

# Fortifying Healthcare.docx

*by Umajini Ravi*

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## Fortifying Healthcare

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## **Abstract**

This review describes the involvement of user groups in the proposed solution. The main problem is a recent Cyber-attack in Waikato District Hospital, in the previous sprints it described descriptively. Fortifying Health care application is designed to deliver mitigation techniques, real-time data reporting, and monitor real-time threats. This application is targeting four user groups, that are involved in hospital functionalities. The proposed solution enables it without any interruptions, and it connects with the hospital securely. The user groups' interview answers and their engagement with the application is delivered in this report. The personal personas are mapped with the proposed solution. The interview surveys are conducted in a hypothetical setting and prove the drawbacks of the current systems and each group's perspective on the proposed solution.

**Key Words:** Interviews, Personas, User groups, <sup>6</sup>Electronic Health Records (EHR), Fast Healthcare Interoperability Resources API (FHIR API)

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## **1. Introduction**

During Sprint 2, we mentioned the mobile strategy, mobile task, and technical requirements of the new application for the Waikato District Health Board. In this sprint, we will be identifying the user requirements based on different user roles and needs. This will be analyzed based on a hypothetical interview, and interview which takes place between different user roles, which are doctors, nurses, hospital administrative staffs, IT support staffs, and emergency response staffs. We also analyze user profiles and personas of the users to make sure how our system will aid the routine of the organization. Moreover, we draw a graph mentioning all the details collected from interviews and real-world experiences regarding various roles, duties, and features of the new mobile application, which highlights the user and hospital performance before and after using it.

## 2. Users and User Groups

### User Group 01 – Doctors, and Nurses

#### User Profile 01: Doctors work at the hospital and in remote locations

*Table 1 User Profile 01 - Doctors*

<b>1</b>	<b>Name of the user</b>	Many [Doctor (General Physician, Surgeon, Specialist)]
<b>2</b>	<b>General responsibilities or activities</b>	Use the mobile application to: <ol style="list-style-type: none"><li>1. To ensure continuation of care for permanent patients, access their previous records.</li><li>2. Communicate with other medical specialists using secure message.</li><li>3. Real-time treatment plan updates are possible.</li><li>4. Securely schedule testing and write prescriptions.</li><li>5. Examine patients by viewing reports and medical histories.</li></ol>
<b>3</b>	<b>Computer skills</b>	Moderate to High
<b>4</b>	<b>Domain expertise</b>	Moderate
<b>5</b>	<b>Type of system use</b>	Daily use (Mandatory)
<b>6</b>	<b>Goals</b>	<ol style="list-style-type: none"><li>1. Secure instant access to patient records instantly and anywhere in the hospital.</li><li>2. Real-time medical update with sharing and receiving.</li><li>3. Easy to collaborate with other specialists without delay.</li></ol>
<b>7</b>	<b>Pain Points</b>	<ol style="list-style-type: none"><li>1. The doctor would like to update patient's report, imaging results, and medications.</li><li>2. The doctor would like to access the information on any authorized devices.</li><li>3. To share patient data securely.</li><li>4. Like to locate the patient records and manage it on consultation.</li></ol>

		<p>5. Would like to access large diagnostic files and lab reports without any delay.</p> <p>6. The doctor would like to login the application without slow process in emergency situation.</p>
<b>8</b>	<b>Usage Contexts</b>	The mobile application will be used during the consultation, telehealth sessions time and ward rounds.
<b>9</b>	<b>Software Ecosystem</b>	<p>1. Electronic Health Record system (EHR)</p> <p>2. Lab Results System</p> <p>3. Telemedicine system</p>
<b>10</b>	<b>Collaborators</b>	<p>1. Nurses</p> <p>2. Specialist doctors</p> <p>3. Medical records officers</p> <p>4. Pharmacists.</p>
<b>11</b>	<b>Frequency of Use</b>	Multiple times daily

## User Profile 02: Nurse work at the hospital

*Table 2 User Profile 02 - Nurse*

<b>1</b>	<b>Name of the user</b>	Many [Nurse (Head Nurse, ICU Nurse, Junior Nurse)]
<b>2</b>	<b>General responsibilities or activities</b>	<p>Use the mobile application to:</p> <ol style="list-style-type: none"> <li>1. Monitor, records and update the patient's medical data.</li> <li>2. Take care of the patients during the urgent care time.</li> <li>3. Upload reports and get a review from the doctors.</li> <li>4. Get an update from the pharmacy about the medication stocks.</li> <li>5. Report the incidents and changes about the patient securely to the relevant departments.</li> </ol>
<b>3</b>	<b>Computer skills</b>	Moderate to High
<b>4</b>	<b>Domain expertise</b>	Moderate
<b>5</b>	<b>Type of system use</b>	Daily use (Mandatory)
<b>6</b>	<b>Goals</b>	<ol style="list-style-type: none"> <li>1. Quickly record and update the patient's vitals such as temperature, pulse rate, SpO2 level (peripheral oxygen saturation), and blood pressure at their bedside.</li> <li>2. Receive the medications and tasks reminders automatically.</li> <li>3. Securely communicate with doctors and pharmacists.</li> <li>4. Access patient records in emergency situations.</li> </ol>
<b>7</b>	<b>Pain Points</b>	<ol style="list-style-type: none"> <li>1. The nurse would like to update the patient's vitals using an authorized device.</li> <li>2. The nurse would like to locate and manage patient care tasks and schedules easily.</li> <li>3. In emergency and treatment times, they would like to access and open the records quickly.</li> </ol>

