Optimizing HealthFirst Care Workflows for Efficiency & Patient Satisfaction
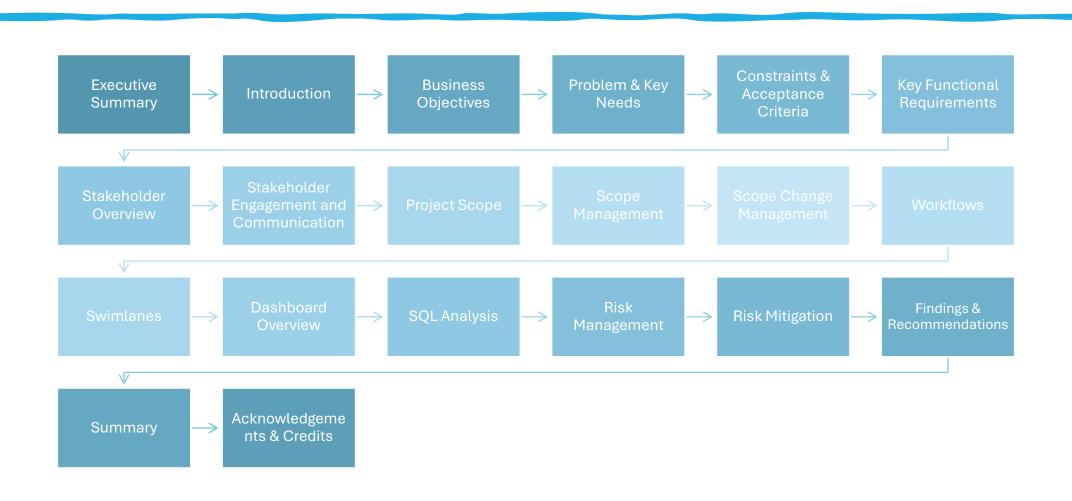
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Executive Summary

Problem:

1. Manual scheduling and communication inefficiencies cause long patient wait times, double bookings, and operational delays.

Key insights:

1. Over 35% of appointments are rescheduled due to conflicts, highlighting scheduling system flaws.

2. Resource strain varies by department, with Oncology and Pediatrics under-resourced and General Medicine overutilized.

Recommended actions:

1. Implement an automated appointment scheduling system with conflict detection and real-time notifications.

2. Introduce self-service patient check-in options to reduce wait times and administrative workload.

3. Deploy a centralized communication platform to improve interdepartmental coordination and issue resolution.
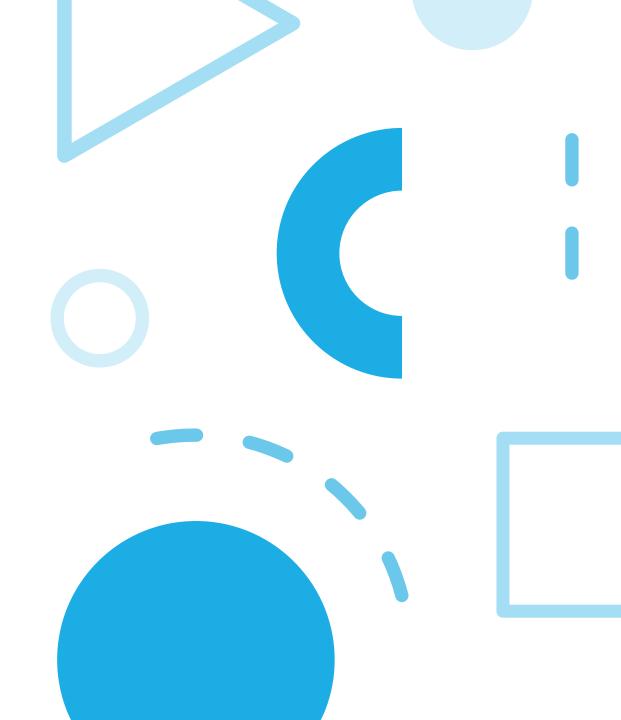
Introduction

Opportunity:

1. Improve patient experience by reducing wait times and scheduling conflicts.

2. Enhance hospital efficiency through better resource management and communication.

Approach:

1. Implement automated scheduling, real-time notifications, and integrated Hospital Information System (HIS).

2. Introduce self-service check-in and centralized communication tools for streamlined workflows.

Key questions/hypotheses:

1. Will automation and real-time updates significantly reduce wait times and no-shows?

2. Can improved resource visibility and communication decrease staff workload and operational delays?

Business Objectives

Reduce patient wait times for appointments and services.

