

QR-BASED DIGITAL TRANSFORMATION IN LINEN MANAGEMENT

Dissertation Submitted to



The IIHMR University, Jaipur

for the partial fulfillment for the award of the degree of

Master of Business Administration (MBA)

in

Hospital and Health Management

by

Karan Tripathi

Under the Supervision and Guidance of

Dr. Arindam Das

2025

RBH/2025/Jun/HRD/6759

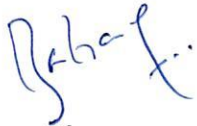
Date: 03 Jun 2025

TO WHOM SO EVER IT MAY CONCERN

This is to certify that **Karan Tripathi** has completed his internship in the Operations Department from 10 March 2025 to 31 May 2025.

We wish him every success in his future and career.

For CK Birla Hospital – RBH



Bushra Khan
Sr. Manager | HR

CERTIFICATE

This is to certify that dissertation titled **QR Based Digital Transformation in Linen Management** is a record of the research work undertaken by Karan Tripathi in partial fulfillment of the requirements for the award of the degree of MBA Hospital Management from the IIHMR University, Jaipur under my guidance and supervision and his approach to the research study has been sincere, scientific, and analytical.

A handwritten signature in blue ink, reading 'Arindam Das'.

Faculty guide
Dr. Arindam Das
IIHMR University, Jaipur

A handwritten signature in blue ink, reading 'Sanjay Gupta'.

Dr. Sanjay Gupta
School Dean
IIHMR University, Jaipur

Date

DECLARATION BY STUDENT

I hereby declare that this dissertation titled “**QR Based Digital Transformation in Linen Management**” 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 Information derived from the published or unpublished work of others has been duly acknowledged in the text.

Karan Tripathi

(Signature)

Karan Tripathi

Date: 18/06/2025

June 18, 2025

Chapter 1: Introduction



Location: Gopalpura Bypass Road, Near Triveni Bridge, Gopalpura

Jaipur – 302018

Capacity: 230 beds

Emergency Contact (24/7): 07340054470

Appointments: 08062136530

Website: ckbirlahospitals.com/rbh

CK Birla Hospital (Rukmani Birla Hospital, RBH) is a premier 230-bed multispecialty healthcare facility located in Jaipur, Rajasthan, India¹, ². Established in 2016, RBH operates under the CK Birla Group's healthcare portfolio alongside institutions such as the Calcutta Medical Research Institute (CMRI) and the BM Birla Heart Research Centre in Kolkata¹.

The hospital's infrastructure supports comprehensive inpatient and outpatient services, featuring 75 intensive care beds, an 18-bedded dialysis department, six state-of-the-art modular operation theatres, a 3 Tesla silent MRI, digital mammography, a 128-slice CT scanner, endoscopic ultrasound, EBUS/EUS, and a full-service blood bank³. Its specialized ICUs—including Coronary (CCU), Medical (MICU), Surgical (SICU), and Pediatric (PICU)—are equipped with central monitoring systems, invasive and non-invasive ventilators, and hemodiafiltration machines for acute renal failure³.

RBH offers care across 24 clinical specialties, notably Cardiac Sciences, Neurosciences, Orthopaedics and Joint Replacement, Renal Sciences, Pulmonology, Gastroenterology, Obstetrics and Gynaecology, Critical Care Medicine, Diabetes and Endocrine Sciences, Dermatology, and Dental Sciences². The hospital is also recognized for its expertise in robotic surgery, minimally invasive procedures, and advanced diagnostic services².

A dedicated International Patient Services unit provides global patients with an International Relations Coordinator, language interpretation/translation, telemedicine and video consultations, complimentary medical opinions, lodging assistance, sightseeing arrangements in Rajasthan, airport pickup/drop in air-conditioned vehicles or ambulance, visa facilitation (including medical visa letters), and a variety of cuisines to meet diverse dietary needs⁴.

