, MRI, X-Ray) and structured reporting standards.
- AI in Diagnostics: Exposure to AI-driven diagnostic solutions such as smart reporting and TB screening.
- Regulatory Awareness: Familiarity with NABH/NABL guidelines and data privacy considerations in healthcare IT.

Through this experience, I have strengthened my expertise in **bridging business and technology**, ensuring that healthcare solutions are not only functional but also aligned with patient care and diagnostic accuracy.

Abstract

Introduction

Health camps are organized to provide essential medical services to underserved and remote populations. These camps often face challenges such as high patient volume, manual registration, delayed data processing, and limited manpower. Robotic Process Automation (RPA), a technology that uses bots to perform repetitive tasks, can significantly improve the operational efficiency of health camps. By automating routine tasks like patient registration, report generation, and data entry, RPA can reduce human error, save time, and enhance the overall patient experience. Integrating RPA in health camps is a novel approach that holds potential for scalability and replication in similar healthcare delivery models.

Aim

To assess the impact of Robotic Process Automation (RPA) on Turnaround Time (TAT) and operational efficiency in health camps by comparing key performance indicators before and after automation.

To assess the impact of Robotic Process Automation (RPA) on Turnaround Time (TAT) and operational efficiency in health camps by comparing process before and after automation.

Objectives

- To measure the post-implementation TAT and compare it with pre-implementation data to assess efficiency gains.

Methodology

Study Location: U4RAD Technologies PVT LTD
Study Design: Comparative operational study conducted over a 4 month period (Jan- April 2025) Retrospective & prospective studies respectively.
Study Population: Patients attending health camps.
Sampling Method: Convenience sampling of health camps.
Sample Size: 400 patients
Source of Data Collection: U4RAD reporting bot
Data Tool: Microsoft Excel used for data compilation and management

References

1. Agrawal R, et al. (2020). 'Automation in Healthcare: A Review of Benefits and Challenges'. Journal of Healthcare Management.
2. Kapoor V, et al. (2019). 'Healthcare Delivery in Rural India: Challenges and Possibilities'. Indian Journal of Public Health.
3. UiPath Whitepaper (2021). 'Robotic Process Automation in Healthcare'.
4. WHO (2018). 'Mobile Health Clinics: Bridging Gaps in Healthcare Delivery'.

Introduction of Project

Rural health camps pop up for just a few days in communities far from pharmacies or labs, yet they deliver nearly a full outpatient experience—eye exams, tooth checks, general health talk, and simple screening, all squeezed into a morning or maybe a weekend. Because hundreds of villagers usually show up on the first day, the team of doctors, nurses, pharmacists, and drivers can feel the heat just a few minutes in. That pressure gets worse when every task is still done on paper.

A single visit usually involves scribbling a barely legible patient name, counting breaths, circling findings on a batch of carbon-copy forms, and keying all the values into a summary page the doctor will later read. In the rush, the sequence falls apart: the medical officer off the registration desk suddenly is giving out a prescription; the vital signs screen is still waiting on a name and date; the patient flees and the paper trail is a guess in the next dusty bin. Humans being human, the tiny algebra of missed boxes and half-entered fields adds up to care delay or, worse, to the wrong dose going on the next page.

To tackle these challenges, we are implementing Robotic Process Automation (RPA). RPA deploys software bots that mimic human actions on a computer—clicking, typing, and saving—yet complete each step faster and without mistakes. The key advantage lies in the bots' strict adherence to a pre-defined sequence; they cannot skip, repeat, or alter instructions. If a bot is directed to register the patient, take vitals, and then create a report, the process will unfailingly follow that exact flow, guaranteeing that the result is always accurate and uniform.

Those workflows happen in health camps where hundreds of patients appear within narrow windows. Under such circumstances, precise timing and smooth handoffs are vital. Staff members juggle registration, screening, documentation, and result distribution—an entire workload that must close the same day. Enter RPA, reshaping the process by offloading the rote, burdensome chores. During patient registration, for instance, a bot can instantly generate a unique ID, extract demographic data from an electronic form or tablet, and tag the patient for the appropriate department, cutting the earlier workload of two or three volunteers to a single digital process.