Increase efficiency and accuracy of appointment scheduling.

Enhance real-time communication between hospital departments and with patients.

Improve visibility and allocation of medical staff and equipment resources.

Streamline patient check-in processes to minimize administrative bottlenecks.

Boost patient satisfaction through timely notifications and post-visit follow-ups.

Methodology

Requirements Gathering - Problem & Key Needs

Problem Statement

- Long patient wait times due to manual scheduling and communication gaps

- Scheduling conflicts causing double bookings and delays

- Inefficient resource allocation and poor inter-department communication

- Low patient satisfaction and staff overload

Key Requirements to Improve Efficiency

- Automated appointment scheduling with conflict detection & real-time updates

- Centralized communication platform for seamless team coordination

- Integration with Hospital Information System (HIS) for data access

- Real-time visibility into doctor and resource availability

- Automated patient notifications via email/SMS

- User-friendly interfaces accessible for all patient groups

Requirements Gathering - Constraints & Acceptance Criteria

Constraints

- Limited project budget capped at $500,000

- Project timeline restricted to 6 months for completion

- Integration challenges with existing legacy hospital systems

- Mandatory compliance with HIPAA and hospital data security policies

- System downtime limited to no more than 1 hour per month

- Potential resistance to change among senior staff and users

Acceptance Criteria

- Appointment scheduling system operates with <2 seconds response time

- System uptime of 99.9% to ensure availability

- Real-time notifications successfully delivered to patients and staff

- Seamless data integration with Hospital Information System (HIS)

- Positive user feedback on system usability, especially from elderly users

- Demonstrated reduction in patient wait times and scheduling conflicts

Key Functional Requirements

Requirement ID	Requirement Description	Priority (MoSCoW)	Stakeholder(s)	Project Objective	Related Data File	Status
FR1	Automate appointment scheduling with conflict detection	Must Have	Administrative Staff	Reduce wait times and scheduling errors	appointment_data.csv	Approved
FR2	Implement real-time appointment notifications for patients	Must Have	Patients, Admin Staff	Improve patient satisfaction and reduce no-shows	feedback_data.csv	Approved
FR4	Integrate HIS for seamless patient and resource data access	Must Have	IT Teams, Doctors, Admin Staff	Streamline operations and improve data access	resource_data.csv	Approved
FR5	Allow admin staff real-time access to doctor availability	Must Have	Administrative Staff	Optimize scheduling and resource allocation	appointment_data.csv	Approved
FR7	Enable patients to receive post-visit instructions via SMS/email	Could Have	Patients	Enhance patient engagement and communication	feedback_data.csv	Approved
FR9	Notification system for lab results and inter-department messages	Must Have	Doctors, Nurses, Admin Staff	Reduce communication delays	feedback_data.csv	Approved
FR10	Online appointment booking with real-time calendar sync	Must Have	Patients, Admin Staff	Improve scheduling efficiency and user experience	appointment_data.csv	Approved
FR11	Real-time resource inventory dashboard	Must Have	IT Teams, Admin Staff	Provide visibility into resource availability	resource_data.csv	Approved
NFR5	Simple UI/UX suitable for elderly users	Must Have	Patients	Ensure system accessibility for all user types	feedback_data.csv	Approved

Stakeholder Overview

Patients: Service recipients - need timely notifications & reduced wait times

Doctors & Nurses: Require real-time schedule visibility and resource updates

Administrative Staff: Manage scheduling & coordination

IT Teams: Implement and maintain HIS and security

Hospital Leadership: Oversee budget and compliance

Stakeholder Engagement & Communication

Engagement Strategies

- Patients: Monthly surveys and newsletters

- Doctors & Nurses: Weekly check-ins and dashboards

- Admin Staff: Weekly coordination meetings

- IT Teams: Bi-weekly technical updates

- Leadership: Monthly strategic briefings

- Support Staff: As-needed updates

Communication Strategies

- Use email, SMS, dashboards, and meetings

- Regular feedback via surveys and direct input

- Role-based messaging tailored to each group

Project Scope

Constraints:

- Project budget limited to $500,000.

- Completion is required within 6 months.

- Compliance with HIPAA and hospital data security policies.

- Dependency on availability of hospital IT infrastructure.

Assumptions:

- Stakeholders (doctors, nurses, admin staff) will be available for periodic reviews.

- Appointment, feedback, and resource data are accurate and accessible.

- Hospital leadership will provide timely decisions on scope changes.

