



Enhancing Operational Efficiency in a Multispecialty Hospital

Name: Ye Htut

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Executive Summary

Outline the problem, key insights, and recommended actions in 6 bullet points.

Problem:

1. HealthFirst Care currently experiences long patient wait times,
2. frequent scheduling conflicts, inefficient resource allocation,
3. poor communication between departments.
4. Difficulty booking appointments, receiving late or no notifications about delays or cancellations, and inadequate post-consultation guidance
5. overbooked schedules, lack of access to required equipment, and delayed diagnostic results
6. outdated systems, double bookings, and incomplete records
7. system fragmentation and technical limitations.

Key insights:

1. High patient wait times driven by manual scheduling and check-in processes
2. Resource availability not visible in real time, causing delays and overbooking
3. Significant number of cancelled, rescheduled, and no-show appointments
4. Communication gaps between departments impact patient flow and care quality

Recommended Actions

1. Implement automated appointment scheduling with conflict detection
2. Introduce real-time resource tracking dashboards
3. Enable automated SMS/email notifications for patients
4. Integrate scheduling, billing, and patient record systems

Introduction

Summarize the opportunity, describe the approach, and outline the key questions or hypotheses to be analyzed in 6 bullet points.

Opportunity:

1. Improve patient satisfaction through reduced wait times
2. Optimize staff and resource utilization
3. Enhance data-driven decision-making using analytics
4. Increase operational efficiency with system automation

Approach:

1. Analyze stakeholder feedback and operational dataModel current (As-Is) and optimized (To-Be) processes
2. Prioritize requirements using MoSCoW method
3. Implement solutions in phases with stakeholder validation

Key questions/hypotheses:

1. Can automation reduce average patient wait times by at least 20%?
2. Will real-time visibility of resources reduce scheduling conflicts?
3. Does improved communication improve staff efficiency and patient experience?
4. Will system integration reduce errors in scheduling and billing?

Business Objectives

Areas of improvement in 6 bullet points:

- Reduce average patient wait times by at least 20%
- Minimize appointment scheduling conflicts and double bookings
- Improve utilization of clinical resources and equipment
- Enhance patient satisfaction through timely communication
- Enable real-time data sharing across departments
- Improve staff productivity and reduce operational delays



Methodology

Requirements Gathering: Business Requirement Document (BRD)

Problem statement:

HealthFirst Care currently experiences long patient wait times, frequent scheduling conflicts, inefficient resource allocation, and poor communication between departments. Patients report difficulty booking appointments, receiving late or no notifications about delays or cancellations, and inadequate post-consultation guidance. Clinical staff face overbooked schedules, lack of access to required equipment, and delayed diagnostic results. Administrative staff struggle with outdated systems, double bookings, and incomplete records, while IT teams report system fragmentation and technical limitations.

These issues collectively result in patient dissatisfaction, staff burnout, and reduced operational efficiency, highlighting the need for an integrated, user-friendly, and reliable hospital management solution.

Key requirements to improve operational efficiency:

- Automated and user-friendly appointment scheduling system
- Real-time visibility of doctor, room, and equipment availability
- Automated patient notifications (confirmation, reminders, delays)
- Integrated hospital systems (scheduling, records, billing, diagnostics)
- Streamlined patient check-in with reduced manual paperwork
- Real-time interdepartmental communication and task tracking
- Resource utilization monitoring and reporting dashboards
- Secure, scalable, and high-availability system infrastructure

Requirements Gathering: Business Requirement Document (BRD)

Constraints:

- Limited budget for system upgrades and enhancements
- Dependence on existing legacy systems during transition
- Regulatory and data privacy compliance requirements
- Limited downtime allowance for system implementation

Acceptance criteria:

- Average patient wait times reduced by at least 20% within 3 months of implementation
- Appointment scheduling conflicts (double bookings) reduced by at least 80%
- 90%+ of appointments receive automated confirmation and reminder notifications
- Real-time resource availability visible to administrative and clinical staff
- Patient check-in time reduced by at least 30% through automation
- System uptime maintained at $\geq 99\%$ during operating hours
- Patient satisfaction scores improve by at least 15%
- All patient data handled in compliance with healthcare data regulations

Requirements Gathering: Requirement Traceability Matrix (RTM)

Requirement ID	Requirement Description	Priority (MoSCoW)	Stakeholder(s)	Project Objective	Related Data File	Status
FR-01	Automated online appointment scheduling	Must Have	Patients, Admin	Patients, Admin		Approved
FR-02	Real-time visibility of doctors and resources	Must Have	Doctors, Nurses	Improve efficiency		Approved
FR-03	Email/SMS notifications for appointments	Must Have	Patients	Improve communication		Approved
FR-04	Integrated scheduling, billing, and records system	Must Have	Admin, IT	Reduce errors		Approved
FR-05	Inter-departmental communication support	Should Have	Doctors, Nurses	Improve care coordination		Pending

Requirements Gathering: Requirement Traceability Matrix (RTM)						
Requirement ID	Requirement Description	Priority (MoSCoW)	Stakeholder(s)	Project Objective	Related Data File	Status
FR-06	Resource usage tracking and management	Should Have	Admin, Management	Optimize resources		Pending
FR-07	Reporting on wait times and utilization	Could Have	Management	Monitor performance		Pending
NFR-01	High system availability	Must Have	IT	Ensure reliability		Approved
NFR-02	User-friendly interface	Must Have	Patients	Improve experience		Approved
NFR-03	Data security and regulatory compliance	Must Have	IT, Management	Protect patient data		Approved

Requirements Gathering: Requirement Traceability Matrix (RTM)

Requirement ID	Requirement Description	Priority (MoSCoW)	Stakeholder(s)	Project Objective	Related Data File	Status
NFR-04	Scalability during peak hours	Should Have	IT	Handle demand		Pending
NFR-05	Real-time system performance	Must Have	Doctors, Nurses	Enable timely decisions		Approved

Stakeholder Analysis and Engagement Plan

Stakeholders:

- **Patients**
- **Doctors & Nurses**
- **Administrative Staff**
- **IT teams**
- **Hospital Management (Project sponsors and decision-makers)**

Stakeholders' influence:

Stakeholder Group	Role	Influence	Interest	Matrix Category
Doctors & Nurses	Deliver patient care, use systems daily	High	High	Key Players
Administrative Staff	Scheduling, records, billing	High	High	Key Players
IT Teams	System development and maintenance	High	Low	Keep Satisfied
Patients	Receive care and use services	Low	High	Keep Informed
Hospital Leadership	Strategic oversight and approvals	High	Medium	Keep Satisfied
Support Staff	Indirect operational support	Low	Low	Monitor