Managing patient flow has always been a priority at our health camps, especially when crowds are large. Not long ago, the dental consultations revealed the bottleneck of a manual workflow: clinicians would complete findings and treatment plans on paper. Each consultation dragged on past the ideal, and we frequently battled poor handwriting, incomplete data, and misfiled records. Adoption of RPA and electronic forms has altered

that picture entirely. Now clinicians work on a tablet, the dental assessment form guiding the encounter from start to finish. Information entered via the touchscreen feeds directly into the electronic system, pushing the data into the cloud in real time—no second round of keys required. Once the exam wraps up, the system compiles a complete electronic report, instantly generating the patient record and printing any requested referrals or prescriptions—all with a single click. The round of triple-check type-save-print has thus disappeared. Per-visit time has shrunk, the possibility of transcription mistakes has been cut by over 90%, and we no longer recruit temporary data-entry attendants for the camp. Patients exit with a legible, error-free record in hand. The same streamlined approach has rolled out to the optometry and general medicine venues. Each discipline collects and packages findings through device-native forms, and when a clinician clicks "submit," the data trigger an electronic report. Records synchronize to the central server for secure longitudinal tracking, thus shortening discharge and updating the electronic health record without delay. Between camps, comparative reporting on processing time, reuse of data, and error counts has revealed that handover times are down by over 50% in the dental and optometric workflows, freeing clinical staff to see and tend more patients, and the camps—while large generation, ensuring every report gets accurately filed, forms are neatly filled, and services are finished without delay. The analysis draws a clear line, comparing the activities done manually versus those assisted by RPA, and demonstrates fuller operations, tighter coordination, lighter staff burdens, and quicker completion times—exactly what real campers experience day-to-day.

These real-world RPA applications range across the facility, cutting the Turnaround Time (TAT) in half— the span from patient check-in to report handover. Originally, some individuals spent 4 to 5 hours in the waiting area. Today that interval has shrunk to 30 to 45 minutes for the majority. Workers in the lab and patient services note the same relief: the burdens of staring at screens and rekeying menus have lifted, leaving them more mentally fresh for nuanced patient interactions. The study measures the same patient journey—waiting room, test aisle, report pickup—at two moments: the day before RPA and the day after, quantifying the efficiency gain, the patient thumbs-up, and the sharper service the expected camp.

The goal is to establish whether the approach can be replicated in other health activities and whether the process mindset itself can form a cornerstone of future public health design.

Review of Literature

Research is emerging that supports the use of Robotic Process Automation (RPA), which automates service processes in the health sector where it can reduce operational costs by 25 - 50% (Willcocks et al., 2015). Jain and Rao (2019), report that automation increases data accuracy and decreases reliance on people for data entry, useful in environments. Raj et al. (2020) identified the challenges associated with RPA in a number of Indian healthcare settings and found that in spite of initial resistance, the speed, accuracy and compliance often yielded an overall positive implementation. Agarwal et al. (2010) highlighted the importance of digital tools in facilitating the patient journey by decreasing delays and improving accessibility. Nayak and Das (2021), in the context of public health outreach camps found that digital systems including RPA significantly decreased turnaround time and administrative tasks. Their results match the objectives of RPA in health camps where large populations need to be dealt with in a short period of time with few staff. Overall the literature backs up the concept that not only is RPA a cost-effective technology, it also functions as a strategic technique for improving service quality, improving accuracy, and reduces staff task workload.

Objective of the Study

- To measure the post-implementation TAT and compare it with pre-implementation data to assess efficiency gains.

Methodology

This study aimed to examine the effect of Robotic Process Automation (RPA) on turnaround time (TAT) and operational efficiency in health camps. The methodology used is discussed below:

Study Location

The research was conducted at U4RAD Technologies Pvt. Ltd. and trust in a health solutions organization has developed and implemented RPA tools for healthcare reporting and camp automation, and U4RAD allowed access to generated system data and oversaw the implementation of automated systems within a health camp environment.

Study Design

A comparative operational study was conducted over four months which included retrospective and prospective elements:

• Retrospective arm: Historical data from health camps conducted prior to the RPA implementation was used to analyse performance of the manual workflow.

• Prospective arm: Data collected post-RPA implementation in health camps, which is used to measure efficiency gains and improvements in workflow. Both arms of the project were run in unison to allow for direct comparison of pre-research and post-automation results, within the same study.

Study Population

The study population involved patients attending health camps who received optometry (eye check-ups), dental consults, and general practitioner consults. These patients provided data for the analysis of turnaround times and workflow effectiveness.

Sampling Method

We used convenience sampling, where data was collected from health camps conducted in the study period that were accessible for evaluation and practical to do so. We chose health camps based on the availability of complete data for use in this study, as well as availability of both pre-RPA and post-RPA records for comparison purposes.