In-Scope:

- Development of a new integrated scheduling system

- Implementation of a centralized communication platform across departments

- Enhancement of patient communication via email/SMS

- Upgrade of resource tracking and availability systems

- Integration of a Hospital Information System (HIS)

Out-of-Scope:

- Construction or redesign of physical infrastructure

- Hiring of additional full-time medical staff

- Overhaul of entire legacy systems beyond core modules

Scope Management Plan

WBS ID	Task Name	Task Description	Milestone
1.0	Initiation	Define project goals, scope, and secure approvals	Project kickoff
2.0	Planning	Develop detailed project plan and resource allocation	Project plan approved
3.0	Design & Development	Build scheduling system and communication platform	Completion of system design
4.0	Implementation	Deploy systems, integrate HIS, and migrate data	System go-live
5.0	Testing & Validation	Conduct user acceptance testing and fix issues	UAT sign-off
6.0	Training & Deployment	Train staff and roll out new processes	Staff trained
7.0	Monitoring & Support	Provide ongoing support and monitor system performance	

Scope Change Management

Document all change requests formally

Assess impact on budget, schedule, and resources

Get approval from stakeholders before implementation

Communicate changes to all teams promptly

Keep a log of all changes and decisions

Control process to prevent scope creep
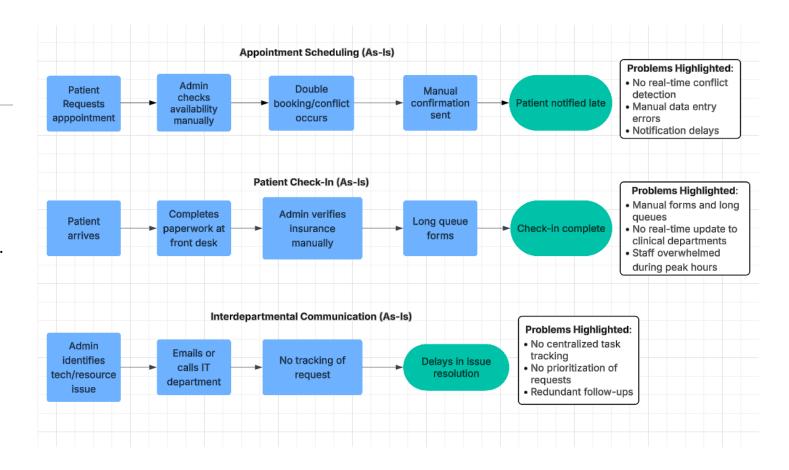
Current Workflows (As-Is)

Methodology:

- Reviewed workflows for appointment scheduling, patient check-in, and interdepartmental communication.
- Conducted staff interviews and process mapping.

Findings:

- Appointment Scheduling: Manual entry = delays, double bookings, missed updates.
- Patient Check-In: Manual paperwork & staff verification = long wait times, bottlenecks.
- Communication: Lack of structured process between admin & IT = slow response times.

Implications:

- Operational inefficiencies affect both staff productivity and patient satisfaction.

Appointment Scheduling (As-Is)

Patient Requests apppointment → Admin checks availability manually → Double booking/conflict occurs → Manual confirmation sent → Patient notified late

Problems Highlighted:
- No real-time conflict detection
- Manual data entry errors
- Notification delays

Patient Check-In (As-Is)

Patient arrives → Completes paperwork at front desk → Admin verifies insurance manually → Long queue forms → Check-in complete

Problems Highlighted:
- Manual forms and long queues
- No real-time update to clinical departments
- Staff overwhelmed during peak hours

Interdepartmental Communication (As-Is)

Admin identifies tech/resource issue → Emails or calls IT department → No tracking of request → Delays in issue resolution

Problems Highlighted:
- No centralized task tracking
- No prioritization of requests
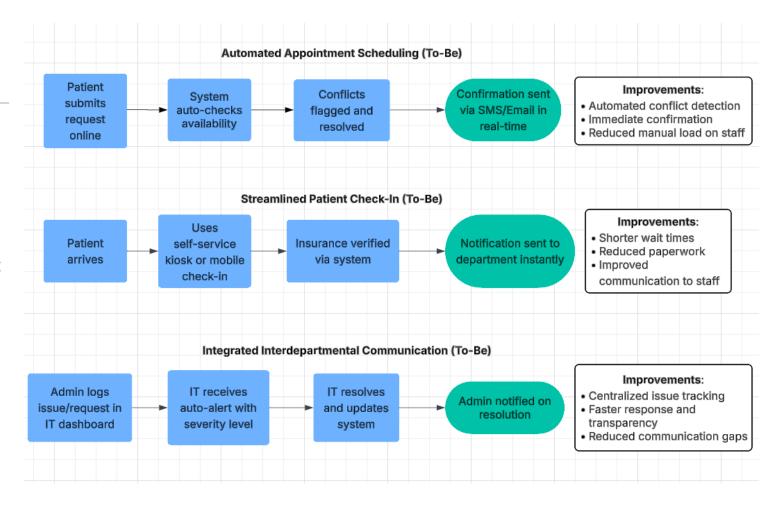- Redundant follow-ups