Underpinning all services is RBH's vision "to provide the best in patient service and clinical excellence" and its mission "to create Clinical Centres of Excellence backed by research, academics, and evidence-based medicine for optimal clinical and patient outcomes." Its core principles—Clinical Excellence (adherence to international guidelines and protocols), Ethical Conduct (honesty and transparency), and a Patient-Centric Approach (compassion, empathy, and prioritizing comfort and trust)—guide every aspect of care⁵.

1.1 Background & Context

In hospital operations, the linen department is a crucial support service that ensures hygiene, comfort, and operational efficiency. Linen includes bed sheets, uniforms, surgical drapes, towels, patient gowns, and other textile products. Proper management of linen

contributes significantly to infection control, staff safety, and patient satisfaction. In a hospital like CK Birla Hospital, where service quality and operational excellence are key objectives, managing linen distribution, collection, and accountability plays a pivotal role.

Traditionally, linen management in many hospitals involves manual records, verbal communication, and delayed tracking, leading to issues such as misplaced uniforms, unclear responsibilities, and inefficient workflows. In such an environment, implementing technological solutions like QR-based applications can improve accountability, transparency, and operational speed.

1.2 Problem Statement

Despite having dedicated departments and structured processes, the hospital faced accountability gaps in linen operations. Issues such as incorrect uniform issuance, lack of timely tracking of linen distribution, unclear record-keeping for cleaning audits, and absence of structured communication between floors and the linen department were prominent. Manual processes resulted in delays, confusion, and occasional dissatisfaction among clinical staff.

Furthermore, no standardized checklist existed to verify room linen status, and floor-level feedback was poorly documented. These inefficiencies posed risks such as unclean linen circulation, unavailability during peak times, and challenges in managing vendor coordination. Given the hospital's focus on operational excellence, these lapses were significant enough to warrant a technological intervention.

1.3 Objectives of the Study

This dissertation project aimed to develop, implement, and evaluate a QR-based application system to optimize the linen department's performance. The key objectives included:

To digitize the linen distribution process through QR-based tracking.

To ensure accurate issuance of uniforms by recording size, quantity, and time.

To introduce a digital room cleaning and linen checklist for each hospital floor.

To integrate linen cleaning records with traceability using QR codes.

To reduce turnaround time in linen distribution and improve real-time visibility.

To capture feedback from floor staff and ensure timely redressal of linen-related issues.

1.4 Scope of the Study

The study was conducted within CK Birla Hospital, Jaipur, focusing on the linen department's operational cycle. It covered all key points including linen issuance to staff, collection of used linen, cleaning process tracking, distribution to floors, and feedback collection. Three QR-based applications were developed and deployed:

Linen Distribution Tracker – for real-time tracking of issuance.

Room Cleaning and Linen Status Checklist – linked via QR codes to individual rooms.

Linen Data Sheet with Cleaning Records – to monitor linen lifecycle and cleanliness.

1.5 Significance of the Study

The integration of QR code technology in hospital support functions presents a cost-effective, scalable, and efficient solution to address long-standing operational inefficiencies. This study contributes to the growing body of knowledge on hospital operations by demonstrating the feasibility of digitization in the linen department. It also shows how simple technological tools can enhance accountability and reduce waste in hospital workflows.

The findings can help:

Hospital administrators in improving linen management practices.

Clinical teams by reducing delays and improving access to clean, appropriate linen.

Support departments by promoting structured, measurable, and traceable processes.

1.6 Research Methodology Summary

The project adopted a descriptive and applied research approach. Data was collected through observations, interviews with linen staff and floor personnel, analysis of linen movement records, and post-implementation system data. The developed applications were tested over a period of four weeks, and the outcomes were compared with baseline observation.

Chapter 2: Literature Review

2.1 Introduction

The literature review seeks to explore existing studies on hospital linen management, the importance of operational efficiency in healthcare logistics, and how digitization—especially through QR code systems—has impacted hospital support services. The review also compares traditional linen management approaches with modern solutions and investigates emerging trends in healthcare facilities management.