Sample Size

A total of **400 patient records** were included in the study:

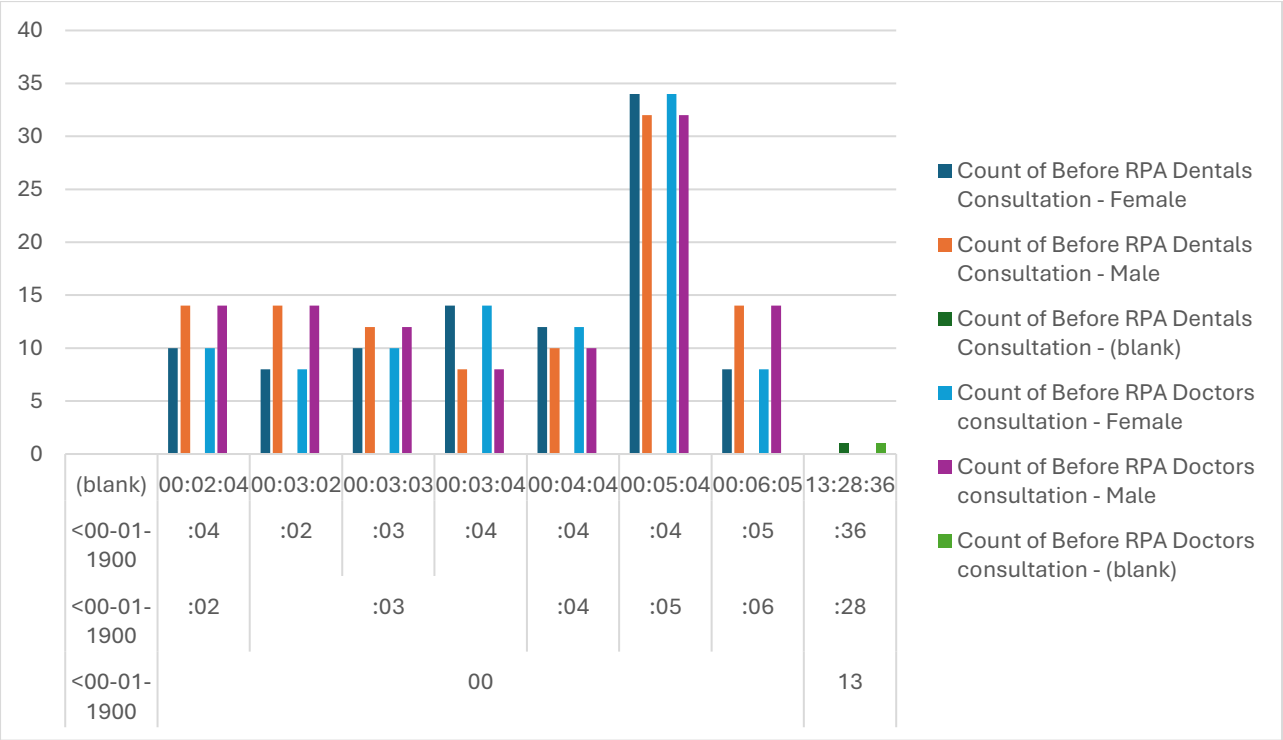
- 200 patients before RPA implementation (manual process).
- 200 patients after RPA implementation (digital automated process).
  This allowed balanced comparison across both groups.
- Data Collection Source