Optimized Processes (To-Be)

Methodology: Process redesign using workflow automation tools and coordination strategies.
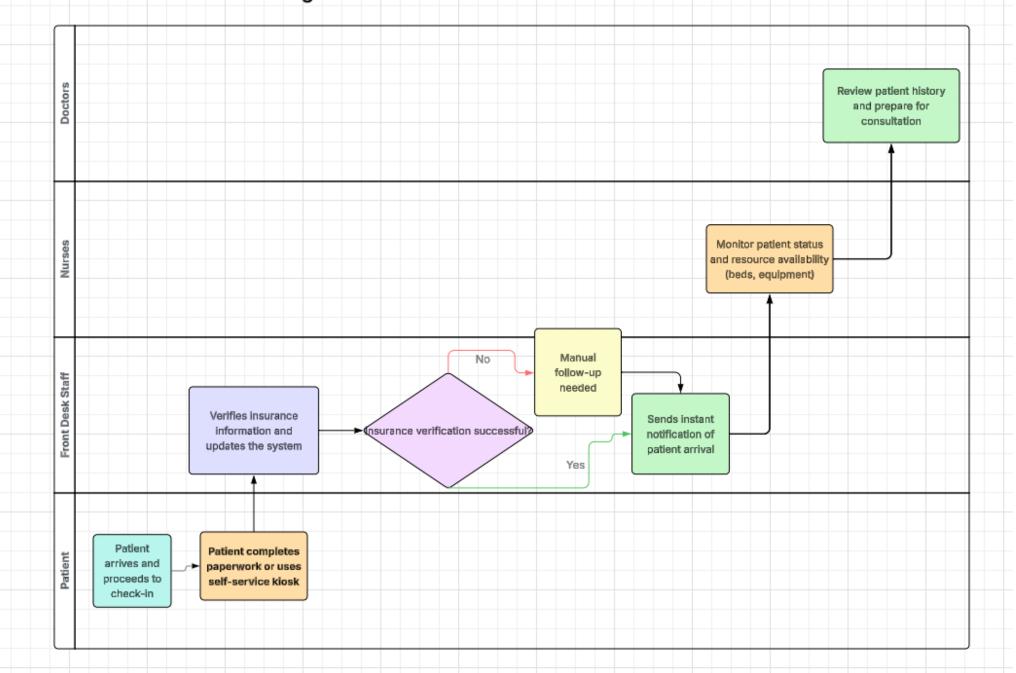
Findings:

- **Automated Scheduling:** Real-time conflict detection, email/SMS confirmations.
- **Self Check-In:** Kiosks or online check-in to reduce paperwork and waiting times.
- **Centralized Task Management:** Improved tracking and resolution of interdepartmental issues.

Implications: Reduced errors, faster service, better collaboration, improved patient experience.

Automated Appointment Scheduling (To-Be)

Patient submits request online → System auto-checks availability → Conflicts flagged and resolved → Confirmation sent via SMS/Email in real-time

Improvements:
- Automated conflict detection
- Immediate confirmation
- Reduced manual load on staff

Streamlined Patient Check-In (To-Be)

Patient arrives → Uses self-service kiosk or mobile check-in → Insurance verified via system → Notification sent to department instantly

Improvements:
- Shorter wait times
- Reduced paperwork
- Improved communication to staff

Integrated Interdepartmental Communication (To-Be)

Admin logs issue/request in IT dashboard → IT receives auto-alert with severity level → IT resolves and updates system → Admin notified on resolution

Improvements:
- Centralized issue tracking
- Faster response and transparency
- Reduced communication gaps

Swimlane Diagram 1: Patient Appointment Scheduling Workflow

IT Team

System supports automated conflict detection during scheduling (supporting step)

Ensures system uptime and fixes any technical issues (ongoing background task)

Administration Staff

Receives request and checks doctor availability

Is the preferred slot available?