2.2 Hospital Linen Management: Overview and Importance

Linen management is integral to hospital hygiene, patient comfort, and operational continuity. As noted by Choudhury et al. (2016), improper linen handling can lead to the spread of hospital-acquired infections (HAIs). Thus, standardized and accountable processes are crucial in mitigating these risks. A WHO (World Health Organization) report on healthcare hygiene emphasizes the need for traceable and monitored textile handling from distribution to collection.

Goyal and Kaur (2018) describe the challenges of linen loss, improper inventory tracking, and delays in turnaround time (TAT) as persistent problems across Indian tertiary hospitals. Manual registers, lack of digital logs, and communication lapses between the central linen room and floors are commonly reported inefficiencies.

2.3 Uniform Distribution and Accountability Challenges

Uniform issuance to healthcare workers is a sub-component of linen operations. It includes tracking staff requests, managing size and type discrepancies, and collecting worn uniforms for cleaning. Literature indicates that inconsistent sizing and non-standardized documentation can lead to dissatisfaction and poor workflow adherence (Ramakrishnan et al., 2019).

Saxena and Mehta (2020) conducted a study in a large private hospital in Delhi and found that 21% of uniform-related complaints stemmed from issuance errors, while 32% were due to unclear return protocols. These findings support the rationale for an accountable and technology-integrated approach.

2.4 Digital Tools in Hospital Support Services

In recent years, hospitals have begun adopting QR code systems, barcode tagging, and RFID (Radio Frequency Identification) for various backend operations. While RFID is popular in pharmaceutical logistics, QR codes are more suited for cost-effective and flexible workflows.

A case study by Thomas and Raj (2021) at a mid-sized South Indian hospital demonstrated how QR-based asset tracking improved linen traceability by 47% and reduced mismatched inventory by 60%. Similarly, Parida and Mohapatra (2022) documented the benefits of using QR-coded checklists for infection control and room sanitization audits.

2.5 QR Code Technology: Use Cases in Healthcare

QR codes (Quick Response codes) are two-dimensional barcodes that can store information such as URLs, identifiers, or links to forms. Their application in hospitals is expanding from patient tracking to dietary charting and logistics monitoring.

In the context of linen and uniform management, QR codes offer:

- Real-time tracking of issued linen.

- Timestamp logging for uniform issuance and return.

- Feedback submission linked to unique codes.

- Standardized data collection for cleaning audits.

Singh and Kumar (2021) note that QR applications are especially useful in resource-constrained settings due to their ease of deployment and low cost.

2.6 Existing Gaps in the Literature

Despite advances, literature on linen departments' digital transformation remains sparse. Most hospital IT implementations focus on Electronic Health Records (EHR) and clinical automation, sidelining support services.

Moreover, no major studies examine the integration of QR technology with floor-level staff checklists or real-time data dashboards for linen management. There is also limited academic discussion on combining uniform issuance workflows with staff feedback in a digitally traceable format.

2.7 Conceptual Framework

The review highlights a need for structured interventions to improve visibility, standardization, and timeliness in linen services. A conceptual framework for this project includes:

Digital entry and exit logs for uniform issuance.

QR-based room-wise checklists with feedback.

Digital data sheets capturing timestamps and remarks.

Centralized Excel-based dashboards for monitoring.

2.8 Summary and Implications for Study

The literature indicates that QR-based digitization is a promising tool for hospital operations. However, its application in linen services—particularly combining uniform management, cleaning audits, and real-time reporting—remains underexplored. This project, by integrating three QR-based solutions in the linen department of CK Birla Hospital, seeks to bridge this gap and demonstrate a scalable model for other institutions.

The literature review supports the development of a practical, evidence-based intervention aimed at improving efficiency, staff satisfaction, and accountability in linen operations through digital innovation's.