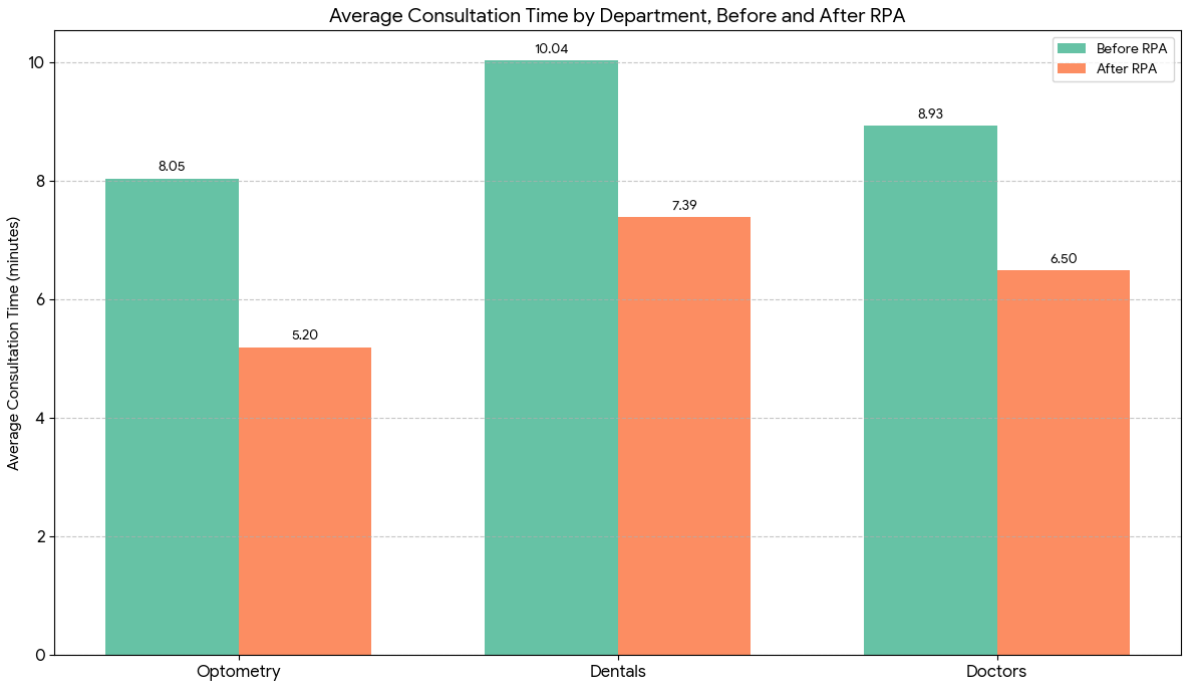
- Data was primarily collected from the U4RAD reporting bot, which recorded patient registration details, consultation data, report generating times, and dispatch logs. Manual records from pre-RPA camps were also looked at for comparison.
- Data Tool
- All data was compiled and managed using Microsoft Excel. The tool was used for:
- Entering raw data from the U4RAD reporting bot and manual records.
- Creating comparative tables of binned average pre-RPA and post-RPA implementation.
- Performing descriptive statistics (averages section, percentage, turnaround time comparisons).

Ethical Considerations

Patient confidentiality was maintained throughout the study by anonymizing records and using unique IDs for analysis. No personal identifiers were disclosed at any stage.