No

Yes

Resolve scheduling conflict manually or via system

Enters confirmed appointment details into the system

Sends appointment confirmation via SMS/email

Patient

Patient requests an appointment

Notification sent to patient

Swimlane Diagram 2: Patient Check-In and Resource Allocation Workflow

Doctors

Review patient history and prepare for consultation

Nurses

Monitor patient status and resource availability (beds, equipment)

Front Desk Staff

Verifies insurance information and updates the system

Insurance verification successful?

No → Manual follow-up needed

Yes → Sends instant notification of patient arrival

Patient

Patient arrives and proceeds to check-in

Patient completes paperwork or uses self-service kiosk

Swimlane Diagram 3: Discharge Planning Process

HealthFirst Care Dashboard

- Tracks appointments, wait times, feedback scores, and resource utilization across departments.

- Highlights workload distribution, operational bottlenecks, and correlations between wait times and satisfaction.

- Supports real-time decision-making for scheduling, staffing, and resource allocation.

SQL Query Behind The Analysis

How many appointments does each doctor handle per day?

```python
pd.read_sql_query("""SELECT
    DoctorID,
    AVG(DailyCount) AS AvgDailyAppointments
FROM (
    SELECT
        DoctorID,
        Date,
        COUNT(*) AS DailyCount
    FROM Appointments
    GROUP BY DoctorID, Date
) AS DailyStats
WHERE DoctorID != 'None'
GROUP BY DoctorID
Order By AvgDailyAppointments DESC""", conn)
```

	DoctorID	AvgDailyAppointments
0	D5	7.153846
1	D29	7.153846
2	D20	6.888889
3	D22	6.461538
4	D8	6.400000
5	D15	6.400000
6	D11	6.400000
7	D26	6.250000
8	D7	6.235294

Are certain doctors or departments overbooked or underutilized?

```python
pd.read_sql_query("""SELECT
    DoctorID,
    Department,
    COUNT(*) / COUNT(DISTINCT Date) AS AvgAppointmentsPerDay
FROM Appointments
GROUP BY DoctorID, Department
ORDER BY AvgAppointmentsPerDay DESC;""", conn)
```

	DoctorID	Department	AvgAppointmentsPerDay
0	D20	General Medicine	14.0
1	D11	Neurology	10.0
2	D11	Orthopedics	10.0
3	D13	Orthopedics	10.0
4	D15	Pediatric	10.0
...	...	...	...
120	D9	Cardiology	5.0
121	D9	General Medicine	5.0
122	D9	Neurology	5.0
123	D9	Orthopedics	5.0
124	D19	Neurology	NaN

What is the appointment completion vs. cancellation/no-show rate by department?

```python
pd.read_sql_query("""SELECT
    Department,
    Status,
    COUNT(*) AS AppointmentCount,
    COUNT(*) * 100.0 / SUM(COUNT(*)) OVER (PARTITION BY Department) AS Percentage
FROM Appointments
WHERE Department != 'None'
GROUP BY Department, Status""", conn)
```

	Department	Status	AppointmentCount	Percentage
0	Cardiology	Cancelled	121	30.024814
1	Cardiology	Completed	141	34.987593
2	Cardiology	No Show	55	13.647643
3	Cardiology	Rescheduled	86	21.339950
4	General Medicine	None	27	8.681672
5	General Medicine	Cancelled	66	21.221865
6	General Medicine	Completed	99	31.832797
7	General Medicine	No Show	64	20.578778
8	General Medicine	Rescheduled	55	17.684887

SQL Query Behind the Analysis

What is the average feedback score by department?

```
pd.read_sql_query("""SELECT
    Department,
    AVG(Feedback_Score) AS AvgFeedbackScore
FROM feedback
GROUP BY Department
ORDER BY AvgFeedbackScore DESC;""", conn)
```

	Department	AvgFeedbackScore
0	Cardiology	7.030303
1	Oncology	6.500000
2	Pediatric	6.324324
3	Neurology	6.264706
4	Orthopedics	5.931034
5	General Medicine	5.384615

What is the average number of daily appointments per department?

```
pd.read_sql_query("""SELECT
    Department,
    COUNT(*) * 1.0 / COUNT(DISTINCT Date) AS AvgDailyAppointments
FROM Appointments
Where Department != 'None'
GROUP BY Department;""", conn)
```

	Department	AvgDailyAppointments
0	Cardiology	6.296875
1	General Medicine	5.980769
2	Neurology	6.375000
3	Oncology	6.661017
4	Orthopedics	6.344828
5	Pediatric	5.847222