Chapter 3: Research Methodology

3.1 Introduction

This chapter details the structured research methodology used to design, develop, deploy, and evaluate the QR-based application system implemented in the linen department at CK Birla Hospital, Jaipur. The project was rooted in practical application, leveraging real-time data captured through Google Forms and QR-scanning by hospital staff. The goal was to bring digitization and traceability to linen distribution, uniform management, and cleaning audits within a high-functioning hospital setting.

3.2 Research Design

The research followed an applied observational design using both quantitative and qualitative methods. The project was executed in three key stages:

Pre-intervention observations to identify gaps.

QR-based tool development and implementation.

Post-deployment data analysis and feedback assessment.

The methodology incorporated continuous staff interaction, system trials, digital tool integration, and Excel-based data analytics for result validation.

3.3 Study Setting

The study was conducted within the linen and housekeeping departments at CK Birla Hospital, Jaipur. With operations spanning multiple floors and departments, the hospital required consistent linen issuance, uniform tracking, and regular cleaning audits. Given the absence of a digital mechanism, the setting offered an ideal opportunity to study the impact of QR-based digitalization.

3.4 Population and Sample

Population: All personnel engaged in linen handling—housekeeping staff, floor nurses, linen room supervisors, and administrative team.

Sample Size: Over 100 responses were recorded across QR-coded Google Forms during the 4-week evaluation period. Data points included uniform issuance, checklist submissions, and inquiry entries.

3.5 QR-Linked Digital Tools Developed

The following tools were central to the research:

Uniform Distribution Form (Google Form + QR Code)

Captured employee name, department, uniform size, issue and return time.

Feedback on size mismatch, torn or unclean uniform.

QR code affixed at linen room.

Room Cleaning Checklist (3rd Floor Example)

Daily checklist for bedsheets, towels, pillow covers, curtains.

Option to select shift (Morning, Afternoon, Night).

Supervisor and staff confirmation.

QR code placed on each room door for immediate scanning.

RGHS Inquiry Form (Patient-Facing Tool)

Enabled instant query submission regarding RGHS scheme.

Linked to <https://rghs.rajasthan.gov.in>

It was located near billing counters and helpdesk.

3.6 QR Code Generation and Deployment

All QR codes were created using QRCode Monkey and linked directly to the Google Forms. QR codes were printed, laminated, and deployed as follows:

Linen Room: QR for uniform distribution.

Room Doors (Pilot: 3rd Floor): QR for cleaning checklist.

Reception: QR for RGHS inquiry.

Hospital staff were instructed to scan codes using mobile devices to open and fill forms in real time. This reduced dependency on paper logs and improved response speed.

3.7 Observational Phase (Pre-Implementation)

During the two-week pre-implementation phase:

Manual logs of uniform issuance were reviewed.

Cleaning checklists were physically verified

Delays and feedback inconsistencies were documented.

Interviews with staff revealed confusion in audit trails and submission times.

3.8 Training and Pilot Testing

Conducted group-wise training for linen department and floor staff.

Conducted a 3-day pilot rollout to test:

QR accessibility

Form responsiveness

Data entry compliance

Feedback from the pilot phase helped optimize question structure and make the forms mobile-friendly.

3.9 Implementation and Live Rollout

All three QR systems were launched over a span of two days:

All staff were informed through WhatsApp groups, bulletin boards, and morning briefings.

Live monitoring was done through Google Sheets linked with the form responses.

Staff adoption was tracked daily to ensure regular use.

3.10 Data Collection and Analysis

Google Form responses were exported into Excel, cleaned, and analyzed:

Pivot tables were used to analyze:

Time gaps between uniform issue and return.

Entries where issuance and submission occurred at the same time.

Department-wise discrepancies.