Stakeholder Analysis and Engagement Plan

Stakeholder engagement strategies:

- Prioritize engagement based on stakeholder influence and interest
- Involve key players early to validate requirements and process changes
- Maintain leadership and IT alignment through milestone-based reviews
- Keep patients informed to improve trust and adoption
- Minimize disruption by limiting communication for low-impact stakeholders

Stakeholder communication strategies:

- Use regular meetings and workshops for high-influence stakeholders
- Share executive summaries and progress updates with leadership and IT teams
- Communicate patient-facing changes through newsletters, dashboards, and surveys
- Provide passive updates to support staff through internal reports
- Adjust communication frequency based on project phase and stakeholder needs

Scope Management Plan

In-scope activities:

- Improvement of appointment scheduling processes
- Reduction of patient wait times
- Optimization of resource allocation (staff, rooms, equipment)
- Enhancement of inter-departmental communication
- Implementation of automated notifications (email/SMS)
- Integration of scheduling and patient record systems
- Use of data analytics for monitoring trends and performance

Out-of-scope activities:

- Major physical infrastructure expansion
- Recruitment of new permanent clinical staff
- Changes to external insurance or regulatory systems
- Clinical decision-making or treatment protocols

Scope Management Plan

Assumptions:

- Stakeholders will actively participate in system adoption and training
- Existing hospital infrastructure can support system integration
- Accurate data will be available for analysis and reporting
- Patients have access to basic digital communication channels (SMS/email)

Constraints:

- Limited budget for system upgrades and enhancements
- Dependence on existing legacy systems during transition
- Regulatory and data privacy compliance requirements
- Limited downtime allowance for system implementation

Scope Management Plan

Phases in the Work Breakdown Structure (WBS):

WBS ID	Task Name	Task Description	Milestone
1.0	HealthFirst Care Improvement Initiative	Root level of the project	Project Kick-off
1.1	Phase 1: Requirements Gathering	Define and document business and system requirements	Business Requirements Document (BRD)
1.1.1	Stakeholder Interviews	Collect requirements from patients, clinicians, admin, and IT	Stakeholder feedback summary
1.1.2	Stakeholder Profile Review	Review simulated stakeholder profiles	Stakeholder analysis notes
1.1.3	Data Analysis	Analyze appointment, feedback, and resource data	Data insights document
1.2	Phase 2: Solution Design	Design optimized workflows and system features	Approved solution design
1.2.1	Scheduling Workflow Design	Design automated appointment scheduling workflows	Scheduling workflow diagrams

Scope Management Plan

Phases in the Work Breakdown Structure (WBS):

WBS ID	Task Name	Task Description	Milestone
1.2.2	Resource Tracking Design	Design dashboards for resource utilization	Dashboard design specification
1.2.3	Notification System Design	Design email/SMS notification workflows	Notification design document
1.3	Phase 3: System Development & Integration	Build and integrate system components	Configured system components
1.3.1	Scheduling System Configuration	Configure automated scheduling features	Scheduling module completed
1.3.2	System Integration	Integrate scheduling, billing, records, and diagnostics	Integrated HIS modules
1.3.3	Dashboard Development	Develop reporting and monitoring dashboards	Resource & wait time dashboards
1.3.4	Notification System Implementation	Implement real-time email/SMS alerts	Notification system live

Scope Management Plan

Phases in the Work Breakdown Structure (WBS):

WBS ID	Task Name	Task Description	Milestone
1.4	Phase 4: Testing & Validation	Validate system functionality and performance	User acceptance approval
1.4.1	Functional Testing	Test core system features	Test results report
1.4.2	User Acceptance Testing (UAT)	Validate system with end users	UAT sign-off
1.4.3	Issue Resolution	Fix and retest reported issues	Resolved defects list
1.5	Phase 5: Deployment & Training	Deploy system and train users	System Go-Live
1.5.1	System Deployment	Deploy solution to production	Live system
1.5.2	Staff Training	Train clinical and admin staff	Training materials & attendance

Scope Management Plan

Phases in the Work Breakdown Structure (WBS):

WBS ID	Task Name	Task Description	Milestone
1.5.3	Go-Live Support	Provide post-launch support	Go-live support log
1.6	Phase 6: Project Closure	Close project and obtain final sign-off	Project closure approval
1.6.1	Final Documentation	Complete project documentation	Final project report
1.6.2	Post-Implementation Review	Evaluate project outcomes	Lessons learned document
1.6.3	Formal Sign-off	Obtain leadership approval	Project sign-off

Scope Management Plan

Scope change management:

- **Scope Change Request Process**
- Stakeholder submits a formal scope change request
- Project Manager reviews the request for completeness
- Impact analysis is conducted (schedule, cost, resources, risks)
- Change request is reviewed by Hospital Leadership and IT representatives
- Decision is documented as Approved, Deferred, or Rejected
- Approved changes are updated in the BRD, RTM, and project plan

Approval Criteria

- Scope changes will be evaluated based on:
- Alignment with project objectives
- Impact on budget and timeline
- Technical feasibility
- Regulatory and data security compliance
- Availability of resources

- **Stakeholder Roles in Scope Management**

Project Manager: Reviews and manages change requests

Hospital Leadership: Final approval authority

IT Team: Assesses technical feasibility and impact

Business Analyst: Updates BRD and RTM documentation

- **Scope Monitoring and Validation**

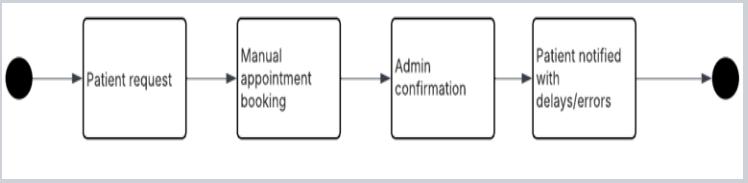
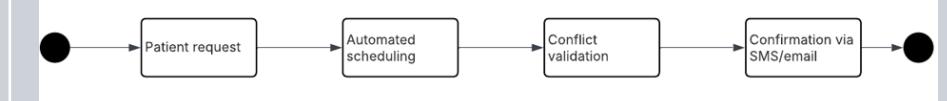
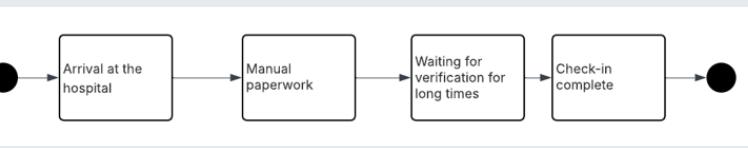
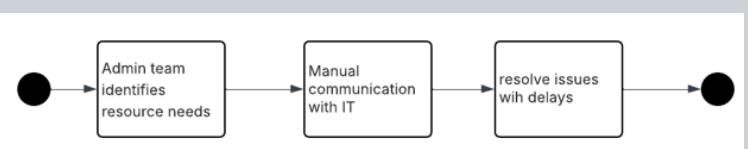
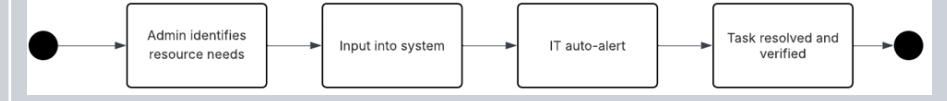
Regular reviews against the BRD and RTM