Which departments have the highest no-show rates?

```
pd.read_sql_query("""SELECT
    Department,
    COUNT(*) FILTER (WHERE Status = 'No Show') * 100.0 / COUNT(*) AS NoShowRate
FROM Appointments
GROUP BY Department
ORDER BY NoShowRate DESC;""", conn)
```

	Department	NoShowRate
0	Orthopedics	40.760870
1	Oncology	29.770992
2	Neurology	26.470588
3	General Medicine	20.578778
4	Pediatric	15.676960
5	Cardiology	13.647643
6	None	0.000000

SQL Query Behind the Analysis

Which resources have the highest and lowest usage hours by department?

```python
pd.read_sql_query("""SELECT
    Department,
    ResourceID,
    SUM(UsageHours) AS TotalUsageHours
FROM Resource
GROUP BY Department, ResourceID
ORDER BY Department, TotalUsageHours DESC;""", conn)
```

	Department	ResourceID	TotalUsageHours
0	Cardiology	R8641	9
1	Cardiology	R1998	9
2	Cardiology	R9923	8
3	Cardiology	R7116	8
4	Cardiology	R4245	8
...	...	...	...
189	Pediatric	R7483	0
190	Pediatric	R7354	0
191	Pediatric	R7325	0
192	Pediatric	R3242	0
193	Pediatric	R2939	0

Are there specific comments/themes recurring in low feedback scores?

```python
pd.read_sql_query("""SELECT
    Comments
FROM feedback
WHERE Feedback_Score <= 3
ORDER BY FeedbackID LIMIT 10;""", conn)
```

	Comments
0	Needs improvement
1	Long wait times
2	Long wait times
3	Long wait times
4	Needs improvement
5	Needs improvement
6	Needs improvement
7	Long wait times
8	Needs improvement
9	Long wait times

What is the average availability rate of resources in each department?

```python
pd.read_sql_query("""SELECT
    Department,
    AVG(CASE WHEN Availability = 'Available' THEN 1 ELSE 0 END) * 100 AS AvgAvailabilityRate
FROM Resource
GROUP BY Department
ORDER BY AvgAvailabilityRate DESC;""", conn)
```

	Department	AvgAvailabilityRate
0	Cardiology	57.142857
1	Neurology	52.941176
2	Pediatric	50.000000
3	Orthopedics	42.307692
4	General Medicine	41.025641
5	Oncology	26.470588

SQL Query Behind the Analysis

Is there a relationship between resource availability and appointment completion?

```python
pd.read_sql_query("""SELECT
    a.Department,
    AVG(CASE WHEN a.Status = 'Completed' THEN 1 ELSE 0 END) * 100 AS CompletionRate,
    AVG(CASE WHEN r.Availability = 'Available' THEN 1 ELSE 0 END) * 100 AS AvailabilityRate
FROM Appointments a
JOIN Resource r
    ON a.Department = r.Department
    AND a.Date = r.Date
GROUP BY a.Department
ORDER BY AvailabilityRate DESC;""", conn)
```

	Department	CompletionRate	AvailabilityRate
0	Pediatric	27.272727	72.727273
1	Orthopedics	33.333333	50.000000
2	Oncology	50.000000	50.000000
3	Neurology	33.333333	41.666667
4	General Medicine	37.500000	37.500000
5	Cardiology	25.000000	25.000000

Which resource types are most prone to unavailability or downtime?

```python
pd.read_sql_query("""SELECT
    ResourceType,
    COUNT(*) FILTER (WHERE Availability = 'Unavailable') * 100.0 / COUNT(*) AS DowntimeRate
FROM Resource
GROUP BY ResourceType
ORDER BY DowntimeRate DESC;""", conn)
```

	ResourceType	DowntimeRate
0	Doctor	54.761905
1	Nurse	51.428571
2	Technician	39.583333
3	Room	0.000000
4	Equipment	0.000000

SQL Query Behind the Analysis

Does resource usage efficiency correlate with higher patient satisfaction?

```python
pd.read_sql_query("""SELECT
    r.Department,
    AVG(r.UsageHours) AS AvgUsageHours,
    AVG(f.Feedback_Score) AS AvgFeedbackScore
FROM Resource r
JOIN Feedback f
    ON r.Department = f.Department
GROUP BY r.Department
ORDER BY AvgUsageHours DESC;""", conn)
```