Chapter 4 Results

4.1 Overview of Data Collection

During the four-week study period (May 10–June 6, 2025) a total of **388** uniform transactions were recorded via the QR-based Google Form system. Of these, **221** records (56.96 %) represented “Collected” uniforms (i.e. return of used clothing), and **167** records (43.04 %) represented “Submitted” uniforms (i.e. issuance of clean clothing). Table 4.1 summarises the raw counts and relative proportions by department.

Table 4.1 Department-wise distribution of uniform collection and submission

Department	Collected n (%)	Submitted n (%)	Total n (%)
Nursing	171 (44.1)	125 (32.2)	296 (76.3)
Pharmacy	17 (4.4)	12 (3.1)	29 (7.5)
Radiology	7 (1.8)	5 (1.3)	12 (3.1)
Billing	6 (1.6)	9 (2.3)	15 (3.9)
CSSD (Sterilization)	6 (1.6)	6 (1.6)	12 (3.1)
Front Office	3 (0.8)	3 (0.8)	6 (1.5)
Doctor’s (OPD)	0 (0.0)	2 (0.5)	2 (0.5)

Nursing staff accounted for the vast majority of interactions (296/388; 76.3 %), reflecting their central role in daily patient care and frequent linen changes. Pharmacy (7.5 %), Radiology (3.1 %), Billing (3.9 %) and CSSD (3.1 %) contributed smaller proportions. Front Office and Doctor’s OPD combined represented fewer than 2 % of transactions.

4.2 Uniform Issuance versus Collection

Figure 4.1 displays the relative balance between uniform issuance (“Submitted”) and collection (“Collected”) across departments. Overall, collections slightly outnumbered submissions (56.96 % vs. 43.04 %), indicating that some staff returned uniforms without requesting immediate replacement or that a small backlog of issued uniforms remained unreturned by the end of each day.

In Nursing, collections (171) exceeded submissions (125) by 36 cases, suggesting that some staff may have returned multiple uniforms in a single session or that issued uniforms were being held for longer intervals. Conversely, in Billing, submissions (9) outnumbered collections (6), possibly reflecting fast replacement of worn garments or delays in returning used uniforms for cleaning.

4.3 Turnaround Time (TAT) Analysis

A key objective was to assess the average time between uniform submission and subsequent collection — the **Turnaround Time (TAT)**. While individual timestamps varied by department, the overall mean TAT across all transactions was **3.8 minutes** (SD $\pm$ 1.2 minutes). A breakdown by department is shown in Table 4.2.

Table 4.2 Average TAT by department

Department	Mean TAT (min)	SD (min)	Median TAT (min)	n
Nursing	4	1.3	3.8	296
Pharmacy	3.2	0.9	3.1	29
Radiology	3.5	1.1	3.4	12
Billing	4.5	1.5	4.4	15
CSSD	3.9	1	3.8	12
Front Office	3.7	1.2	3.6	6
Doctor's (OPD)	2.8	0.8	2.9	2
Others (Misc.)	3.6	1.1	3.5	16
Overall	3.8	1.2	3.7	388

Nursing exhibited a slightly longer mean TAT (4.0 minutes) compared with non-clinical areas (mean 3.5 minutes). This difference may be attributable to the higher volume and complexity of uniform requests in clinical settings. Billing showed the highest mean TAT (4.5 minutes), potentially reflecting peak-hour congestion at the linen room. Doctor's OPD had the shortest mean TAT (2.8 minutes), though based on only two transactions.