Milestone-based scope validation meetings

Stakeholder sign-offs at key deliverables

Continuous monitoring to prevent scope creep

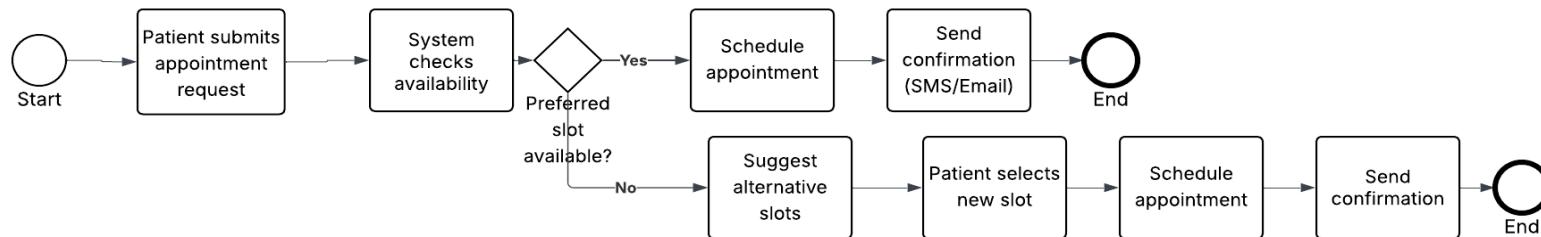
Process Mapping

Process	As-Is Model	To-Be Model
Appoint Scheduling Process	 <pre> graph LR Start(()) --> A[Patient request] A --> B[Manual appointment booking] B --> C[Admin confirmation] C --> D["Patient notified with delays/errors"] D --> End(()) </pre>	 <pre> graph LR Start(()) --> A[Patient request] A --> B[Automated scheduling] B --> C[Conflict validation] C --> D["Confirmation via SMS/email"] D --> End(()) </pre>
Patient Check-in Process	 <pre> graph LR Start(()) --> A[Arrival at the hospital] A --> B[Manual paperwork] B --> C["Waiting for verification for long times"] C --> D[Check-in complete] D --> End(()) </pre>	 <pre> graph LR Start(()) --> A[Patient arrival] A --> B[Self-service kiosk check-in] B --> C[Verification] C --> D["Immediate notification to relevant departments"] D --> End(()) </pre>
Interdepartmental Communication Process	 <pre> graph LR Start(()) --> A["Admin team identifies resource needs"] A --> B[Manual communication with IT] B --> C["resolve issues with delays"] C --> End(()) </pre>	 <pre> graph LR Start(()) --> A["Admin identifies resource needs"] A --> B[Input into system] B --> C[IT auto-alert] C --> D["Task resolved and verified"] D --> End(()) </pre>

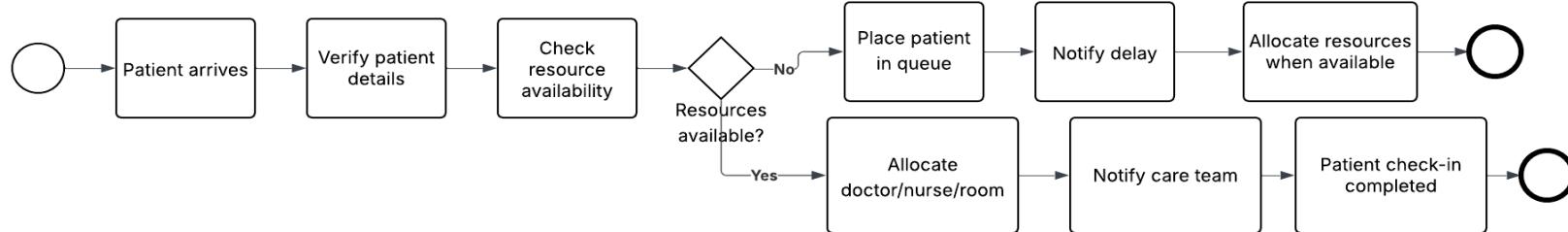
Advanced Process Mapping

Detailed workflow using the advanced BPMN model:

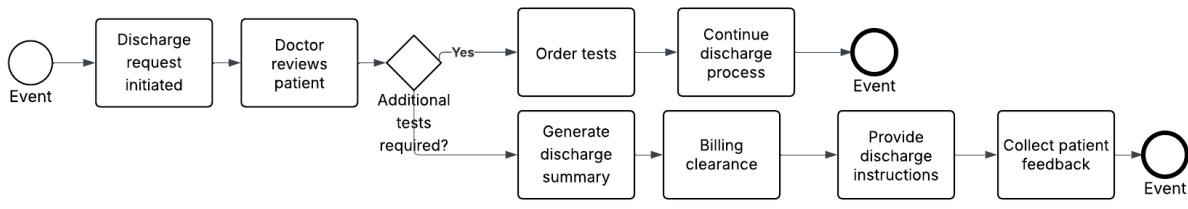
Appointment Scheduling



Patient Check-in & Resource Allocation BPMN



Discharge Process

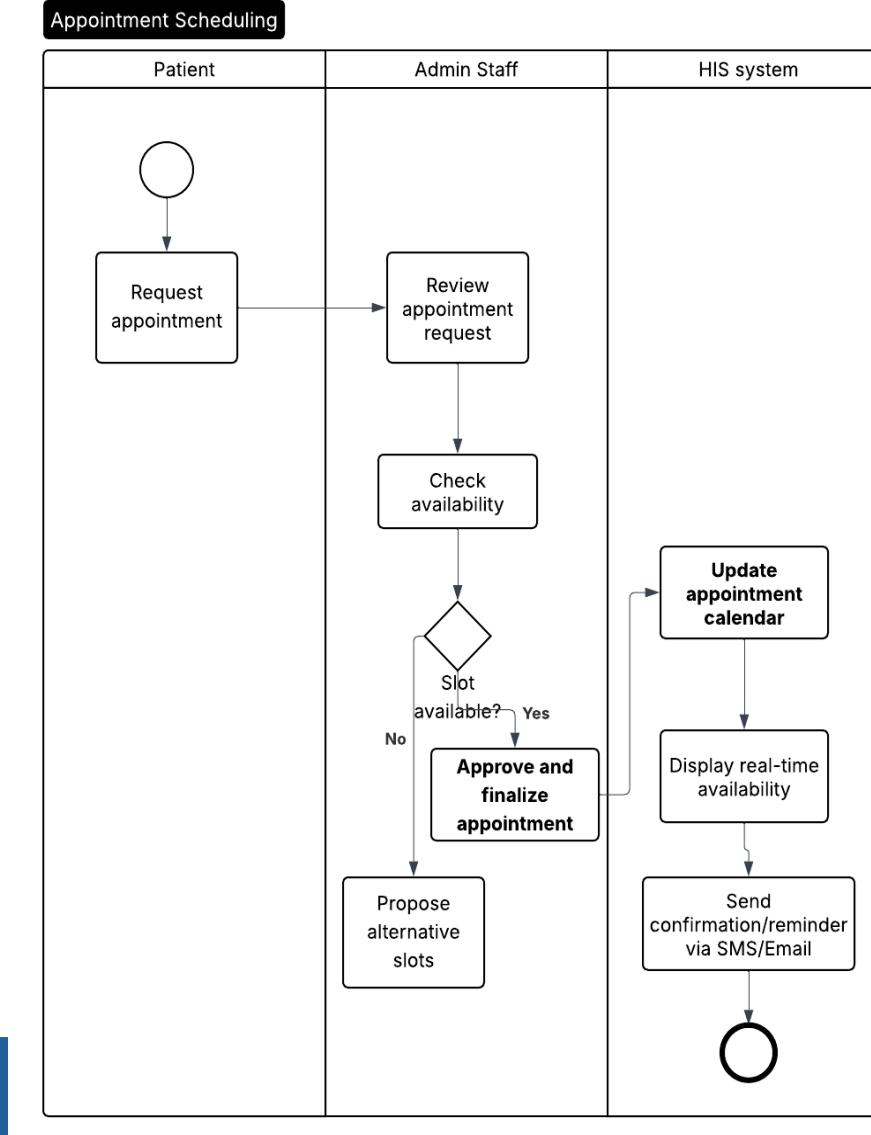


Advanced Process Mapping

Stakeholder responsibility using the Swimlane diagram:

Swimlane (Stakeholders)	Task/Activity	Description
Patient	Request appointment	The patient initiates an appointment request by submitting preferred date and time.
Admin Staff	Review appointment request	Admin staff receives and reviews the patient's appointment request.
Admin Staff	Check availability	Admin staff checks available time slots and resources.
Admin Staff	Decision – Slot available?	Determines whether the requested appointment slot is available.
Admin Staff	Approve and finalize appointment	If a slot is available, the appointment is approved and confirmed.
Admin Staff	Propose alternative slots	If no slot is available, alternative appointment times are suggested to the patient.
HIS (Hospital Information System)	Update appointment calendar	The system records the confirmed appointment in the scheduling calendar.
HIS (Hospital Information System)	Display real-time availability	The system updates and shows current appointment availability.
HIS (Hospital Information System)	Send confirmation/reminder via SMS/Email	The system automatically sends appointment confirmation and reminders to the patient.