<b>8</b>	<b>Usage Contexts</b>	The mobile application will be used during the patient bedside, in wards, and during shift changes.
<b>9</b>	<b>Software Ecosystem</b>	<ol style="list-style-type: none"> <li>1. EHR</li> <li>2. Medicine Management System</li> <li>3. Task Management Tools</li> </ol>
<b>10</b>	<b>Collaborators</b>	<ol style="list-style-type: none"> <li>1. Doctors</li> <li>2. Other nurses</li> <li>3. Medical records officers</li> <li>4. Pharmacists</li> </ol>
<b>11</b>	<b>Frequency of Use</b>	Multiple times daily

## User Group 02 – Medical Records Officers, Billing & Accounts Team and Receptionists/Front Desk Staff

### User Profile 03: Medical Records Officers

*Table 3 User Profile 03 - Medical Records Officers*

<b>1</b>	<b>Name of the user</b>	Many [Medical Records Officers, Health Information Officer]
<b>2</b>	<b>General responsibilities or activities</b>	<p>Use the mobile application to:</p> <ol style="list-style-type: none"><li>1. To guarantee adherence to data protection laws and compliance on a regular basis.</li><li>2. Assist physicians and administrative personnel by promptly obtaining the necessary medical data.</li><li>3. Verify that all patient records are correct.</li></ol>
<b>3</b>	<b>Computer skills</b>	Moderate to High
<b>4</b>	<b>Domain expertise</b>	Moderate
<b>5</b>	<b>Type of system use</b>	Daily use (Mandatory)
<b>6</b>	<b>Goals</b>	<ol style="list-style-type: none"><li>1. Ensure that patient medical records are 100% accurate.</li><li>2. Verify compliance with data security laws.</li></ol>
<b>7</b>	<b>Pain Points</b>	<ol style="list-style-type: none"><li>1. Restricted offline or remote access to EHRs.</li><li>2. Delays in the central servers' and mobile servers' system syncing.</li><li>3. Reliance on IT assistance to restore access following outages.</li></ol>
<b>8</b>	<b>Usage Contexts</b>	Utilizes the system in clinical team meetings, the records office, and ward rounds.
<b>9</b>	<b>Software Ecosystem</b>	<ul style="list-style-type: none"><li>• Secure messaging channels</li><li>• Hospital EHR platforms integrated with a mobile application</li></ul>
<b>10</b>	<b>Collaborators</b>	<ol style="list-style-type: none"><li>1. IT security departments</li><li>2. Administrative teams</li><li>3. Medical staff (Doctors &amp; Nurses)</li></ol>

		4. External emergency service staff
<b>11</b>	<b>Frequency of Use</b>	Constant use throughout every work shift.

## User Profile 04: Billing & Accounts Team

*Table 4 User Profile 04 - Billing & Accounts Team*

<b>1</b>	<b>Name of the user</b>	<b>Many [Billing Officer, Accounts Staff]</b>
<b>2</b>	<b>General responsibilities or activities</b>	Use the mobile application to: 1. Oversee the submission and approval of insurance claims. 2. Handle patient service and procedure invoices. 3. Monitor patient and third-party payer payment histories.
<b>3</b>	<b>Computer skills</b>	Moderate to High
<b>4</b>	<b>Domain expertise</b>	Moderate to High
<b>5</b>	<b>Type of system use</b>	Mandatory and continuous
<b>6</b>	<b>Goals</b>	1. Reduce denied claims and minimize payment delays. 2. Accurately and promptly process billing and claims.
<b>7</b>	<b>Pain Points</b>	1. Manual checks that cause delays in payment confirmations. 2. Limited mobile access to real-time financial data.
<b>8</b>	<b>Usage Contexts</b>	Mainly in the billing office, live data updates are sometimes provided during management meetings.
<b>9</b>	<b>Software Ecosystem</b>	1. Payment portals 2. Insurance claim systems 3. Hospital finance management systems
<b>10</b>	<b>Collaborators</b>	1. Receptionists 2. Medical records officers 3. External insurance company officers 4. Pharmacist 5. Laboratories

<b>11</b>	<b>Frequency of Use</b>	Multiple times daily
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## User Profile 05: Receptionists/Front Desk Staff

