

Enhancing Operational Efficiency in a Multispecialty Hospital

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Executive Summary

1. The hospital records a 27.7% completion rate and a 25.2% no-show rate across 206 valid appointment records.
2. Patients wait 41.4 minutes on average. General Medicine records the longest departmental average at 43.9 minutes.
3. Average feedback is 6.32/10, while 84 of 211 scored responses need attention.
4. Only 44.9% of valid resource records show availability, which limits scheduling flexibility.
5. Stakeholder evidence links delays to double bookings, limited real-time capacity visibility, slow handoffs, and disconnected systems.
6. A phased scheduling, capacity, notification, and data-integration programme should target wait time, attendance, resource availability, and patient communication.

Source: appointment_data (10).csv, resource_data (4).csv, feedback_data (3).csv, and Stakeholders Profile_for Requirement Gathering.docx.

Introduction

Opportunity

Improve appointment flow, resource allocation, and patient communication across six departments.

Approach

Combine appointment, feedback, and resource data at department level. Validate findings against stakeholder profiles and process evidence.

Questions

Which departments drive delays and missed appointments? Where does capacity fail to match demand? Which controls reduce risk without adding delay?

Hypothesis

Integrated scheduling and timely notifications can reduce avoidable delays, but department-level data cannot prove patient-level causation.

Analysis period: records dated in 2024 where a valid date is present. Department is the common analytical key.

Business Objectives

1. Reduce average patient wait time from 41.4 minutes to 30 minutes or less within 90 days of pilot launch.
2. Increase the appointment completion rate from 27.7% to at least 45% within six months.
3. Reduce the no-show rate from 25.2% to below 15% through confirmations and reminders.
4. Increase positive feedback scores of 8 to 10 from 40.8% to at least 60%.
5. Increase recorded resource availability from 44.9% to at least 65% through capacity balancing.
6. Publish a weekly department dashboard with agreed definitions, owners, and data-quality controls.

Targets are proposed acceptance thresholds for stakeholder approval, not observed outcomes.



Methodology

Requirements Gathering: Business Requirements Document

Problem statement

Patients experience long waits, appointment disruption, inconsistent follow-up, and resource constraints. Staff lack integrated scheduling, live capacity visibility, and reliable cross-department information.

Key requirements

1. Provide a shared appointment calendar with real-time clinician and room availability.
2. Send appointment confirmations, changes, reminders, and delay notices through SMS or email.
3. Record referrals, test results, transfers, and follow-up actions in one traceable workflow.
4. Monitor wait time, appointment status, resource use, availability, and feedback by department.
5. Apply role-based access, audit history, data validation, and downtime procedures.

Requirements Gathering: Constraints and Acceptance Criteria

Constraints

1. Legacy scheduling and patient-record systems operate as separate data sources.
2. Network downtime may interrupt online scheduling and notifications.
3. Clinical operations limit training and deployment windows.
4. Privacy and security controls restrict access to patient-level information.

Acceptance criteria

1. The pilot meets the approved wait-time, completion, no-show, feedback, and availability targets.
2. Users can view current appointment and resource status without duplicate entry.
3. Notifications log delivery status and support accessible patient preferences.
4. Authorized users complete end-to-end UAT with no unresolved critical defects.

Acceptance thresholds require sponsor approval before baselining.

Requirements Gathering: Requirement Traceability Matrix

ID	Description	MoSCoW	Stakeholders	Objective	Related data file	Status
BR-01	Real-time appointment and capacity calendar	Must	Schedulers, clinicians	Wait and completion	Appointments, resources	Provisional
BR-02	Automated confirmation, reminder, and delay notices	Must	Patients, schedulers	No-show and communication	Appointments, feedback	Provisional
BR-03	Traceable referral, result, transfer, and follow-up workflow	Should	Clinicians, nurses	Handoffs and care flow	Stakeholder profiles	Provisional
BR-04	Department resource-availability dashboard	Must	Operations, clinical leads	Availability	resource_data (4).csv	Provisional
BR-05	Wait-time and feedback monitoring	Should	Management, patients	Wait and satisfaction	feedback_data (3).csv	Provisional
BR-06	Role access, audit history, validation, and downtime controls	Must	IT, compliance, all users	Security and continuity	All sources	Provisional

Status remains provisional until stakeholder validation and approval.

Stakeholder Analysis and Influence

Stakeholder	Primary need	Influence	Impact
Patients	Simple booking, shorter waits, timely updates	Medium	High
Doctors	Balanced schedules, equipment access, timely results	High	High
Nurses	Safe staffing, supplies, reliable transfer notices	High	High
Scheduling and billing staff	Accurate availability and complete records	High	High
Hospital leadership	Service, capacity, risk, and benefit visibility	High	High
IT and security	Integration, resilience, access, and audit controls	High	High

Source: Stakeholders Profile_for Requirement Gathering.docx. Leadership and compliance roles are inferred governance stakeholders.