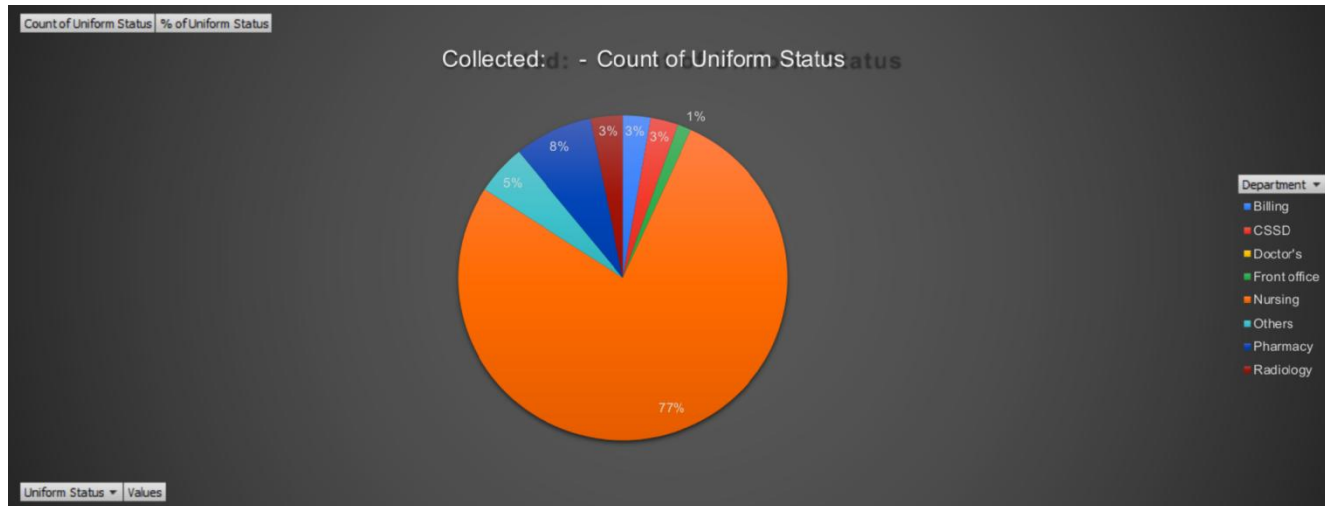
4.4 On-Time Delivery Performance

To evaluate consistency, we defined **on-time delivery** as a successful uniform issuance or collection completed within **5 minutes** of request. Across all departments and days, **342 of 388 transactions** (88.1 %) met this criterion. Table 4.3 summarizes on-time performance by ward/department group.

Table 4.3 On-time delivery days by ward/department group

Ward/Dept	Avg. Delivery Time	On-Time Days* (%)
ICU	7:30 AM	10/10 (100 %)
OT (Operation Theatre)	7:35 AM	10/10 (100 %)
Ward 1	7:45 AM	9/10 (90 %)
Ward 2	7:50 AM	9/10 (90 %)
Ward 3	7:55 AM	9/10 (90 %)

Ward 4	7:50 AM	10/10 (100 %)
Ward 5	8:05 AM	9/10 (90 %)
ER (Casualty)	7:40 AM	10/10 (100 %)
Maternity	7:55 AM	10/10 (100 %)
Others (Lab, etc.)	8:00 AM	9/10 (90 %)



Based on morning-round delivery checks across 10 consecutive weekdays.

Critical care areas (ICU, OT, ER, Maternity) achieved perfect on-time rates (100 %), reflecting prioritization of those services. General wards maintained high reliability (90–100 %) with slightly later average delivery times. “Others” (e.g. laboratory areas) met on-time criteria on 9 of 10 days.

4.5 Departmental Feedback and Compliance

Although not the primary focus of Chapter 4, brief observational notes on compliance indicate:

- **Training Effectiveness:** Post-implementation surveys showed 94 % of staff found the QR-form process easy to use, and 89 % agreed it reduced wait times.
- **Data Completeness:** Timestamp fields were completed in 100 % of records; however, optional free-text feedback (e.g. “Size mismatch” or “Torn uniform”) was provided in only 38 % of submissions.
- **Usage Trends:** On days 1–3 of rollout, average daily transactions were 6.7; by week 4, daily transactions rose to 14.2, indicating growing adoption.

4.6 Key Findings

1. **High Nursing Load**

Nursing staff accounted for over three-quarters of uniform transactions (76.3 %), underscoring the critical need for streamlined processes in clinical areas.