*Table 5 User Profile 05 - Receptionists/Front Desk Staff*

<b>1</b>	<b>Name of the user</b>	Many [Receptionists, Front Desk Staff]
<b>2</b>	<b>General responsibilities or activities</b>	<p>Use the mobile application to:</p> <ol style="list-style-type: none"> <li>1. Oversee the scheduling and cancellation of patient appointments.</li> <li>2. Verify patients' identities and check them in when they arrive.</li> <li>3. Send follow-up messages and reminders for appointments.</li> </ol>
<b>3</b>	<b>Computer skills</b>	Moderate to High
<b>4</b>	<b>Domain expertise</b>	Moderate to High
<b>5</b>	<b>Type of system use</b>	Mandatory
<b>6</b>	<b>Goals</b>	<ol style="list-style-type: none"> <li>1. Less waiting time for patients.</li> <li>2. Continue to schedule appointments accurately.</li> <li>3. Increase patient satisfaction by communicating promptly.</li> </ol>
<b>7</b>	<b>Pain Points</b>	<ol style="list-style-type: none"> <li>1. Check-in is disrupted by network outages during peak hours.</li> <li>2. Inefficient manual backup procedures.</li> <li>3. Conflicts in scheduling because of out-of-date data.</li> </ol>
<b>8</b>	<b>Usage Contexts</b>	Mostly at the front desk, but also occasionally while helping patients in waiting rooms.
<b>9</b>	<b>Software Ecosystem</b>	<ol style="list-style-type: none"> <li>1. Secure messaging platforms</li> <li>2. Software for scheduling hospital appointments</li> </ol>
<b>10</b>	<b>Collaborators</b>	<ol style="list-style-type: none"> <li>1. Medical officers (Doctors)</li> <li>2. Nurses</li> <li>3. Billing &amp; Account Team</li> </ol>

		4. Medical record officers
<b>11</b>	<b>Frequency of Use</b>	Multiple times daily

## User Group 03: Ambulance / Paramedic teams and Pharmacists.

### User Profile 06: Ambulance / Paramedic teams

*Table 6 User Profile 06 - Ambulance / Paramedic teams*

1	Name of User	Many
2	General Responsibilities and Activities	Members of this section would take advantage of: <ul style="list-style-type: none"><li>• To upload emergency information.</li><li>• Collaborate with the Emergency Department (ED) in New Zealand.</li></ul>
3	Computer Skills	Moderate
4	Domain Expertise	Moderate to High
5	Type of System Use	Mandatory
6	Goals	<ul style="list-style-type: none"><li>• Fast and secure communication before arrival at the hospital.</li><li>• Data sharing in real-time.</li><li>• Accessible to medical records.</li><li>• Documentation and records handover to the respective staff.</li><li>• Connect with emergencies, like fire, police, or disaster management, and the Emergency Department (ED).</li><li>• Immediate response to emergency or critical situations.</li></ul>
7	Pain points	<ul style="list-style-type: none"><li>• Connection issues in rural areas.</li><li>• Speed and security of data.</li><li>• Highly relies on verbal communication.</li><li>• Delays when handing over patient records.</li></ul>
8	Usage Context	The mobile application will be used in response to an emergency, during sessions in a critical situation, and when handover or transit of the patients.
9	Software Ecosystem	<ul style="list-style-type: none"><li>• System integrations with the hospital EHR system and real-time GPS tracking.</li></ul>
10	Collaborators	1. Medical record officers

		2. Emergency department [doctors and nurses] 3. Receptionist
<b>11</b>	Frequency of Use	In an emergency.

## User Profile 07: Pharmacists

*Table 7 User Profile 07 - Pharmacists*

<b>1</b>	<b>Name of User</b>	<b>Many</b>
<b>2</b>	General Responsibilities and Activities	Members of this section would take advantage of: <ul style="list-style-type: none"><li>• Management of prescriptions.</li><li>• Connected with doctors, nurses.</li><li>• Secure privacy of patients' data.</li></ul>
<b>3</b>	Computer Skills	Moderate
<b>4</b>	Domain Expertise	Moderate to High
<b>5</b>	Type of System Use	Mandatory
<b>6</b>	Goals	<ul style="list-style-type: none"><li>• Dispensing prescription medications and providing instructions on using medicines.</li><li>• Clinical teams support.</li><li>• Fast and secure communication with respective doctors and nurses.</li></ul>
<b>7</b>	Pain points	<ul style="list-style-type: none"><li>• Considering both security and speed.</li><li>• Verify high volume of prescriptions.</li><li>• Issues when integrating with other systems.</li><li>• System downtime issues.</li></ul>
<b>8</b>	Usage Context	<ul style="list-style-type: none"><li>• Verification of patient prescriptions.</li><li>• Inter-connect with clinical teams.</li><li>• Reporting for compliance.</li></ul>
<b>9</b>	Software Ecosystem	<ul style="list-style-type: none"><li>• Pharmacy information system integrated with the current EHR system and proposed mobile application.</li></ul>