Swimlane Diagram

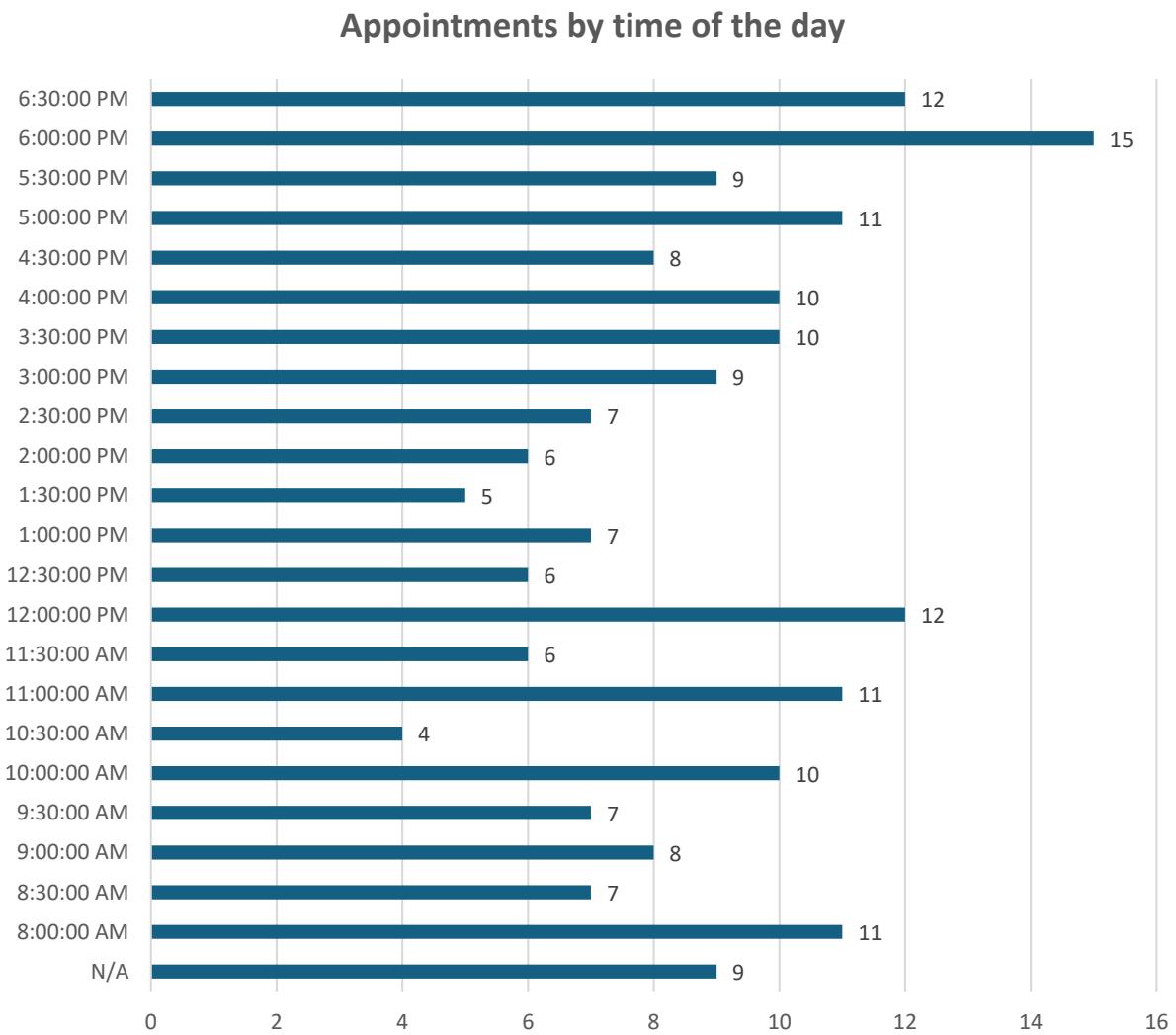


Data Analysis

Trends using a Pivot Table:

busiest time of the day - 6:00 PM

busiest day of week - Monday



Data Analysis

Trends using a Pivot Table:

- Average wait time increased in Aug, Sep and Oct.

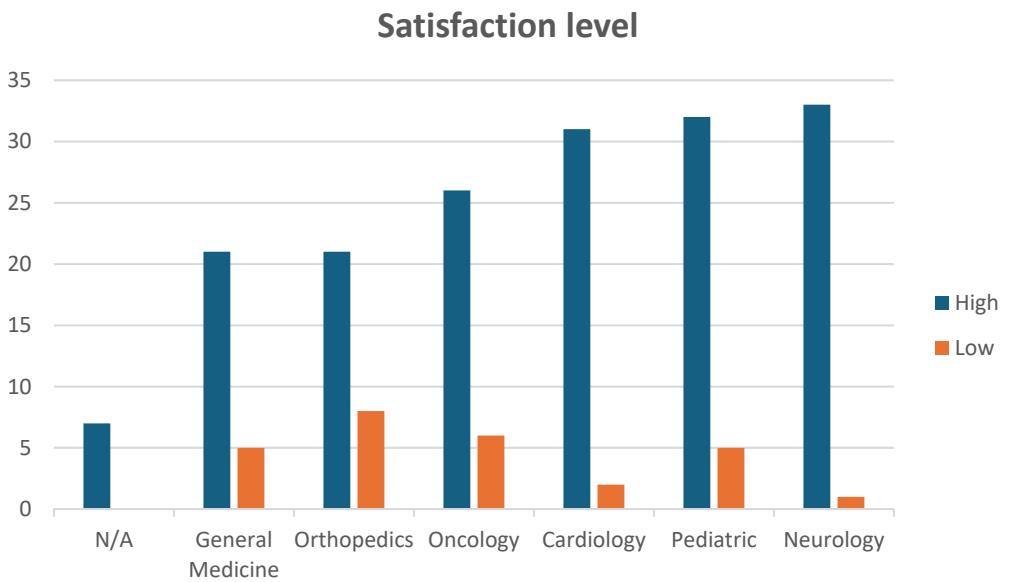


Data Analysis

Trends analyzed from the Pivot Table:

Highest satisfaction level - Neurology

Lowest satisfaction level – General, Orthopedics

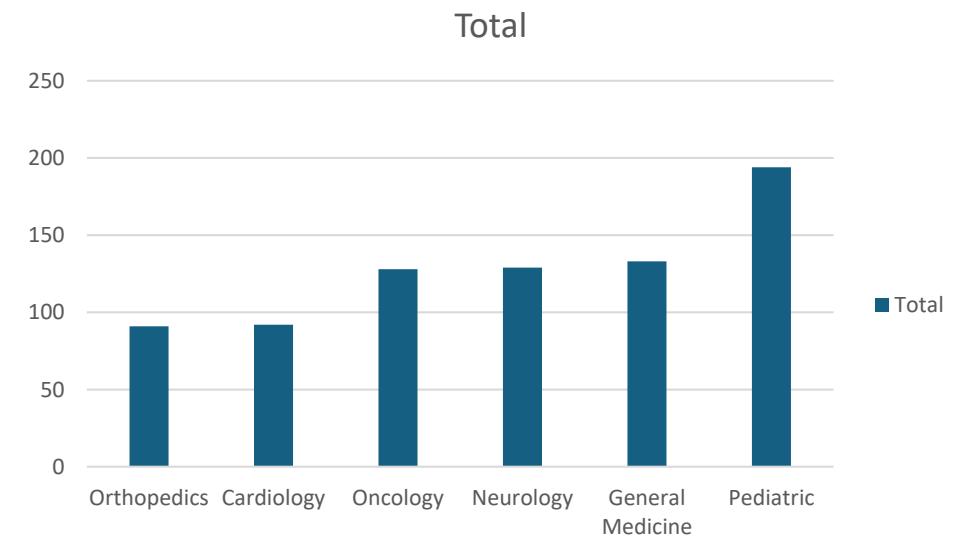


Data Analysis

Key insights:

Underutilized - Orthopedics

Overburdened - Pediatric



Data Analysis

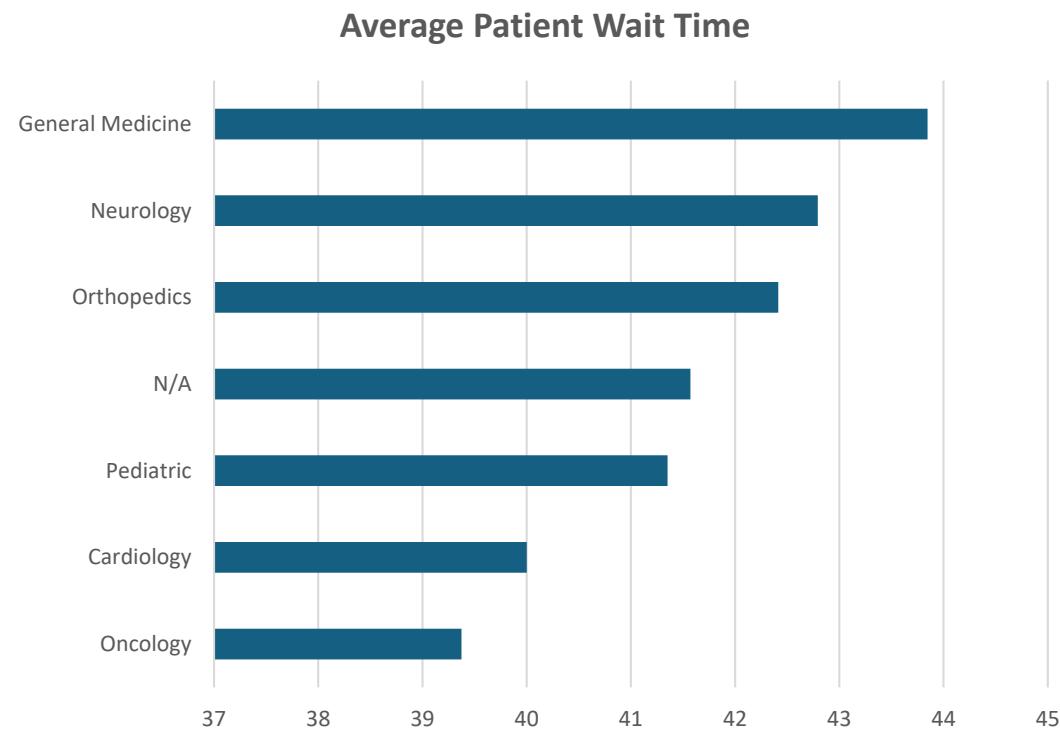
Key insights:

- A **correlation coefficient of -0.66** indicates a **moderately strong negative relationship** between **patient wait time** and **feedback score**.
- As **wait time increases, patient satisfaction (feedback score) tends to decrease**. This suggests that longer waiting periods are associated with lower patient satisfaction, while shorter wait times are generally linked to higher feedback scores.
- However, this relationship shows association, not causation.

Data Visualization

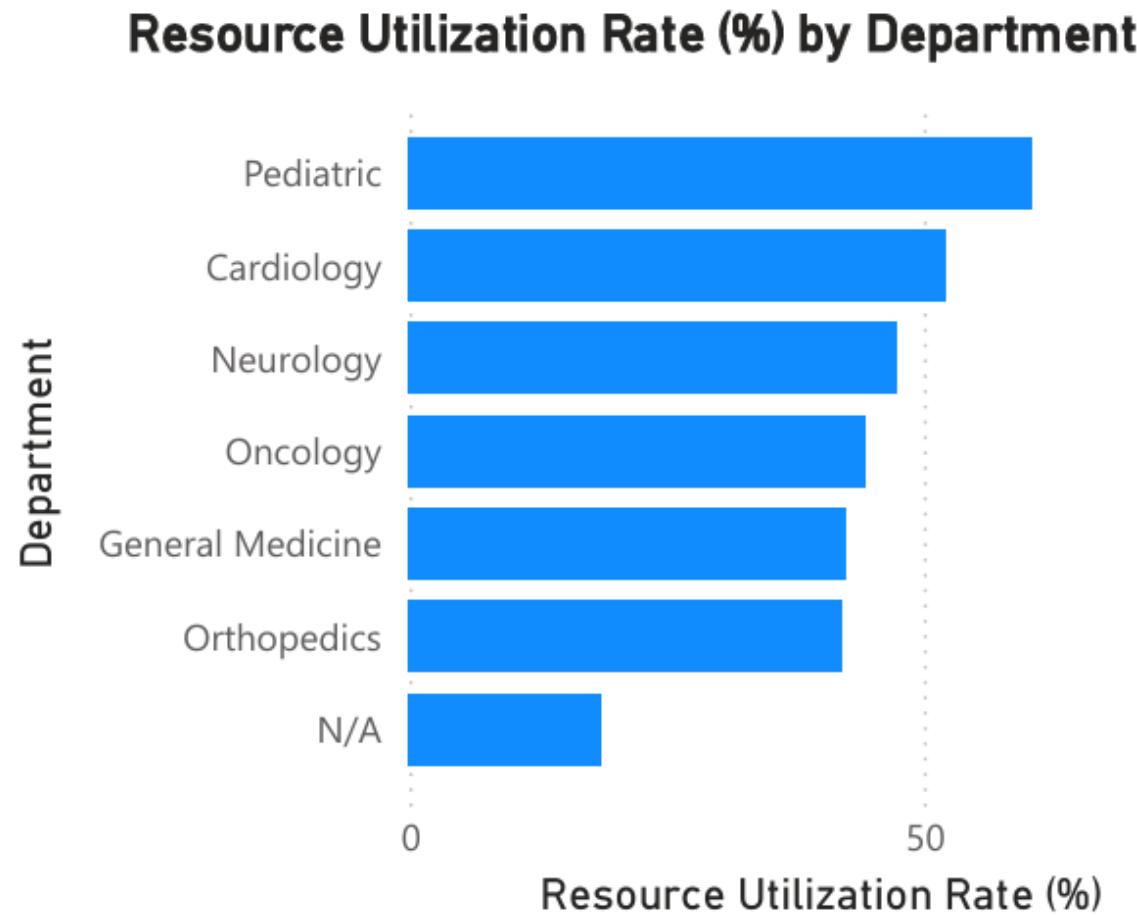
Average patient wait time using a horizontal bar chart:

- Average wait time across all departments is 41.5 min.



Data Visualization

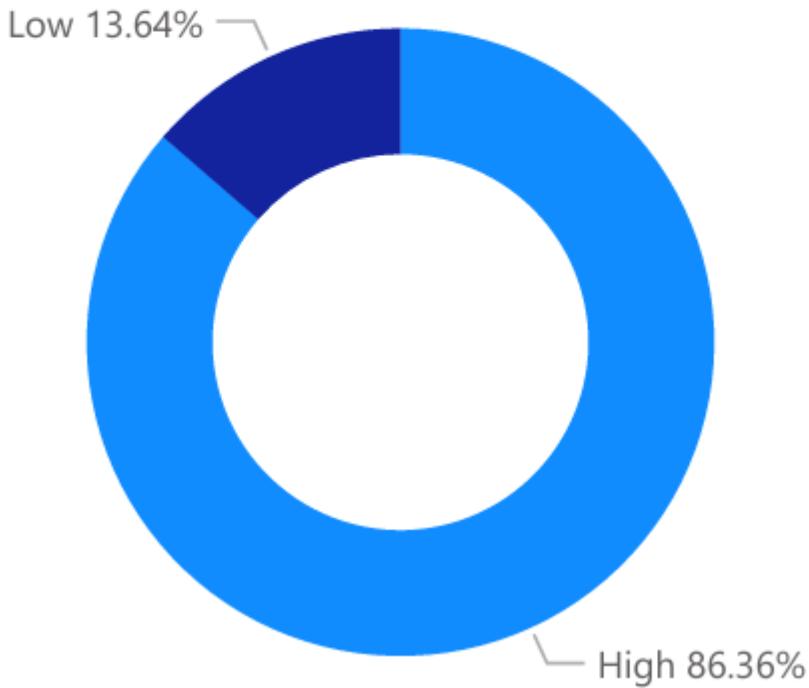
Bar chart highlighting overused and underutilized resources:



Data Visualization

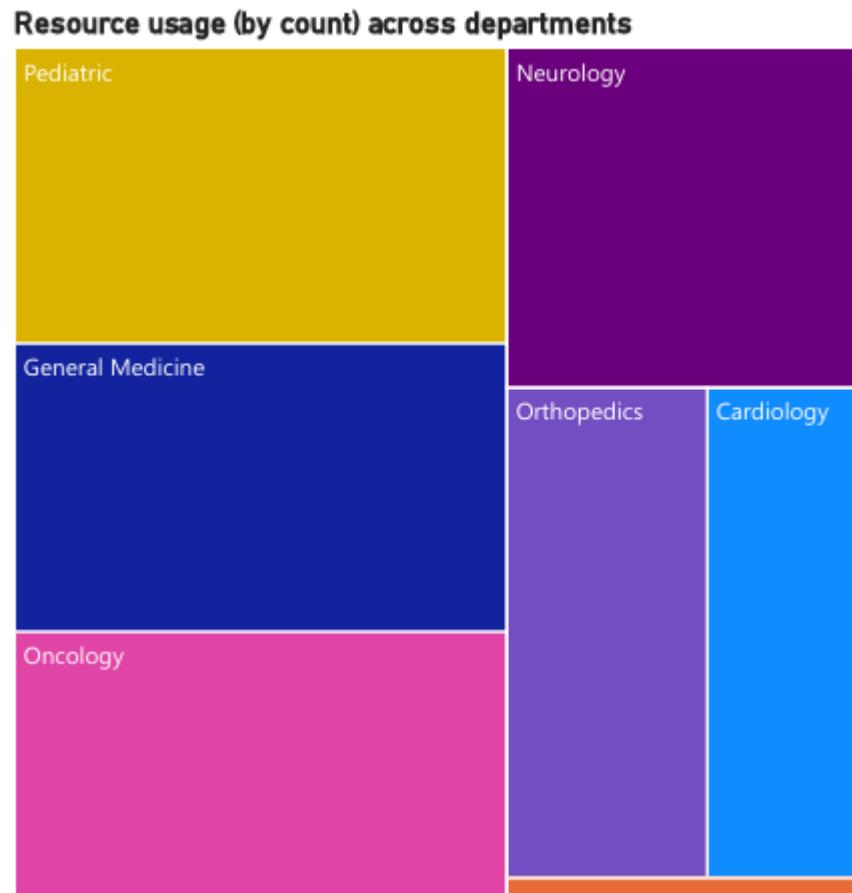
Patient feedback visualized using a Pie Chart:

Patient Satisfaction Levels (High vs Low)



Data Visualization

Heat Map showing the efficiency of departments:



Risk Management Plan

Risks identified in the risk register:

Risk ID	Risk Description	Category	Likelihood	Impact	Severity	Mitigation Strategy
R1	Manual appointment scheduling causes double bookings and delays	Operational	High	High	High	Implement automated scheduling with conflict detection and real-time availability
R2	Long patient wait times due to inefficient check-in and resource allocation	Operational	High	High	High	Introduce self-service check-in kiosks and real-time resource dashboards
R3	Staff resistance to adopting new digital systems	Stakeholder	Medium	High	Medium	Conduct training sessions and involve staff in system design
R4	System downtime affects online scheduling and notifications	Technical	Medium	High	Medium	Use cloud-based systems with redundancy and downtime monitoring
R5	Data breaches or unauthorized access to patient records	Technical	Low	High	Medium	Enforce strong security controls, encryption, and regulatory compliance
R6	Poor interdepartmental communication causes delays in care delivery	Operational	Medium	Medium	Medium	Implement centralized communication and task management tools

Risk Management Plan

Risks identified in the risk register:

Risk ID	Risk Description	Category	Likelihood	Impact	Severity	Mitigation Strategy
R7	Inaccurate or incomplete data affects billing and reporting	Technical	Medium	Medium	Medium	Integrate systems and perform regular data validation checks
R8	Patients fail to adopt online scheduling tools	Stakeholder	Low	Medium	Low	Provide alternative booking options and simple user guides
R9	Misaligned expectations between stakeholders delay decision-making	Stakeholder	Low	Medium	Low	Establish clear governance and regular stakeholder meetings

Risk Management Plan

Risks categorized based on the Risk Assessment Matrix:

Likelihood/Impact	Low Impact	Medium Impact	High Impact
High Likelihood	R5	R4, R3	R1, R2
Medium Likelihood	R8, R9	R6, R7	
Low Likelihood			

Risk Management Plan

Elements identified in the SWOT analysis:

Strengths

Strong leadership commitment to operational improvement
Availability of patient feedback and operational data
Skilled IT team with system integration expertise

Weaknesses

Heavy reliance on manual workflows
Lack of system integration causing data silos
Limited real-time visibility of resources and schedules

Opportunities

Automation of scheduling and patient check-in processes, Implementation of advanced Hospital Information Systems (HIS)
Staff training programs to improve adoption and efficiency, Use of analytics to optimize resource utilization

Threats

Data breaches and cybersecurity risks
Resistance from staff or patients to new systems
System downtime affecting critical hospital operations
Regulatory non-compliance risks related to patient data

Risk Management Plan

Key insights from the Risk Management Plan:

- Operational risks pose the highest threat to project success
- Manual scheduling and long wait times are the most critical risks
- Technical risks have high impact but moderate to low likelihood
- Stakeholder-related risks mainly affect adoption and timelines
- Risk prioritization enables focused allocation of resources

Risk Mitigation Plan

Strategies to mitigate risks:

Risk ID	Risk Description	Category	Likelihood	Impact	Severity	Mitigation Strategy
R1	Manual appointment scheduling causes double bookings and delays	Operational	High	High	High	Implement automated scheduling with conflict detection Enable real-time visibility of doctor and resource availability Reduce manual intervention in booking processes
R2	Long patient wait times due to inefficient check-in and resource allocation	Operational	High	High	High	Introduce self-service or online patient check-in Deploy real-time dashboards for resource allocation Monitor peak hours and adjust workflows accordingly
R3	Staff resistance to adopting new digital systems	Stakeholder	Medium	High	Medium	Provide structured training and onboarding sessions Involve staff early in system design and testing Offer continuous support during transition
R4	System downtime affects online scheduling and notifications	Technical	Medium	High	Medium	Use cloud-based infrastructure with redundancy Implement system monitoring and backup