Stakeholder Engagement and Communication Plan

Stakeholder	Engagement method	Communication	Cadence	Owner
Patients	Interviews and usability tests	Accessible SMS/email and patient forum	At discovery and pilot review	Patient experience lead
Clinical staff	Workflow workshops and observation	Huddles and clinical governance updates	Weekly during design	Clinical lead
Administrative staff	Process walkthroughs and UAT	Working sessions and change notices	Twice weekly in pilot	Operations manager
Leadership	Decision and benefits reviews	Executive dashboard and decision log	Biweekly	Project sponsor
IT and security	Architecture and control reviews	Technical backlog and risk log	Weekly	IT manager

Each session ends with decisions, actions, owners, due dates, and unresolved questions.

Scope Management Plan

In scope

1. Appointment request, scheduling, confirmation, change, arrival, and closure.
2. Department-level wait, status, feedback, resource-use, and availability reporting.
3. Referral, result, transfer, and follow-up information handoffs.
4. Pilot notifications, role access, audit history, training, UAT, and benefit tracking.

Out of scope

1. Clinical diagnosis, treatment protocols, medication decisions, and medical-device control.
2. Full replacement of billing, laboratory, radiology, or electronic medical-record platforms.
3. Hospital construction, permanent staffing establishment, and procurement contract reform.
4. Claims about patient-level causes that the supplied department-level data cannot support.

Scope Assumptions and Constraints

Assumptions requiring validation

1. Departments apply comparable appointment-status definitions.
2. Feedback scores follow a 0 to 10 scale.
3. Eight hours represents the daily resource-use benchmark for initial analysis.
4. The pilot can access reliable appointment, resource, and feedback extracts.

Delivery constraints

1. Missing identifiers, dates, times, departments, and duplicated IDs affect source quality.
2. Department is the only shared key across all three datasets.
3. Legacy-system and network limitations may restrict real-time integration.
4. Privacy, security, accessibility, and clinical continuity remain mandatory gates.

Work Breakdown Structure

WBS	Task	Description	Milestone
1.0	Discover	Validate needs, data definitions, risks, and current process	Baseline approved
2.0	Design	Future process, requirements, controls, and prototype	Design approved
3.0	Prepare data	Clean mappings, ownership, interfaces, and quality checks	Data ready
4.0	Configure pilot	Scheduling, notifications, dashboard, and access	Pilot ready
5.0	Validate	UAT, security, training, reconciliation, and fixes	Go-live decision
6.0	Operate and improve	Monitor benefits, defects, adoption, and next release	90-day review

Scope Change Management

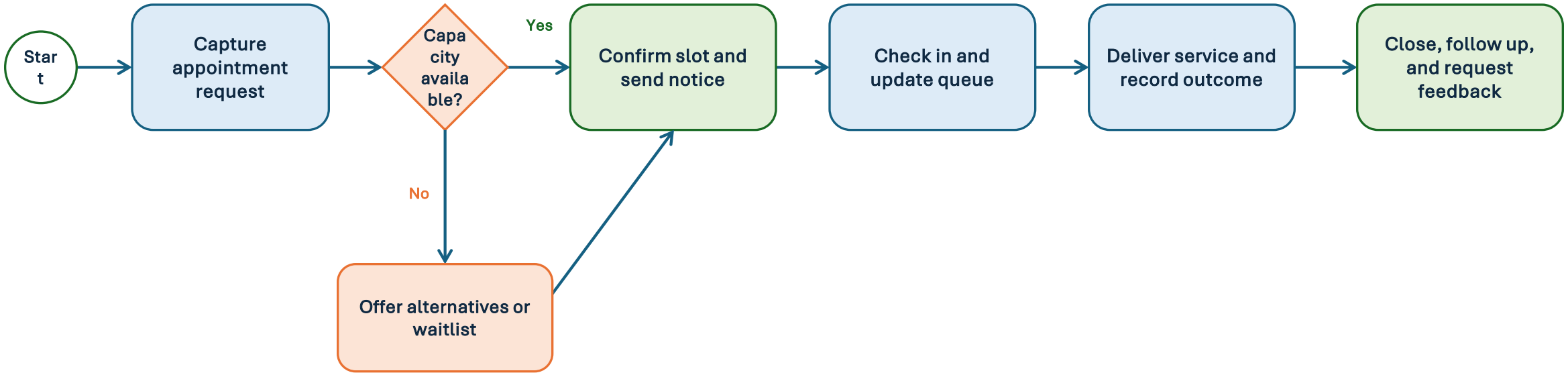


Emergency patient-safety or security changes follow expedited governance and receive retrospective review.