	Department	AvgUsageHours	AvgFeedbackScore
0	Pediatric	4.800000	6.324324
1	Orthopedics	4.615385	5.931034
2	Cardiology	4.571429	7.030303
3	General Medicine	4.512821	5.384615
4	Neurology	4.294118	6.264706
5	Oncology	3.764706	6.500000

Do departments with high appointment volume have lower feedback scores?

```python
pd.read_sql_query("""SELECT
    a.Department,
    COUNT(a.Appointment) AS TotalAppointments,
    AVG(f.Feedback_Score) AS AvgFeedbackScore
FROM Appointments a
JOIN Feedback f
    ON a.Department = f.Department
GROUP BY a.Department
ORDER BY TotalAppointments DESC;""", conn)
```

	Department	TotalAppointments	AvgFeedbackScore
0	Pediatric	14911	6.324324
1	Neurology	13566	6.264706
2	Cardiology	13299	7.030303
3	Oncology	11712	6.500000
4	Orthopedics	10672	5.931034
5	General Medicine	7384	5.384615

Are patient wait times longer in departments with lower resource availability?

```python
pd.read_sql_query("""SELECT
    f.Department,
    AVG(f.WaitTime) AS AvgWaitTime,
    AVG(CASE WHEN r.Availability = 'Available' THEN 1 ELSE 0 END) * 100 AS AvailabilityRate
FROM Feedback f
JOIN Resource r
    ON f.Department = r.Department
GROUP BY f.Department
ORDER BY AvailabilityRate ASC;""", conn)
```

	Department	AvgWaitTime	AvailabilityRate
0	Oncology	39.375000	26.470588
1	General Medicine	43.846154	41.025641
2	Orthopedics	42.413793	42.307692
3	Pediatric	41.351351	50.000000
4	Neurology	42.794118	52.941176
5	Cardiology	40.000000	57.142857

Risk Management Plan

Risk ID	Risk Description	Category	Likelihood	Impact	Severity	Mitigation Strategy
R1	Integration issues with legacy systems	Technical	High	High	Critical	Conduct thorough compatibility testing and phased integration
R2	Staff resistance to new system adoption	Organizational	Medium	High	High	Provide training and engage staff early in the process
R3	Data breaches or HIPAA non-compliance	Security	Low	Critical	High	Implement strict security protocols and regular audits
R4	Budget overruns due to unforeseen expenses	Financial	Medium	Medium	Medium	Maintain contingency funds and monitor costs closely
R5	System downtime impacting hospital workflow	Operational	Low	High	High	Schedule maintenance during off-peak hours and have backups

SWOT Analysis for HealthFirst Care Initiative

Strengths	Weaknesses
Strong leadership commitment	Manual workflows causing inefficiencies
Reliable datasets (appointments, feedback)	Staff resistance to change
Clear business objectives & stakeholder engagement	Dependence on legacy systems
Cloud-based scalable infrastructure	Limited IT staff availability
Opportunities	Threats
Process automation & HIS integration	Risk of data breaches & HIPAA violations
Enhanced staff training and engagement	Change resistance from senior staff
Better patient engagement via SMS/email	Budget & time constraints
Centralized issue tracking & communication	Integration delays with legacy tech

Risk Management Plan Key Insights

- Integration with legacy systems poses a significant risk to timelines and costs.
- Change resistance from staff could delay adoption and reduce effectiveness.
- Data security and HIPAA compliance require ongoing vigilance and controls.
- Limited budget and tight schedule increase pressure on resource allocation.
- Potential downtime must be minimized to avoid disrupting hospital operations.
- Proactive communication and training are critical to mitigate user resistance.

Risk Mitigation Plan

Risk ID	Description	Likelihood	Impact	Severity	Mitigation Strategy	Contingency Plan
R1	Integration issues with legacy systems	High	High	Critical	Phased testing and gradual rollout	Revert to legacy system if critical failures
R2	Staff resistance to new system	Medium	High	High	Training and change management	Provide additional support and coaching
R3	Data breaches or HIPAA non-compliance	Low	Critical	High	Strict security policies and regular audits	Incident response plan and data recovery
R4	Budget overruns	Medium	Medium	Medium	Monitor expenses and maintain contingency funds	Scale back non-critical features
R5	System downtime	Low	High	High	Schedule maintenance during off-hours, backups	Use backup systems and emergency protocols

Key Insights - Risk Mitigation Plan

PRIORITIZE AND ADDRESS THE HIGHEST-IMPACT RISKS EARLY.

COMBINE MITIGATION AND CONTINGENCY PLANS FOR RESILIENCE.