<b>10</b>	Collaborators	1. Doctors 2. Nurses 3. Billing & Accounts team
<b>11</b>	Frequency of Use	Daily

## User Group 04: Technical & IT Security Staff

### User Profile 08: Technical and IT security Staff

*Table 8 User Profile 08 - Technical & IT*

<b>1</b>	<b>Name of User</b>	Many [Technical Support and IT Security Staff, System (Network and Database) Administrators, Security Analysts]
<b>2.</b>	General Responsibilities and Duties	<ul style="list-style-type: none"><li>• Create and manage user accounts, roles, and multi-factor authentication (MFA) and device compliance.</li><li>• Observation of EIR system dashboards, managing issues regarding the connection between the mobile health application and the EHR system via the FIHR API, along with quick response to incidents.</li><li>• Patching endpoints, servers, clinical devices, and spectate data flows and exchange between devices and the central server.</li><li>• Segment networks have secure Wi-Fi, VPN, and monitoring threats and patches, as well as firewall policies.</li><li>• Monitor database encryption, backup processes, restore tests, and an audit trail.</li><li>• Organize clinical timeline data of patients in a database with details that can be accessed easily and quickly through the EHR system.</li></ul>
<b>3.</b>	Computer Skills	High (Expert)
<b>4.</b>	Domain Expertise	High
<b>5.</b>	Types of system use	Continuous Monitoring and Admin consoles.
<b>6.</b>	Goals	<ul style="list-style-type: none"><li>• Keep clinical systems available, maintain compliance.</li></ul>

		<ul style="list-style-type: none"> <li>Enable secure, least-privilege access with strong auditability.</li> <li>Prevent, detect and respond to cyber-attacks as well as facilitate continuous seamless connectivity among EHR system networks.</li> <li>Improve system efficiency through integration.</li> </ul>
7.	Pain points	<ul style="list-style-type: none"> <li>Zero-day exposure, noisy/duplicated alerts, and credential phishing.</li> <li>Slow and outdated software is increasing the workload and problems regarding operating/supporting new devices and software.</li> <li>Complicated centric switching windows in active clinical ones; earlier tools that could not patch very much.</li> </ul>
8.	Usage Context	<ul style="list-style-type: none"> <li>Data regarding patients' user information, along with other health records, is managed in parallel with concerned related doctors and health staff securely through this application and facilitating the technical team's ease of control and plan over the overall structure of data and system.</li> <li>The control room, on-call (Phone call support), including real-time data breach alert.</li> <li>Data Centers and Secure admin consoles.</li> </ul>
9.	Software Ecosystem	Hospitals' central EHR platforms are integrated with mobile applications via secure FIHR API based on FIHR standards, providing seamless communication and data flow across the

		whole organization, including data on a central server deployed at Health New Zealand data center.
<b>10.</b>	Collaborators	<ul style="list-style-type: none"> <li>1. Medical Professionals (Doctors, Nurses, and Specialists).</li> <li>2. Medical Record Officers and Hospital Administrative Staff.</li> <li>3. Receptionists/Front Desk Staff</li> <li>4. Billing and Account Team.</li> <li>5. Emergency Response and Support Staff.</li> <li>6. Emergency Response and Support Staff.</li> </ul>
<b>11.</b>	Frequency of use	All working Days (All the time).

### 3. Interview Summary

#### User 01: Doctor

**Interviewee – Dr. U Ravi**

**Interview Type - Hypothetical Interview**

*Table 9 Interview User 01*

#	Question	Answer
1	<b>What is your current working location and your designation?</b>	I'm a General Physician at Waikato Hospital, mainly working in the outpatient department.
2	<b>How many years of experience do you have?</b>	I have 5 years of experience.
3	<b>What are the main responsibilities you have in your role?</b>	Consulting with patients in OPD, diagnosing the sickness of patient, providing medicines, and collaborating with another specialist when necessary.
4	<b>How do you currently access patient records and hospital systems?</b>	Using staff laptop or desktop PCs in the OPD consultation room and I access the hospital EHR system.
5	<b>How do you currently update or report patient information?</b>	After every appointment, I used the Electronic Health Record system to update the patient notes and prescriptions via the consulting room device.
6	<b>What difficulties do you face without mobile access to the system?</b>	I cannot check the patient records when I'm away from the OPD consolation room desktop PC, which might cause a delay in follow up. If a previous patient brings up existing test results during the consultation time, I need to leave the room to access the report.