Process Mapping: Current and Future States

Process stage	Current state	Future state
Request	Patient struggles with online booking or calls the hospital	Accessible multi-channel request with guided fields
Schedule	Limited live availability causes conflict and double booking	Shared capacity calendar validates clinician and room availability
Notify	Cancellations and delays may reach patients late	Confirmation, reminder, change, and delay notifications are logged
Visit and handoff	Wait updates, test results, referrals, and transfers are inconsistent	Status, queue, results, referral, and transfer ownership remain visible
Close and learn	Feedback and resource data sit in separate files	Closure triggers feedback and updates a governed operations dashboard

Advanced Process Mapping: Appointment Workflow



Proposed workflow. Detailed clinical activities and exception rules require departmental validation.

Advanced Process Mapping: Stakeholder Responsibilities

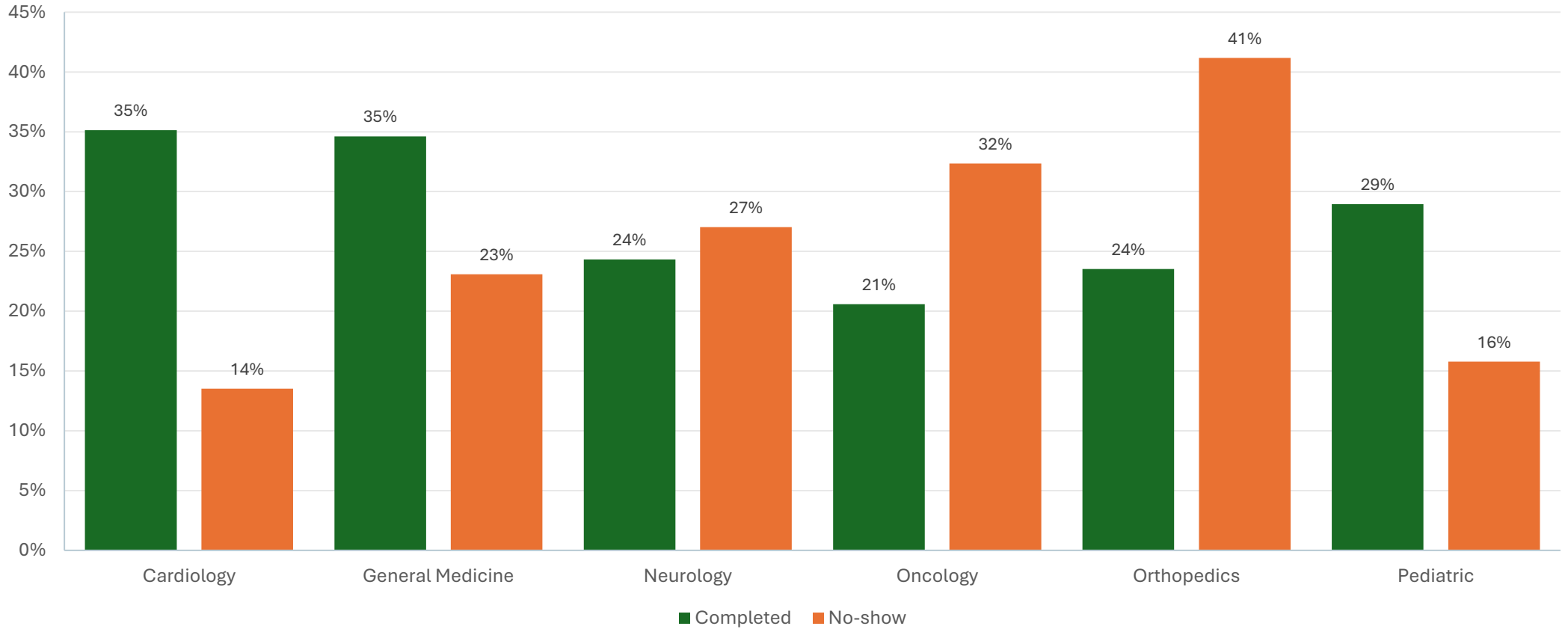
Lane	Request	Schedule	Visit	Follow-up
Patient	Submit preferences and contact details	Choose or confirm slot	Check in and receive delay updates	Receive instructions and provide feedback
Scheduling team	Validate request	Match clinician, room, and equipment	Manage exceptions and queue changes	Close appointment status
Clinical team	Review referral need	Confirm clinical capacity	Triage, consult, and record outcome	Approve follow-up and referrals
HIS and notifications	Validate identity and fields	Check conflicts and send confirmation	Update queue and make results visible	Send instructions and update dashboard