TRAINING AND COMMUNICATION REDUCE RESISTANCE RISKS.

CONTINUOUS MONITORING ENSURES RISK CONTROLS REMAIN EFFECTIVE.

SECURITY AND COMPLIANCE REQUIRE ONGOING VIGILANCE.

BUDGET AND TIMELINE PRESSURES DEMAND PROACTIVE MANAGEMENT.

Findings & Recommendations

Key Findings
&
Recommendations

Key Findings

- Manual scheduling causes frequent errors and delays

- Patient wait times exceed acceptable limits, lowering satisfaction

- Legacy system integration is a major technical challenge

- Communication gaps hinder timely issue resolution

- Staff resistance may impact smooth adoption of new systems

- Budget and timeline constraints require careful planning

Recommendations

- Implement automated scheduling with conflict detection

- Develop real-time patient notification systems

- Integrate legacy systems carefully with phased testing

- Establish centralized communication platforms

- Provide comprehensive staff training and support

- Monitor budget and timelines closely, with contingency plans

Further Questions, Insights, and Recommendations

Question	Insights	Recommendations
Appointment Completion vs. Cancellation/No-Show	Orthopedics (41%), Oncology (30%) and Neurology (26%) have highest no-show rates. High cancellations in Cardiology and Oncology. Pediatrics has many reschedules.	Implement reminder systems and flexible rescheduling. Strategically overbook high no-show departments. Optimize slot usage.
Appointments per Doctor per Day	Most doctors handle 5.5–7.15 daily appointments; some are overloaded (up to 14/day).	Balance doctor workloads to avoid burnout, redistribute appointments, provide support staff for busy doctors.
Departments with Highest No-Show Rates	Orthopedics, Oncology, Neurology have highest no-show rates.	Offer flexible scheduling, telehealth options, targeted patient engagement in these departments.
Overbooked or Underutilized Doctors/Departments	Some doctors (e.g. D20) have very high daily loads; others underutilized.	Redistribute appointments to balance workload and maintain quality care.
Average Daily Appointments per Department	Oncology has highest daily appointments (6.66), others close behind.	Prioritize staffing/resources in high-volume departments to maintain flow and reduce wait times.
Average Feedback Scores by Department	Cardiology highest satisfaction (7.03), General Medicine lowest (5.38).	Focus quality improvement efforts on low-scoring departments, enhance patient communication and service.
Recurring Themes in Low Feedback	Frequent complaints: "Needs improvement," "Long wait times."	Streamline patient flow, reduce bottlenecks, improve customer service training.
Resource Usage Hours by Department	Wide variation; some resources unused (0 hrs), Cardiology and Pediatrics have higher usage.	Optimize allocation by reallocating underused resources; improve utilization tracking.
Average Resource Availability Rate	Cardiology highest (57%), Oncology lowest (26%).	Prioritize resource maintenance and staffing in low availability departments to reduce wait times.
Resource Types Most Prone to Unavailability	Doctors (55%) and Nurses (51%) have highest downtime rates.	Improve staff scheduling and shift planning to reduce downtime.
Relationship: Resource Availability & Appointment Completion	No direct correlation between volume and feedback; resource availability impacts wait times.	Monitor availability closely in high-volume departments; align appointments with capacity.
Resource Usage Efficiency vs. Patient Satisfaction	Mixed results; high usage doesn't always mean higher satisfaction.	Balance resource use with quality of care; monitor efficiency alongside patient satisfaction.
Patient Wait Times vs. Resource Availability	Oncology lowest availability and long waits; low availability linked to longer waits overall.	Increase resource availability via staffing/maintenance; use real-time data to dynamically manage resources.

Project Summary

- Analyzed hospital appointments, resource use, and patient feedback across departments

- Identified high no-show rates in Orthopedics, Oncology, and Neurology affecting scheduling

- Found uneven doctor workloads with some overbooked, others underutilized

- Patient satisfaction highest in Cardiology, lowest in General Medicine; long wait times a common issue

- Resource availability low in Oncology, linked to longer wait times

- Recommendations: improve reminders, balance doctor schedules, increase resource availability, reduce wait times, and implement real-time monitoring

- Goal: enhance scheduling efficiency, reduce patient wait times, and boost satisfaction through data-driven insights

Acknowledgments & Credits

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Data sources:

1. appointment_data.csv

2. feedback_data.csv

3. resource_data.csv

Tools:

Google Looker Studio, Jupyter Notebook (SQL, Python), Excel, MS Word, MS PowerPoint