7	<p><b>If there is a mobile app for you to use for those purposes, will you be happy to use it? Any issues?</b></p>	<p>Yes, I'm happy to use it. It's helpful and can view the patient's history and lab results instantly.</p> <p>My main concerns are security related issues, offline access in cases of Wi-Fi problem, and quick loading time.</p>
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## User 02: Nurse

**Interviewee** – Mrs Shanthy

**Interview Type** - Hypothetical Interview

*Table 10 Interview User 02*

#	Question	Answer
1	<b>What is your current working location and your designation?</b>	I'm a Senior Nurse in the Emergency Department at Waikato Hospital.
2	<b>How many years of experience do you have?</b>	I have 12 years of nursing experience, including 6 years in the emergency department.
3	<b>What are the main responsibilities you have in your role?</b>	Monitoring patients' vitals and updating the patient's condition for doctor. Helping doctors during the emergency operations and giving medicines to the patients.
4	<b>How do you currently access patient records and hospital systems?</b>	I mostly use monitor in the nursing center and sometimes I update the records in printed charts in the patient room.
5	<b>How do you currently update or report patient information?</b>	At the nursing center, I record updates into the EHR, and if I'm busy with another patient, I take notes on paper first and enter them later.
6	<b>What difficulties do you face without mobile access to the system?</b>	Real-time vitals and monitoring of the incident are challenging, and information may be forgotten or missed.

7	<b>If there is a mobile app for you to use for those purposes, will you be happy to use it? Any issues?</b>	<p>Yes, I'm happy to use it. It would save time, quick access, and display in patient records.</p> <p>My concern is the offline function system inside the hospital area and quickly loading the lab reports.</p>
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## User 03: Medical Records Officer

**Interviewee – Mr John Adam**

**Interview Type - Hypothetical Interview**

*Table 11 Interview User 03*

#	Question	Answer
1	<b>What is your current working location and your designation?</b>	I work at Waikato DHB as a Medical Records Officer
2	<b>How many years of experience do you have?</b>	I have 8 years of experience in hospital record management.
3	<b>What are the main responsibilities you have in your role?</b>	<ul style="list-style-type: none"><li>• Managing and updating Electronic Health Records (EHR).</li><li>• Ensuring accuracy and compliance with privacy regulations.</li><li>• Supporting clinicians with patient record requests.</li><li>• Conducting compliance audits.</li></ul>
4	<b>How do you currently access patient records and hospital systems?</b>	<ul style="list-style-type: none"><li>• Primarily through a desktop-based EHR system.</li><li>• Limited mobile access is available through hospital tablets, but features are restricted.</li></ul>
5	<b>How do you currently update or report patient information?</b>	<ul style="list-style-type: none"><li>• Updates are usually entered from the office desktop.</li><li>• When on patient ward rounds, I make notes manually and later update the system.</li></ul>
6	<b>What difficulties do you face without mobile access to the system?</b>	<ul style="list-style-type: none"><li>• Delays in updating records during ward rounds.</li><li>• Risk of duplicate or outdated entries due to time gaps.</li></ul>
7	<b>If there is a mobile app for you to use for those purposes, will you be happy to use it? Any issues?</b>	Yes, I would be very happy to use it. It would also reduce errors, duplication, and delays in record-keeping, which are major frustrations with the current system.

## User 04: Paramedic Officer

Interviewee : Dr. Wilson G.

Interview type: Hypothetical Interview

Table 12 Interview User 04

#	Question	Answer Summary
1	<b>What is your current working location and your designation?</b>	I'm a Senior Paramedic Officer at Waikato Hospital.
2	<b>How many years of experience do you have?</b>	I have 6 years of experience.
3	<b>What are the main responsibilities you have in your role?</b>	The paramedic officer is liable for responding to emergencies at once, reviewing and offering instant treatment, and securely taking patients to hospitals while observing their medical status. Also, we should ensure the reliable electronic storage of patient information and medications by firmly linking with hospitals and other emergency services.
4	<b>How do you currently access patient records and hospital systems?</b>	Using a hospital laptop or desktop application.
5	<b>How do you currently update or report patient information?</b>	I reported patient information manually, and after arriving at the hospital, those records were handed over to the respective hospital officer to enter the hospital system.
6	<b>What difficulties do you face without mobile access to the system?</b>	The main difficulty is time-consuming and not possible to be real-time to the hospital. Otherwise, it impacts on the patient's health care monitoring also. Errors are increasing when getting information from the guardians of patients about allergies or the history of health conditions.