Data Analysis: Department Pivot Table

Department	Appointments	Completed	No-show	Avg wait	Feedback	Availability
Cardiology	37	35.1%	13.5%	40.1 min	7.03/10	59.1%
General Medicine	26	34.6%	23.1%	43.9 min	5.48/10	43.9%
Neurology	37	24.3%	27.0%	42.3 min	6.36/10	52.9%
Oncology	34	20.6%	32.4%	39.4 min	6.51/10	27.0%
Orthopedics	34	23.5%	41.2%	42.0 min	6.03/10	41.9%
Pediatric	38	28.9%	15.8%	41.4 min	6.24/10	50.0%

Pivot grain: department. Appointment rates use 206 rows with known department and status. Wait and feedback use complete department records.

Data Analysis: Appointment Outcome Comparison



Orthopedics records the highest no-show rate at 41.2%. Oncology records the lowest completion rate at 20.6%.

Data Analysis: Key Insights

General Medicine

Longest average wait at 43.9 minutes and lowest average feedback at 5.48/10.

Orthopedics

Highest no-show rate at 41.2%, consistent with stakeholder reports of cumbersome referrals and limited equipment access.

Oncology

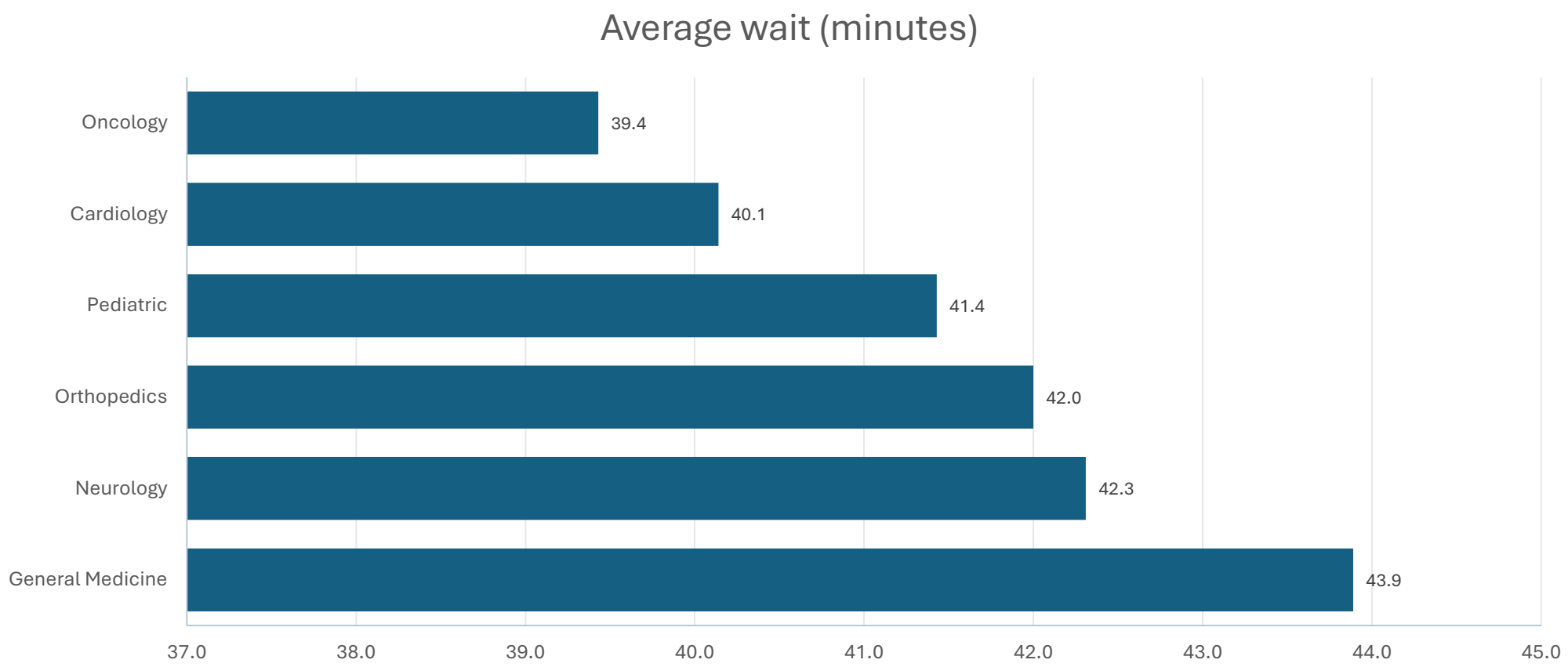
Shortest average wait at 39.4 minutes, but lowest completion rate at 20.6% and lowest availability at 27.0%.