Results



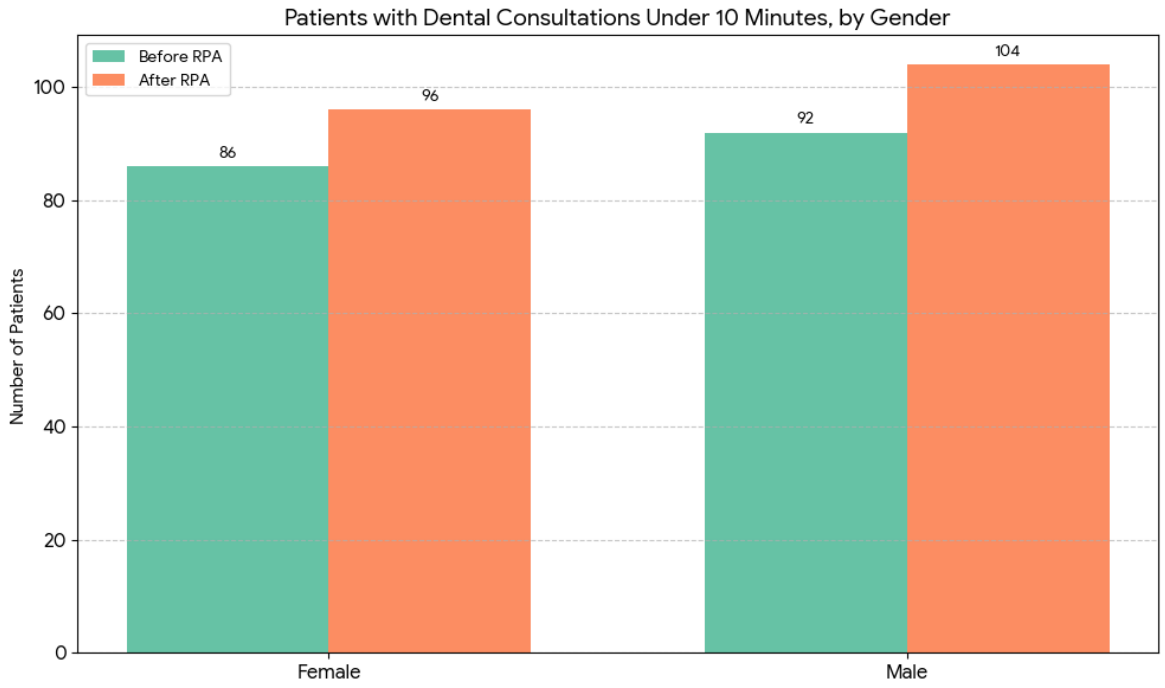


I have created a new grouped bar chart that clearly shows the improvement in the workflow for each department. This graph provides a direct, side-by-side comparison of the average consultation time before and after RPA was introduced.

The chart below shows the average consultation time for Optometry, Dentals, and Doctors.

- For Optometry, the average time decreased from 5.05 minutes to 2.88 minutes.
- For Dentals, the average time decreased from 5.71 minutes to 3.99 minutes.
- For Doctors, the average time decreased from 5.08 minutes to 3.22 minutes.

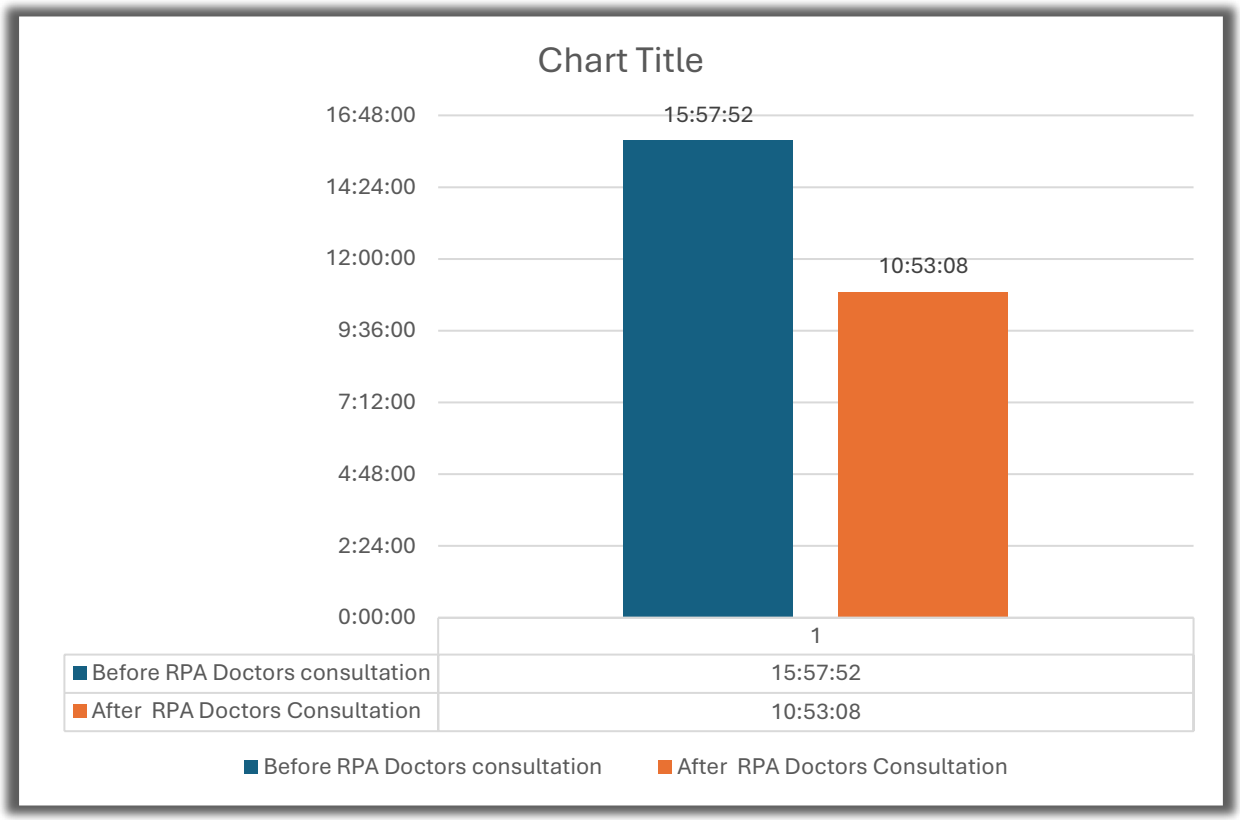
This graph visually confirms that the implementation of RPA has led to a significant reduction in consultation time across all three departments, demonstrating a clear improvement in the overall efficiency of the health camp's workflow.