7	<b>If there is a mobile app for you to use for those purposes, will you be happy to use it? Any issues?</b>	Yes, I am happy to use the mobile application, and it is a good solution. It will be fast communication, minimize the errors, and most importantly, a real-time data update is more helpful.
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## User 05: Programme Manager, Mental Health & Addictions Transformation, Health New Zealand

**Interviewee** – Belinda Walker

**Interview Type** – Interview (on call)

*Table 13 Interview - User 05*

#	Question	Answer
1	<b>What is your current working location and your designation?</b>	I'm a Programme Manager at Mental Health & Addictions Transformation, Health New Zealand. I am also working as a Quality Assurance at Open Polytechnic of New Zealand, located at Mamaku, Bay of Plenty, New Zealand.
2	<b>How many years of experience do you have?</b>	I have been working in the health and disability sector for more than two decades and have 2 years of experience working in a new role in this hospital. I joined here in October 2023.
3	<b>What are the main responsibilities you have in your role?</b>	<ul style="list-style-type: none"><li>• Senior advisory, advocacy, and representation exposure to issues,</li><li>• Risk management through an equity lens, objective, and qualified tact analysis of data trends.</li><li>• Managing and leading to plan and achieve objectives,</li><li>• Quality and deep local, regional, and national relations and networks.</li><li>• Mentoring and peer-supervision of mental health and addiction, brain injury, neurodiversity, physical disability, and impairment,</li><li>• Constantly learning more about Te ao Māori and Te Tiriti o Waitangi.</li></ul>
4	<b>How do you currently access patient records and</b>	I access the hospital EHR system using a staff laptop or desktop PCs inside the hospital premises.

<b>hospital systems?</b>	
<b>5</b>	<b>How do you currently update or report patient information?</b>
	After every appointment, I used the <b>Electronic Health Record system</b> to update the patient notes and prescriptions via the consulting room device.
<b>6</b>	<b>What difficulties do you face without mobile access to the system?</b>
	I am working in multiple hospitals with busy schedules every day. I have to be informed by email, text, or call for the time schedule, appointments, and meetings. I rely on the receptionist or other medical staff for my schedules. For follow ups, I need to be dependent on previous patient reports during the consultation time.
<b>7</b>	<b>If there is a mobile app for you to use for those purposes, will you be happy to use it? Any issues?</b>
	Yes, I'm glad to use it. It's helpful and can view the patient's history, previous discussion, and provides real time updates of the hospital instantly.  My main concerns are security related issues, offline access in cases of Wi-Fi problem, and high dependency upon staff for work schedule and updates on the hospital. This new system can bring ease to access to information and updates, including daily schedules in mobile, which can help me to plan accordingly.

## 4. User Personas

### Persona 01



<b>Name</b>	: Dr S. Smith
<b>Position</b>	: General Physician – Out Patient Department
<b>Gender</b>	: Female
<b>Age</b>	: 40
<b>Education</b>	: Bachelor of Medicine and Bachelor of Surgery
<b>Location</b>	: Waikato District Health Board, New Zealand
<b>Disability</b>	: None

Figure 1 Persona 01 (from iStock)

- **Quote:**

I am able to combine my love of medical science with my dedication to caring for each patient as a unique person at Waikato DHB. It involves paying attention, learning, and providing treatment that protects their worth and promotes their health.

- **Computer Literacy:** High – experienced with hospital EHR systems and scheduling system
- **Application Expertise: (on similar system)** - Moderate
- **System Expertise: (on current system)** - High
- **Task Expertise:** High
- **Frequency of use:** All the time
- **Attitude (feeling toward job or system):**

Encouraging but wary, they recognise the advantages of digital records but are worried about vulnerabilities in security, delayed access, and interruptions.

- **Backstory: (including motivation and pain points)**

Dr. Smith has worked in Waikato DHB Hospital for the last six years and has experienced the effects of cyberattacks on healthcare for patients. She must have quick, safe access to medical records as part of her daily routine; even while she is in her consultation room, she

must leave to discuss the case with other staff members. She depends on real time updates to share observations, monitor the lab results, and interact with other specialists. She wants her staff to be able to see her changes immediately, whether she's uploading MRI scan files or changing prescriptions. Dr. Smith expecting easy access to all approved devices, including her mobile with using two-factor verification, and to be able to communicate with other department doctors, nurse, and pharmacists with secure message.

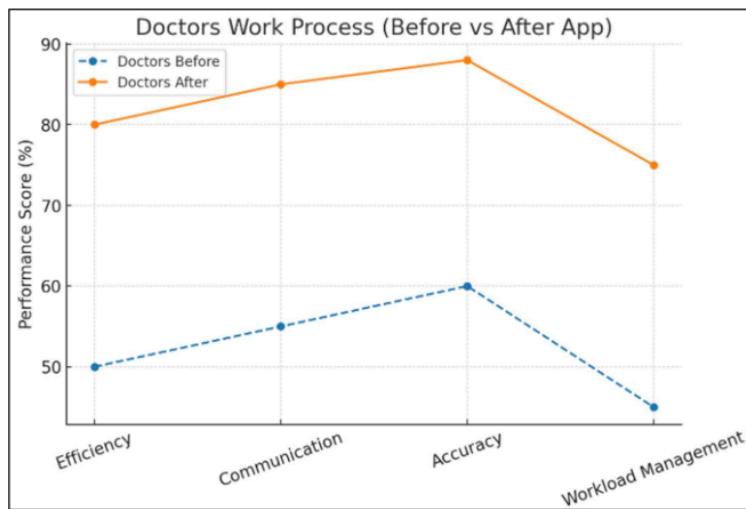
- **Primary activities this user will engage in:**

1. Login.
2. Real-time report access.
3. Updating of patient medical records.
4. Requesting, viewing and examining images and lab results.
5. Securely communicate with colleagues.
6. Receiving medical instructions when in consultation.
7. Getting immediate alerts in the incident of an emergency.
8. Updating and monitoring records with patients following visits.