Cardiology

Highest composite efficiency score, yet patient and clinician profiles still report peak-time delays. Department averages may conceal variation.

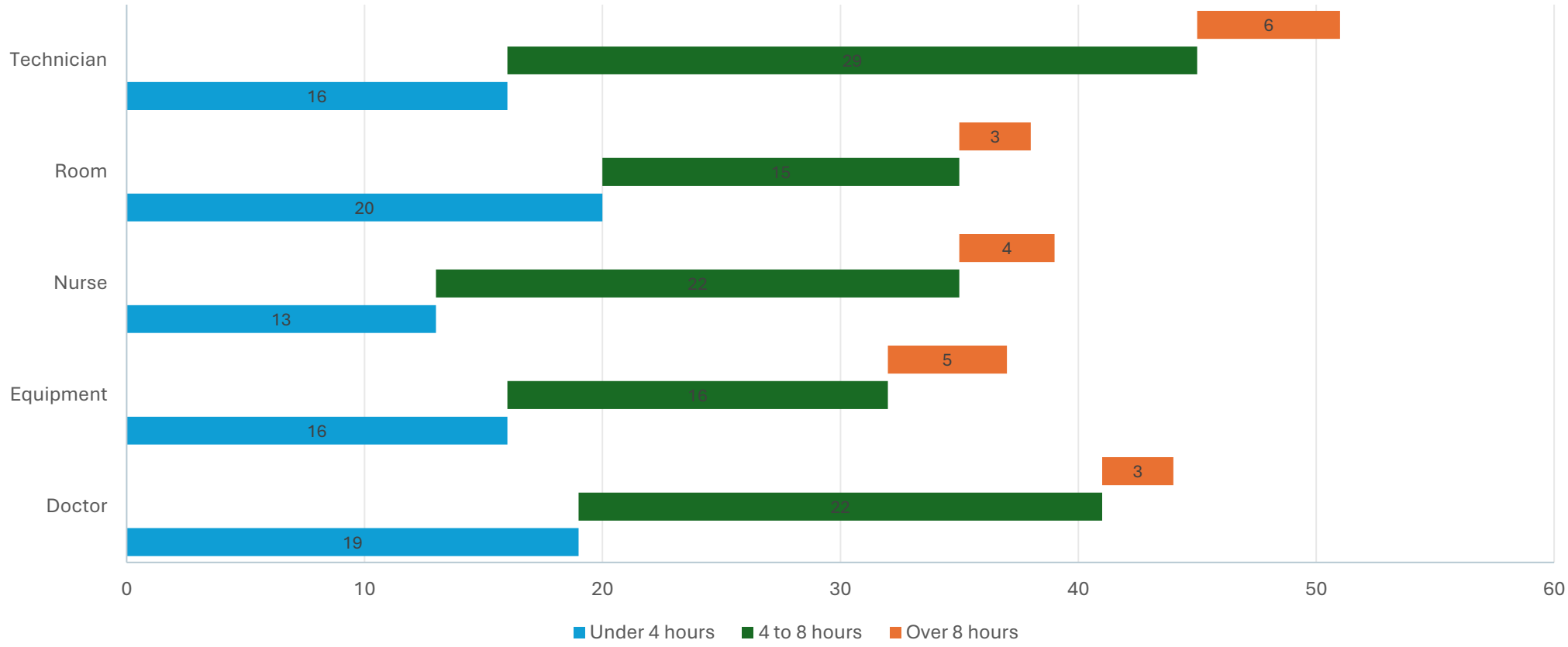
Associations use department-level aggregates. They do not establish individual patient-level causes.

Data Visualization: Average Patient Wait Time



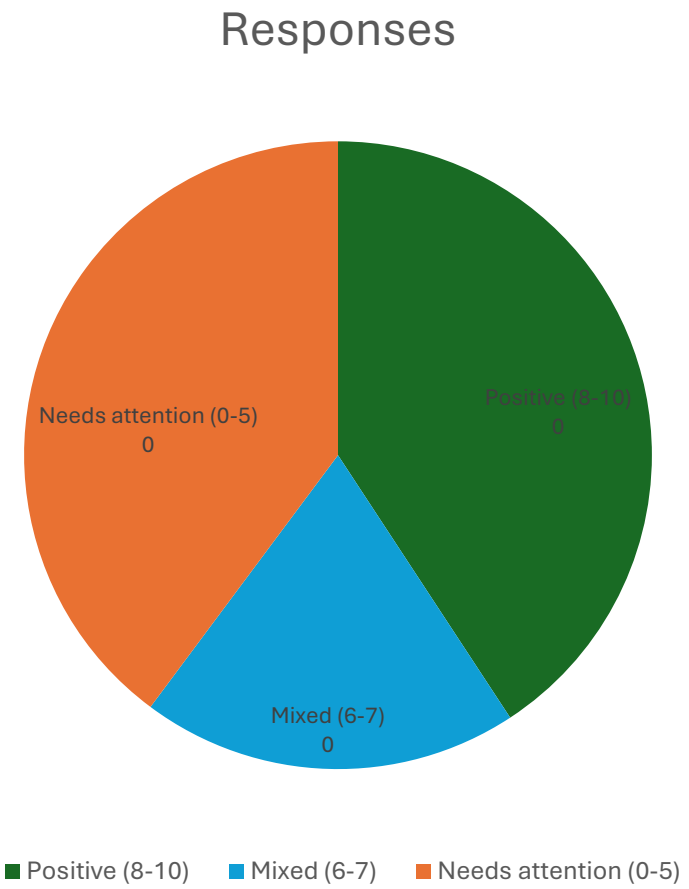
Source: feedback_data (3).csv, n=210 complete department, score, and wait-time rows. Proposed target: 30 minutes or less.