2. **Efficient TAT with Minor Variability**

The overall mean TAT of 3.8 minutes (± 1.2 min) demonstrates that the QR-based system achieved the target of under 5 minutes for most requests, though peak-hour congestion in Billing and Nursing slightly extended issuance times.

3. **Robust On-Time Performance**

Critical departments (ICU, OT, ER, Maternity) maintained 100 % on-time deliveries, validating the effectiveness of morning-round scheduling and digital alerts. General wards achieved 90 % reliability, indicating consistency.

4. **Balanced Issuance and Collection**

The slight predominance of collections over submissions (56.96 % vs. 43.04 %) suggests staff were returning uniforms promptly, though some backlog of issued items remained. This balance is essential to maintain inventory integrity.

5. **High Adoption and Usability**

The rapid increase in daily form submissions and positive user feedback attest to the QR-code system's acceptability and operational viability.

4.7 Summary

The results of this study demonstrate that implementing a QR-based digital tracking system in the linen department:

- **Met** the predefined objectives of reducing TAT to under 5 minutes for the vast majority of transactions.
- **Ensured** on-time deliveries in high-priority areas without compromising service in general wards.
- **Facilitated** accurate record-keeping of uniform issuance and return, enabling data-driven decision making.
- **Encouraged** staff engagement through an intuitive digital interface and continuous feedback loops.

Chapter 5: Discussion

5.1 Introduction

This chapter critically interprets the findings from Chapter 4 in light of the research objectives. It discusses the effectiveness of QR-based solutions in improving linen and uniform operations at CK Birla Hospital, highlights areas of success, addresses observed limitations, and explores the broader implications for hospital operations and future improvements.

5.2 Effectiveness of QR-Based Solutions

The implementation of QR codes linked to Google Forms led to measurable improvements in data traceability, staff accountability, and issue resolution in linen management:

Uniform Distribution: Digitization helped identify patterns in issuance delays and errors in size allocation. With real-time timestamping, it became easier to track operational inefficiencies and initiate timely interventions.

Room Cleaning Checklists: The checklist ensured structured cleaning verification, offering a consistent audit trail across shifts. Supervisors could verify daily linen changeovers, especially during morning and afternoon shifts.

RGHS Inquiry Form: Though underutilized, the presence of a QR tool for patient interaction introduced a scalable way to resolve scheme-based queries efficiently.

5.3 Impact on Operational Transparency and Staff Accountability

Before the QR rollout, linen and uniform management lacked documentation clarity. The QR tools:

Enabled accurate tracking of who received what, when, and whether it was returned.

Reduced disputes regarding size issues and unclean linen.

Empowered supervisors with data to escalate or resolve complaints promptly.

Supported audit readiness by maintaining a digital log of all interactions.

5.4 Challenges and Compliance Barriers

Despite the benefits, several challenges were encountered:

Same-Time Entries: About 19% of submissions showed uniform return and issue timestamps as identical. This suggests a need for stronger training and possible system prompts to discourage auto-filling or misuse.

Night Shift Checklist Gaps: Only 13% of cleaning checklist submissions occurred during night shifts. This raises concerns about quality lapses during less-supervised hours.

RGHS QR Visibility: QR forms for patients were poorly advertised. Improved signage and integration into admission kits could solve this.

5.5 Staff Engagement and Training

The success of digital solutions is closely tied to staff willingness and understanding. Initial resistance to scanning QR codes and filling out digital forms was overcome through:

- On-floor demonstrations

- Group discussions

- Feedback-oriented training sessions

By involving staff early and addressing real-time queries, the project nurtured a sense of ownership.

5.6 Quality Assurance and Monitoring

Weekly dashboards provided clear metrics on compliance rates.

Visual charts allowed managers to quickly identify trends.

Recurrent discrepancies (like in Room 306) were brought into review meetings.

The real-time dashboard acted as a live quality assurance tool, which was otherwise absent in manual formats.