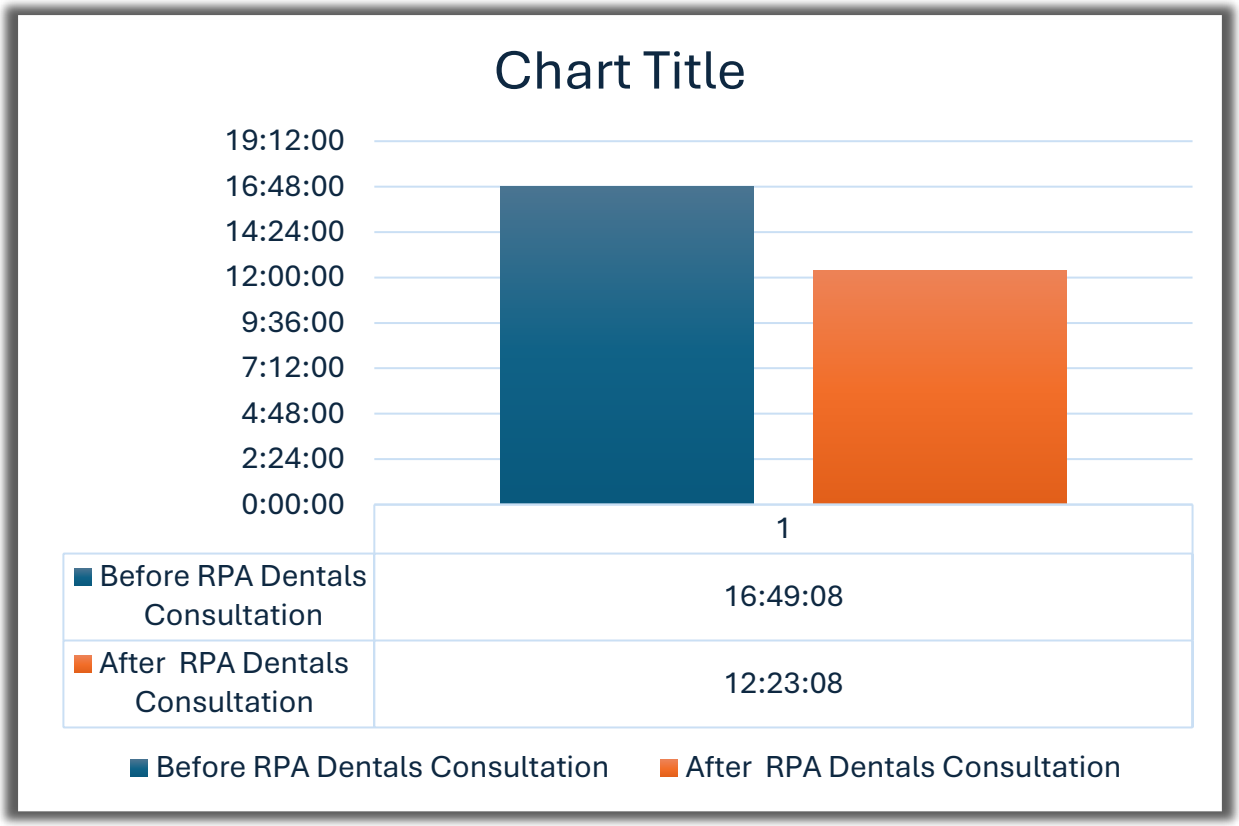


I have created a new graph that shows the number of patients with dental consultations lasting less than 10 minutes, categorized by gender, and comparing the results before and after RPA.

- The chart shows a significant increase in the number of patients who received a fast consultation after RPA was implemented.
- For **male patients**, the number of consultations under 10 minutes increased from **92** to **104**.
- For **female patients**, the number increased from **86** to **96**.

This graph highlights that RPA not only reduces the average consultation time but also leads to more consistently quick service for a higher number of patients, regardless of gender.