Data Visualization: Resource Utilization Signals



Source: resource_data (4).csv, n=209 records with resource type and usage hours. Thresholds are working assumptions pending capacity validation.

Data Visualization: Patient Feedback Distribution



Source: feedback_data (3).csv. n=211 valid scores. Categories: positive 8-10, mixed 6-7, needs attention below 6.

Data Visualization: Department Efficiency Heat Map

Department	Completed	Avg wait	Feedback	Availability	Index
Cardiology	35.1%	40.1 min	7.03/10	59.1%	**96.0/100**
Pediatric	28.9%	41.4 min	6.24/10	50.0%	**58.3/100**
Neurology	24.3%	42.3 min	6.36/10	52.9%	**49.7/100**
Oncology	20.6%	39.4 min	6.51/10	27.0%	**41.6/100**
General Medicine	34.6%	43.9 min	5.48/10	43.9%	**37.3/100**
Orthopedics	23.5%	42.0 min	6.03/10	41.9%	**36.1/100**

Index gives equal weight to normalized completion, inverse wait, feedback, and availability. Use for prioritization, not clinical performance appraisal.

Risk Assessment Plan: Risk Register

ID	Risk	Category	L	I	Score	Owner / response
R1	Scheduling conflicts continue after process change	Operational	4	4	16	Operations: capacity rules and monitoring
R2	Integration errors create incomplete or inconsistent records	Data/technical	4	4	16	IT: validation, reconciliation, rollback
R3	Peak demand exceeds staff, room, or equipment capacity	Capacity	4	3	12	Clinical leads: thresholds and escalation
R4	Unauthorized access or notification exposure affects privacy	Security	3	4	12	Security: least privilege and audit
R5	Staff bypass the new workflow or duplicate entries	Adoption	3	3	9	Change lead: co-design and adoption checks
R6	Poor source quality distorts dashboards and decisions	Data quality	3	3	9	Data owner: rules, exceptions, stewardship

Likelihood and Impact use a 1 to 4 scale. Scores reflect the proposed solution and require owner validation.

Risk Assessment Plan: Likelihood and Impact Matrix

Likelihood / impact	1 Low	2 Moderate	3 High	4 Severe
4 Almost certain				R1, R2
3 Likely			R5, R6	R4
2 Possible				
1 Unlikely				

R3: likelihood 4, impact 3

Priority bands: critical 12–16, medium 6–11, low 1–5.

Risk Assessment Plan: SWOT Analysis

Strengths

1. Department-level appointment, feedback, and resource data already exist.
2. Stakeholders identify specific workflow and communication problems.
3. IT proposes integrated scheduling and analytics capabilities.

Weaknesses

1. Systems operate in silos with incomplete records and duplicate identifiers.
2. Completion, no-show, wait-time, and availability indicators show large gaps.
3. Network downtime and legacy interfaces constrain reliability.

Opportunities

1. Shared capacity visibility can reduce conflicts and wasted slots.
2. Timely notifications can improve attendance and patient confidence.
3. Governed analytics can focus improvement on department-specific causes.

Threats

1. Security failures could expose patient information.
2. Poor adoption may create parallel workflows and inconsistent records.
3. Unmanaged peak demand may shift delays rather than remove them.

Risk Assessment Plan: Key Insights

1. Scheduling and integration risks receive the highest initial score of 16 because either failure can preserve delays or corrupt operational records.
2. Capacity risk requires department-specific thresholds. A hospital-wide average can hide peak-time shortages.
3. Security and clinical continuity remain release gates. Schedule benefit cannot justify uncontrolled access or unsafe downtime.
4. Data quality needs named owners because duplicate and incomplete identifiers already affect each source file.
5. Adoption must be measured through workflow completion, duplicate-entry rates, notification use, and unresolved exceptions.