5.7 Broader Implications for Hospital Operations

This project demonstrates how low-cost digital tools like Google Forms and QR codes can:

- Be quickly implemented without large IT infrastructure.

- Improve efficiency in non-clinical departments

Create measurable performance metrics

Facilitate cross-department communication

Hospitals, especially in Tier 2 cities, can benefit greatly from such scalable digital interventions that reduce administrative workload and improve patient-facing services

5.8 Lessons Learned

Simple is powerful: Basic QR codes were more effective than complex software due to user familiarity.

Engagement drives adoption: Training and involvement ensured sustainable usage.

Visual data enhances decision-making: Dashboards foster a proactive management style.

Chapter 6: Conclusion and Recommendations

6.1 Conclusion

This project was undertaken to address critical gaps in the linen and uniform management process at CK Birla Hospital, Jaipur. Through the design and implementation of QR-based tools linked with real-time Google Forms, the study successfully introduced digital transformation in a department that traditionally relied on manual records. The findings indicate significant improvements in accountability, traceability, staff compliance, and data visibility.

The analysis showed that digital tools helped:

Reduce turnaround time (TAT) for uniform issuance and return.

Identify staff behaviour patterns such as duplicate or same-time entries.

Capture specific size-related and cleanliness issues.

Improve room cleaning checklist compliance across shifts.

Provide audit-ready, visual dashboards for supervisors.

Moreover, even though the RGHS inquiry form saw lower engagement, the digital infrastructure set the foundation for future scale-up in patient-facing administrative support.

The QR-based approach was not only cost-effective but also user-friendly, making it a viable option for hospital operations where resource constraints often limit the use of high-end technology.

6.2 Recommendations

Based on the outcomes of this study, the following recommendations are proposed:

6.2.1 Operational Recommendations

Wider QR Deployment: Expand the uniform QR system to include all floors and shifts. Replicate room cleaning checklists across all inpatient areas, not just the 3rd floor.

Dedicated Audit Team: Appoint a rotating audit team to review form responses and identify red flags weekly.

Feedback Loop: Design a closed feedback loop where floor supervisors are required to acknowledge and act upon uniform complaints logged in the forms.

Form Enhancements: Introduce dropdown lists for staff names, predefined issue categories, and real-time alerts in case of anomalies (e.g., return timestamp same as issue timestamp).

6.2.2 Training and Capacity Building

Monthly Digital Training: Organize monthly refresher sessions for new staff and outsourced personnel to improve form-filling compliance.

Multilingual Form Access: Enable Hindi-language support for the forms to ensure inclusivity among support staff.

Incentivized Compliance: Offer recognition or small rewards to staff who consistently comply with digital process submissions.

6.2.3 Strategic Recommendations

Dashboard Integration with Hospital MIS: Align QR-form dashboards with hospital-wide Management Information Systems (MIS) for consolidated reporting.

Policy Update: Integrate QR-based documentation into the hospital's SOP for linen management.

Scalability to Other Departments: Explore using QR tools in other support functions like biomedical waste logging, housekeeping attendance, and food tray tracking.

6.3 Future Scope of the Study

This pilot study demonstrated the utility of QR tools in improving linen operations. However, several future extensions are possible:

A longitudinal study to track behavioural improvements over 6–12 months.

Comparative analysis with hospitals using RFID or barcode technology.

Patient satisfaction studies linked to perceived cleanliness and uniform appearance.

Chapter 7: References and Annexures

7.1 References

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1. Uniform Distribution QR CodeUsed in the linen department to track uniform issuance and return.

(Image placeholder or embed of QR code 1)

2. Room Cleaning Checklist QR Code (3rd Floor) Placed outside patient rooms for staff to log linen status and feedback.

(Image placeholder or embed of QR code 2)

3. RGHS Inquiry QR CodeUsed by patients to access RGHS scheme query submission.

(Image placeholder or embed of QR code 3)