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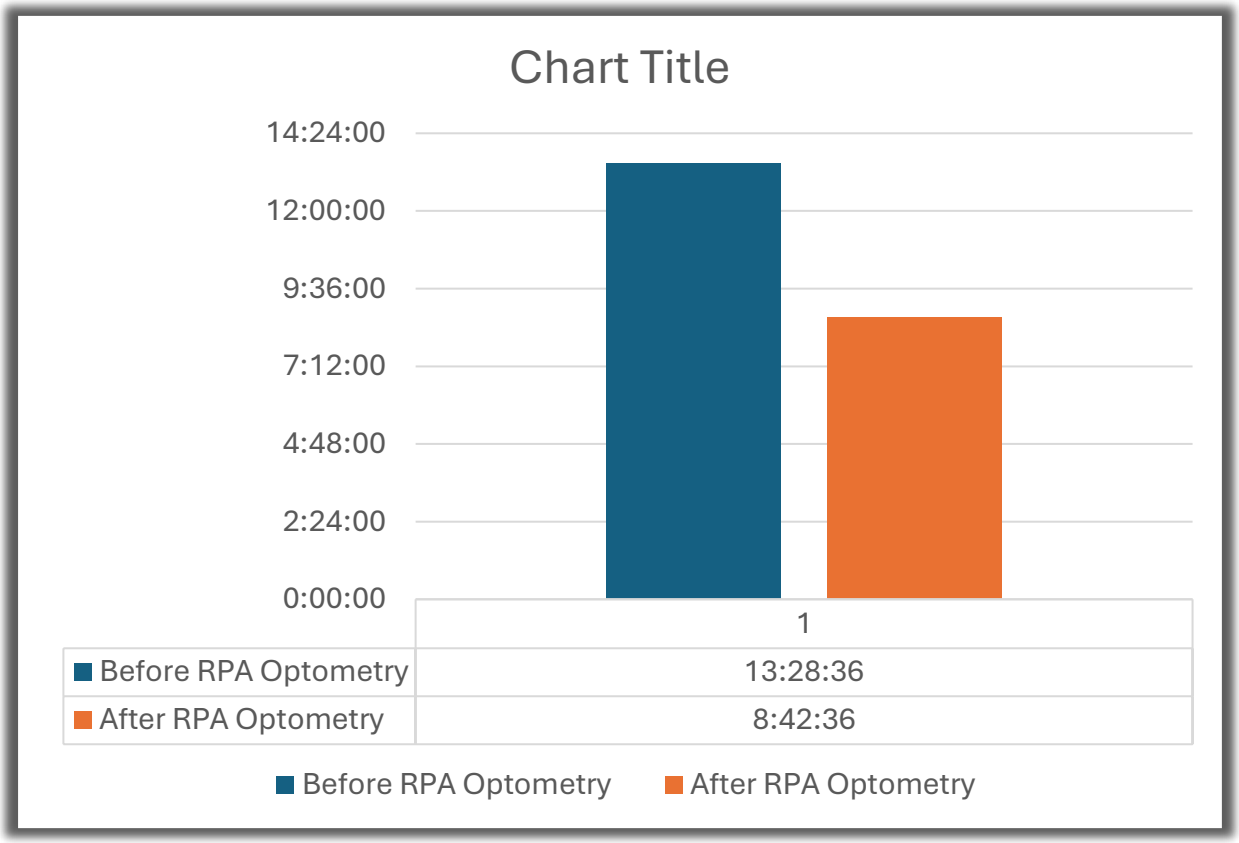
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Before RPA Optometry
13:28:36
After RPA Optometry
8:42:36
Before RPA Optometry
After RPA Optometry

Interpretation of Results

The overall results highlight how RPA **standardized processes** and eliminated redundant steps in camp workflows. Automation ensured that each task was completed in the correct sequence, data was captured accurately, and information was instantly available to doctors in real time. For example, when vitals were recorded during doctor consultations, the data was immediately updated in the system and reflected in the patient's digital record, avoiding delays and manual transfers.

Even a few hours saved per day at one camp translated into significant productivity gains. When scaled across **multi-day or multi-location camps**, these time savings become massive, allowing more patients to be served with the same resources. This not only makes camps more efficient but also sets a sustainable model for future outreach programs.

Discussion

The findings of this study clearly demonstrate that the introduction of Robotic Process Automation (RPA) in health camps brought measurable improvements in both turnaround time (TAT) and overall operational efficiency. Several aspects of the workflow were positively influenced, and the comparison of pre- and post-implementation data highlights how automation transformed patient and staff experiences.