Risk Mitigation Plan

Strategies to mitigate risks:

Risk ID	Risk Description	Category	Likelihood	Impact	Severity	Mitigation Strategy
R7	Inaccurate or incomplete data affects billing and reporting	Technical	Medium	Medium	Medium	<p>Integrate scheduling, billing, and clinical systems</p> <p>Perform regular data validation and audits</p> <p>Define clear data ownership responsibilities</p>
R8	Patients fail to adopt online scheduling tools	Stakeholder	Low	Medium	Low	<p>Provide alternative booking options (phone, in-person)</p> <p>Design user-friendly interfaces</p> <p>Share simple guides and support materials</p>
R9	Misaligned expectations between stakeholders delay decision-making	Stakeholder	Low	Medium	Low	<p>Establish clear governance and decision-making roles</p> <p>Conduct regular stakeholder alignment meetings</p> <p>Maintain transparent communication on scope and progress</p>

Risk Mitigation Plan

Factors included in the Contingency Plan:

Risk ID	Contingency Plan
R1	Temporarily increase manual review of bookings and prioritize critical appointments
R2	Activate queue management procedures and reassign staff during peak hours
R3	Provide additional support sessions and extend transition timelines
R4	Switch to backup systems and notify users of temporary service disruption
R5	Activate incident response plan and notify compliance and security teams
R6	Escalate issues to department leads and use manual coordination protocols

Risk Mitigation Plan

Factors included in the Contingency Plan:

Risk ID	Contingency Plan
R7	Perform emergency data reconciliation and delay non-critical billing
R8	Increase support desk assistance and promote alternative booking channels
R9	Escalate decisions to project sponsor and conduct urgent alignment meetings

Risk Mitigation Plan

Risks prioritized based on the Visual Risk Matrix:

Priority Level	Risk ID & Description	Rationale	Action Urgency
High	R1 – Manual appointment scheduling causes double bookings and delays	High likelihood and high impact directly affect patient experience and operations	Immediate action required
High	R2 – Long patient wait times due to inefficient check-in and resource allocation	Major contributor to patient dissatisfaction and operational inefficiency	Immediate action required
Medium	R3 – Staff resistance to adopting new digital systems	Can delay implementation and reduce system effectiveness	Address early and monitor
Medium	R4 – System downtime affects online scheduling and notifications	Disrupts critical services and communication	Mitigate and monitor
Medium	R5 – Data breaches or unauthorized access to patient records	High impact but lower likelihood due to controls	Continuous monitoring
Medium	R6 – Poor interdepartmental communication causes delays in care delivery	Affects workflow coordination and patient flow	Planned improvement

Risk Mitigation Plan

Risks prioritized based on the Visual Risk Matrix:

Priority Level	Risk ID & Description	Rationale	Action Urgency
High	R7 – Inaccurate or incomplete data affects billing and reporting	Leads to financial and reporting issues	Planned improvement
Low	R8 – Patients fail to adopt online scheduling tools	Limited impact due to alternative booking options	Monitor periodically
Low	R9 – Misaligned expectations between stakeholders delay decision-making	Occasional delays with limited operational impact	Review as needed

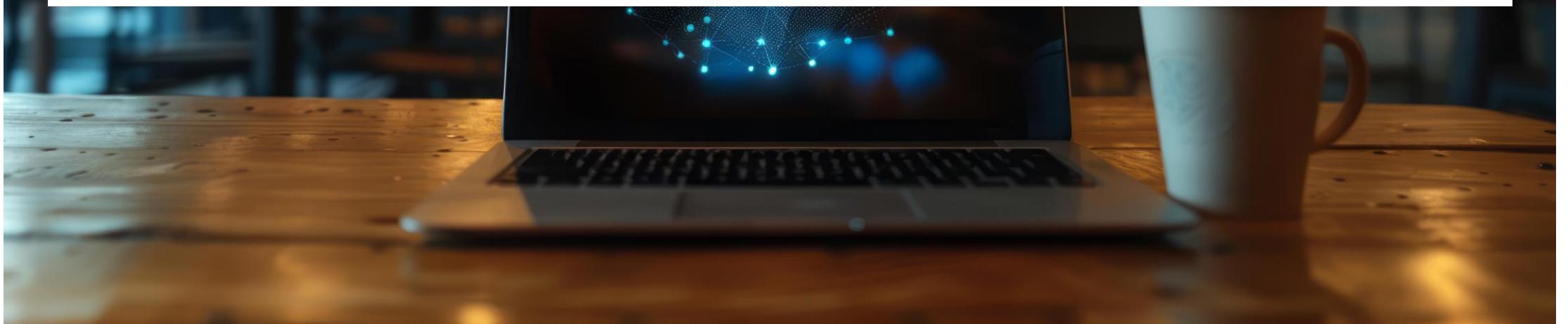
Risk Mitigation Plan

Key insights from the Risk Mitigation Plan:

- Automation is the primary strategy to reduce high-severity risks
- Training and stakeholder involvement reduce resistance risks
- System integration minimizes data and communication failures
- Preventive controls are more effective than reactive measures
- Contingency plans ensure continuity during disruptions



Findings and Recommendations



Key Findings

1. Manual scheduling and check-in processes are the primary causes of long patient wait times
2. Lack of real-time visibility into resource availability leads to overbooking and inefficiencies
3. Interdepartmental communication gaps delay patient flow and care delivery
4. High proportion of cancelled, rescheduled, and no-show appointments indicates poor communication
5. Operational risks outweigh technical and stakeholder risks in overall project impact

Key Recommendations

1. Implement automated appointment scheduling with conflict detection and notifications
2. Introduce digital or self-service patient check-in to reduce manual delays
3. Deploy real-time dashboards for resource tracking and workload balancing
4. Integrate hospital systems to eliminate data silos and improve coordination
5. Support change adoption through staff training and phased implementation

Conclusion

Provide a summary of observations in 3–5 bullet points.

1. Automation and system integration offer the greatest efficiency gains
2. Early stakeholder involvement is critical to reduce resistance and misalignment
3. Data-driven insights improve decision-making and resource optimization
4. Clear process ownership reduces delays and communication breakdowns
5. Proactive risk mitigation ensures continuity and project success

APPENDIX

Appendix

Note: Use this section to include supplementary materials, such as charts, graphs, data tables, and other supporting documents, for this Business Analysis (BA) report.