Risk Mitigation Plan: Response Strategies

ID	Primary mitigation	Indicator	Residual target	Owner
R1	Capacity rules, conflict checks, and daily exception review	Double bookings and queue age	Score 8 or below	Operations manager
R2	Field validation, reconciliation, monitoring, and rollback	Failed interfaces and unmatched records	Score 8 or below	IT manager
R3	Demand forecast, escalation thresholds, and protected capacity	Wait and utilization by shift	Score 6 or below	Clinical leads
R4	Least privilege, encryption, audit, and tested response	Unauthorized events and audit gaps	Score 4 or below	Security lead
R5	Co-design, role training, floor support, and usage review	Bypass and duplicate-entry rates	Score 6 or below	Change lead
R6	Data rules, exception queue, owners, and quality scorecard	Missing and duplicate keys	Score 4 or below	Data owner

Risk Mitigation Plan: Contingency Plan

Trigger	Immediate action	Continuity method	Decision / owner
Scheduling or HIS outage	Declare incident and preserve current queue	Controlled downtime list with later reconciliation	IT incident lead decides recovery
Incorrect or missing data feed	Quarantine affected dashboard data	Display freshness warning and use validated prior extract	Data owner approves restoration
Notification failure	Stop repeated sends and assess exposure	Phone high-risk changes and retain delivery log	Operations and security decide restart
Capacity threshold breached	Escalate and rebalance appointments	Use approved overflow, transfer, or reschedule rules	Clinical lead owns patient safety
Critical security event	Revoke access, contain, and preserve evidence	Use approved manual process with minimum data	Security lead directs response

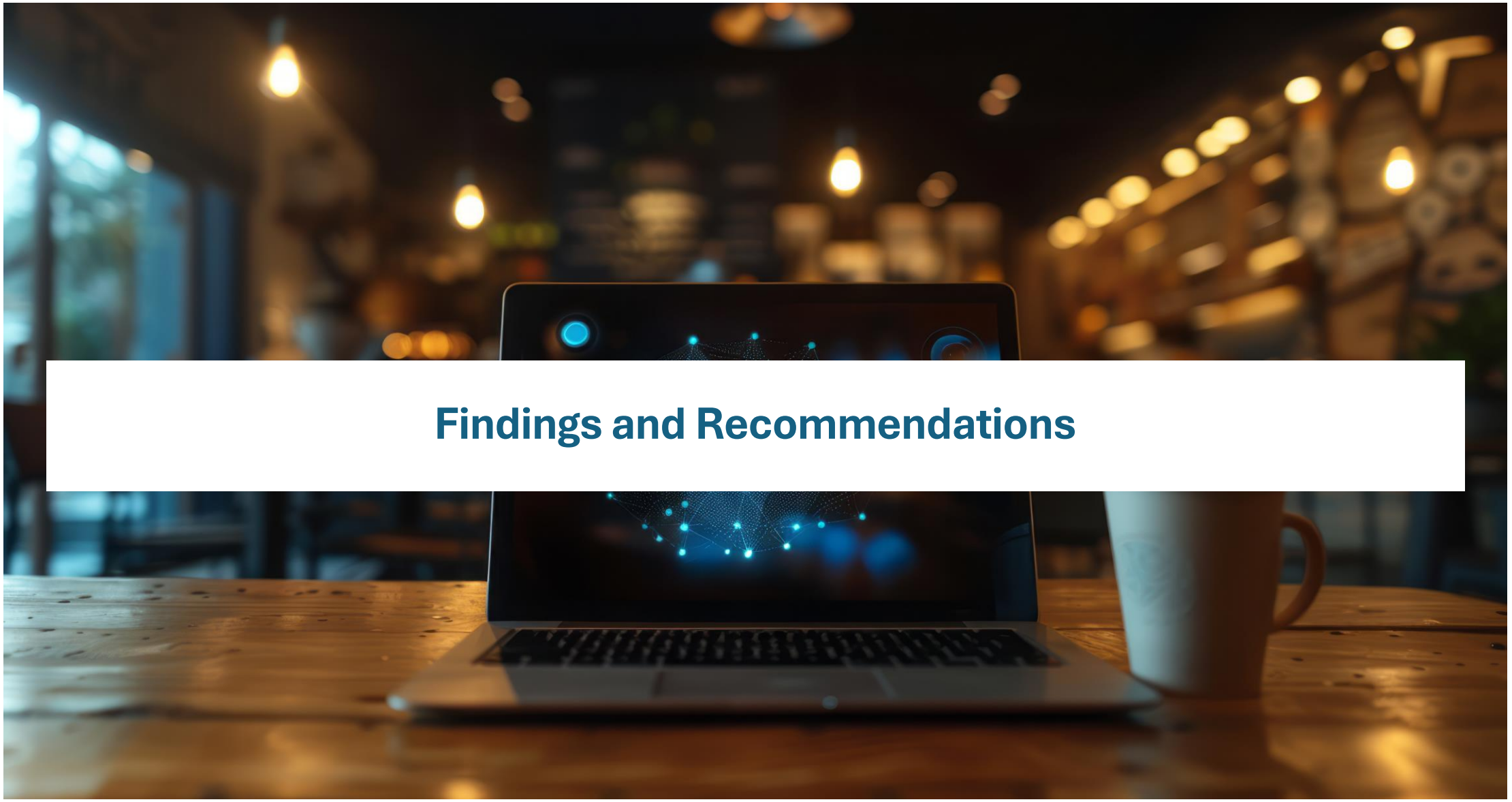
Risk Mitigation Plan: Prioritized Action Matrix