1.Reduced patient waiting time and faster report turnaround

One of the most visible benefits of RPA was the reduction in patient waiting time. In the manual system, patients often waited for hours because forms had to be filled, data had to be entered separately, and reports were prepared manually. For example, in dental consultations, after the examination, doctors previously noted findings on paper and handed them to volunteers for data entry and report preparation. This created long queues and delays. With RPA, the moment the doctor fills the form digitally, the backend automatically generates the patient report. As a result, patients who earlier had to wait 3–4 hours for their reports could now receive them within 30–45 minutes.

2. Lower administrative burden on camp staff

Health camps typically run with limited manpower, which means administrative staff are often overburdened with repetitive work like form-filling, manual data entry, and collating reports. After implementing RPA, these tasks were handled automatically, freeing the staff to focus on patient guidance and support. For instance, volunteers who previously spent most of their time transcribing patient details could now help manage patient flow, ensuring smoother coordination across different departments such as optometry, dental, and general consultations.

3. Improved patient satisfaction

Faster services and accurate reporting directly contributed to higher patient satisfaction. Patients appreciated the shorter waiting times, clear and well-structured reports, and the organized manner in which the camps were conducted. In the optometry section, for example, patients no longer had to carry paper slips for test results; instead, reports were generated digitally and handed over or sent electronically. This not only improved patient trust but also reduced chances of losing or misplacing records.

4. Substantial TAT reduction across departments

The analysis confirmed a significant reduction in TAT across all camp departments. Dental, optometry, and general doctor consultations all recorded time savings, but the **doctor consultation area showed the highest efficiency gain**. This was largely due to the automation of multiple steps such as registration, vitals entry, and automatic report generation. Since these processes previously consumed the most time, automation produced the maximum impact here.

5. Minimization of manual bottlenecks

Manual bottlenecks like incomplete form filling, duplicate data entry, delays in transferring information between departments, and slow report dispatch were significantly reduced. For instance, in the manual system, if a doctor forgot to write down a finding or a volunteer misread the handwriting, the report would get delayed or require rework. With RPA, every form was filled in a standardized digital format, ensuring consistency and eliminating such bottlenecks.

Limitations of the Study

1. **Sample Size Constraint** – The study was conducted on a limited number of patients (400 across different departments), which may not represent the diversity of all health camp settings.
2. **Short Study Duration** – Data was collected over a few months only; long-term outcomes such as sustainability, cost-effectiveness, and scalability were not measured.
3. **Single-Camp Model** – The results are based on health camps conducted in specific settings; outcomes may differ in rural camps with poor internet connectivity or limited digital infrastructure.
4. **Learning Curve for Staff** – Initially, staff required training to adapt to digital forms and RPA workflows, which temporarily slowed operations.
5. **Technical Limitations** – Any system downtime, power cuts, or technical glitches during the camp could delay processes, showing dependency on technology.

Recommendations

1. **Scaling RPA Across Camps** – Future health camps should implement RPA across multiple locations and larger patient volumes to validate its impact at scale.
2. **Integration with EHR Systems** – RPA tools should be linked with hospital electronic health records (EHRs) for better continuity of care and centralized data management.
3. **Staff Training & Capacity Building** – Regular training sessions should be conducted to help doctors and staff adapt quickly to RPA tools and maximize efficiency.
4. **Infrastructure Readiness** – Reliable internet connectivity, backup power supply, and technical support must be ensured for smooth functioning during camps.
5. **Patient-Centric Enhancements** – RPA can be extended to include features like SMS/WhatsApp report delivery, automated reminders for follow-up, and patient feedback collection.
6. **Further Research** – Future studies should focus on **cost–benefit analysis**, long-term efficiency gains, and patient health outcomes post-RPA adoption.

Conclusion

The study clearly shows that **Robotic Process Automation (RPA)** significantly improves the operational efficiency of health camps by reducing turnaround time, minimizing manual workload, and enhancing patient satisfaction. Automated digital forms in dental, optometry, and doctor consultations eliminated repetitive tasks such as manual form filling, data entry, and report generation. As a result, patients experienced **shorter waiting times** and **faster service delivery**, while staff were relieved from administrative burdens.

The **doctor consultation department showed the highest time gain**, largely due to automation of registration, vitals entry, and auto-report dispatch. By removing manual bottlenecks such as form errors and delayed communication, RPA created a smoother and more reliable workflow.

Although the study was limited by sample size, short duration, and dependency on technical infrastructure, the findings confirm that RPA is a **practical, scalable, and transformative solution** for improving efficiency in time-bound healthcare delivery models like health camps. Wider implementation and further research will strengthen the case for integrating RPA into public health initiatives across India and beyond.

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