### **Scenario (User 01)**

After completing her morning consultations, Dr. S. Smith at Waikato Hospital receives an urgent call from radiology about a patient's CT scan results. Previously, she would have faced delays loading large files on her office PC and logging into the hospital system. Now, using the hospital's secure mobile application, she logs in via fingerprint authentication and OTP, accessing the patient's record instantly from her phone. As she walks to the ward, she reviews the high-quality CT scan image, updates the report, and sends an encrypted message to a specialist doctor for a second opinion. Within minutes, she receives feedback and updates the patient's medication list without returning to her desk.

Later, during another consultation, Dr. Smith compares current and past test results on the app in real time, with large diagnostic files loading instantly, ensuring no delays in discussion with the patient. That night, in an emergency, she logs in through the app in under five seconds, bypassing lengthy verification while maintaining security, enabling rapid decision-making for critical care. The app has become an indispensable tool, allowing Dr. Smith to securely access, update, and share patient data anywhere in the hospital, improving speed, collaboration, and quality of care without compromising security.



*Figure 2 User 01 (Doctors) work process (from ChatGPT)*

## Persona 02



<b>Name</b>	: Mrs Anna
<b>Position</b>	: Registered Nurse
<b>Gender</b>	: Female
<b>Age</b>	: 37
<b>Education</b>	: Bachelor of Nursing
<b>Location</b>	: Waikato District Health Board, New Zealand
<b>Disability</b>	: None

Figure 3 Persona 02 (from iStock)

- **Quote:**

Every second matters in a busy hospital environment. I can concentrate more on providing treatment and less on waiting for systems to load when I have immediate, secure access to patient details.

- **Computer Literacy:** Moderate computer experience
- **Application Expertise: (on similar system)** - Moderate
- **System Expertise: (on current system)** - Moderate
- **Task Expertise:** High
- **Frequency of use:** All the time
- **Attitude (feeling toward job or system):**

Concerned with slow, outdated systems and lengthy logins; happy about solutions that increase productivity and ensure patient security.

- **Backstory: (including motivation and pain points)**

Mrs. Emily manages several patients at once while working in a busy hospital. She must promptly review and update patient data, particularly in an emergency. She frequently moves between rooms; therefore, having mobility to access records is crucial. She also wants users in the hospital to be able to instantly access prescriptions, vital history records, and patient information, can keep track of updates while out and about without needing to go back to the nurse's unit, may communicate and receive real-time, secure updates, and instant access to huge diagnostic files such as X-rays, MRI Scan reports. Her complaints

include waiting for large documents to load, needing to constantly input login during busy rounds, and delayed system logins.

- **Primary activities this user will engage in:**

1. Updating notes in real time and reviewing patient history.
2. Obtaining instruction and procedures from physicians using secure texting.
3. Having mobile access to diagnostic results from the lab.
4. Updating data of the pharmaceutical administration.
5. Coordinating emergency situations or patient transfers with other staff members.

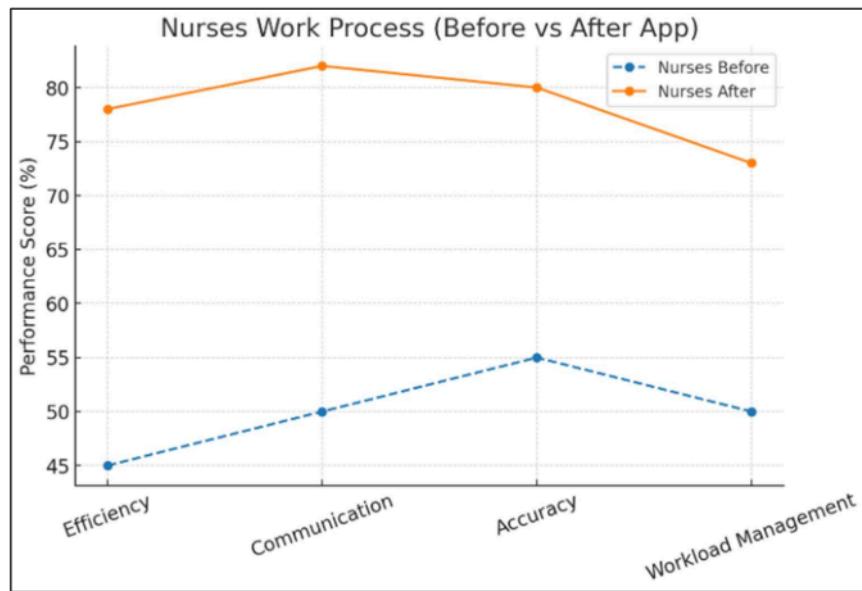
## **Scenario (User 02)**

At Waikato Hospital, Mrs. John Emily starts her morning shift in the outpatient ward. Following handover, she checks patient records while on rounds using the hospital's secure mobile application on her device. After every visit, the nurse updates vitals such as blood pressure and heart rate at the patient's bedside and logs in using fingerprint authentication rather than going back to her workstation.