Priority	Risks	Rationale	Action timing
Critical	R1 Scheduling, R2 Integration	Highest exposure and direct effect on service flow and data integrity	Controls designed before pilot
High	R3 Capacity, R4 Security	Capacity can preserve delays. Security remains a release gate	Test before go-live and monitor daily
Medium	R5 Adoption, R6 Data quality	Both can erode benefits and decision confidence over time	Owners active from discovery through operation

Action urgency reflects current exposure. Owners should reassess scores after control tests and at the 30-day pilot review.

Risk Mitigation Plan: Key Insights

1. The pilot should begin only after scheduling conflict checks, data reconciliation, access control, and downtime procedures pass testing.
2. Daily exception review provides the fastest feedback on double bookings, long queues, missing records, and notification failure.
3. Capacity responses need clinical ownership because staffing, rooms, and equipment affect different departments at different times.
4. Residual risk should be accepted explicitly. A mitigation plan does not remove operational or security accountability.
5. The 30-day review should decide whether to scale, revise, pause, or roll back the pilot.



Findings and Recommendations

Key Findings

1 Appointment reliability is weak

Only 27.7% of 206 valid appointment records are completed, while 25.2% are no-shows. Orthopedics has the highest no-show rate at 41.2%.

2 Patient experience varies by department

Average wait is 41.4 minutes. General Medicine combines the longest wait at 43.9 minutes with the lowest feedback at 5.48/10.

3 Capacity and data controls need joint improvement

Availability is 44.9% across valid department records. Stakeholders also report equipment shortages, staffing imbalance, system silos, and slow handoffs.

Key Recommendations

Recommendation	Owner	Target / measure	Timing
Pilot a shared capacity calendar with conflict rules in Orthopedics and General Medicine	Operations and clinical leads	No-show below 15%; wait at or below 30 minutes	0-90 days
Add confirmation, reminder, change, and delay notifications with preference and delivery tracking	Patient experience and IT	At least 95% delivery; fewer unnotified changes	0-90 days
Create a governed department dashboard with data-quality exceptions and named metric owners	Data owner and IT	Weekly refresh; reconciled totals; declining missing and duplicate keys	0-60 days
Design phased HIS integration for referrals, results, transfers, and follow-up	IT manager and clinical governance	UAT passed; no critical security defects; handoff completion tracked	3-9 months

Targets are proposed. Sponsors should baseline and approve them before implementation.

Conclusion

1. The supplied records show material gaps in appointment completion, attendance, wait time, feedback, and resource availability.
2. Stakeholder profiles explain plausible mechanisms, including double booking, poor visibility, limited equipment, slow results, and fragmented communication.
3. A controlled pilot should combine process change, notifications, capacity management, data governance, and secure integration.
4. Leadership should approve targets and owners, validate the proposed workflow, and review pilot evidence after 30 and 90 days.


APPENDIX

Appendix: Sources, Quality, and Metric Definitions

Source	Rows	Valid analysis rows	Observed limitation
appointment_data (10).csv	216	206	11 missing IDs, 9 missing times, 9 missing statuses, 16 duplicated ID groups
resource_data (4).csv	213	207	3 missing IDs, 2 missing departments, 6 missing dates, 13 duplicated ID groups
feedback_data (3).csv	217	210	7 missing departments and 18 duplicated ID groups
Stakeholder profiles	10 profiles	Qualitative evidence	Purposeful sample, not a representative survey

Metric definitions

1. Completion rate: completed appointments divided by records with known department and status.
2. Availability rate: records marked Available divided by complete department resource records.
3. Efficiency index: equal-weight normalized completion, inverse wait, feedback, and availability.
4. Feedback categories: positive 8-10, mixed 6-7, needs attention below 6.