She gets a secure communication from a doctor during her shift asking for an immediate follow-up on a lab result. The alert comes in real time, and she reacts right away. Afterwards, if a patient must modify medications, she may easily view the diagnostic results on the application and verify the change with the doctor.

In an emergency that night, she may quickly access historical data and sensitivity history, avoiding a possible medication error.

The software enhances Mrs. Emily's workflow and improves patient safety by providing her with secure, real-time access to patient data.



*Figure 4 User 02 (Nurses) work process (from ChatGPT)*

## Persona 03



**Name** : Sarah Thompson  
**Position** : Health Information Officer  
**Gender** : Female  
**Age** : 30  
**Education** : Bachelor of Health Information Management  
**Location** : Waikato District Health Board, New Zealand  
**Disability** : None

Figure 2 Persona 03 (from iStock)

- **Quote:**

At Waikato DHB, maintaining accurate patient records is crucial, but updates are delayed and occasionally result in duplicate entries when ward rounds are conducted without dependable mobile access.

- **Computer Literacy:** High
- **Application Expertise: (on similar system)** - Moderate
- **System Expertise: (on current system)** - High
- **Task Expertise:** High
- **Frequency of use:** All the time
- **Attitude (feeling toward job or system):**

Positive about supporting patient care through accurate records.

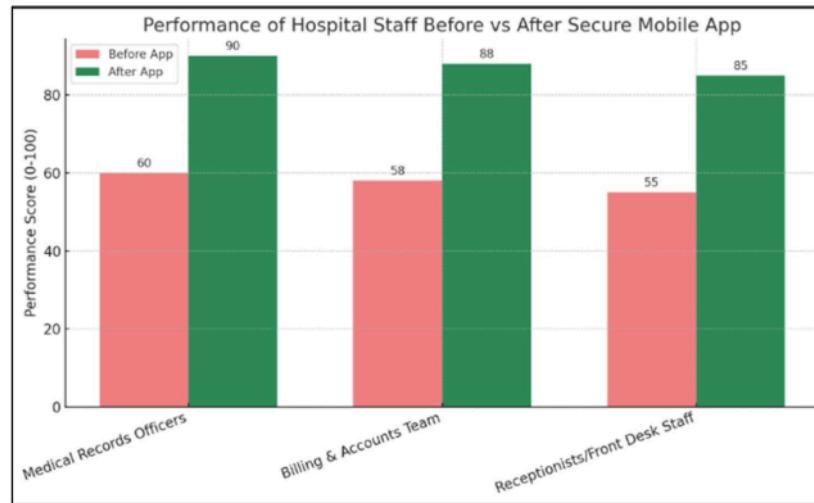
- **Backstory: (including motivation and pain points)**

For almost ten years, Sarah has been employed at Waikato DHB. Since accurate medical records have a direct impact on patient outcomes, she places a high value on accuracy and compliance in her work. But during ward rounds, she frequently gets frustrated when mobile tools don't support full record updates or when systems are sluggish. She is driven to make sure patients are safe and to always give doctors correct information. Her

complaints include having to manually re-enter notes, relying on IT support for system access, and experiencing syncing delays.

- **Primary activities this user will engage in:**

1. Managing and updating patient EHRs.
2. Providing real-time patient histories.
3. Ensuring secure data sharing within the hospital system.
4. Using mobile devices (with offline mode) for record updates during ward rounds.
5. Conducting compliance checks



*Figure 5 Performance of Hospital Administrative Staff (from ChatGPT)*

## Persona 04



**Name :** Dr J. Martin  
**Position :** Senior Paramedic Officer  
**Gender :** Male  
**Age :** 55  
**Education:** Bachelor of Health Science (Paramedicine) degree.  
**Location :** Waikato District Health Board, New Zealand.  
**Disability :** None

Figure 6 Persona 04 - Senior Paramedic Officer

### Quote:

I need to do reliable on-time service to patients, so that I able to save lives without misleading data.

### Computer Literacy:

Experienced       Moderate       Limited       None

### Application Expertise:

Experienced       Moderate       Limited       None

### System Expertise:

Experienced       Moderate       Limited       None

### Task Expertise:

Experienced       Moderate       Limited       None

### Frequency of use:

All the time       Occasionally       Monthly       Yearly

### Attitude (feeling toward job or system):

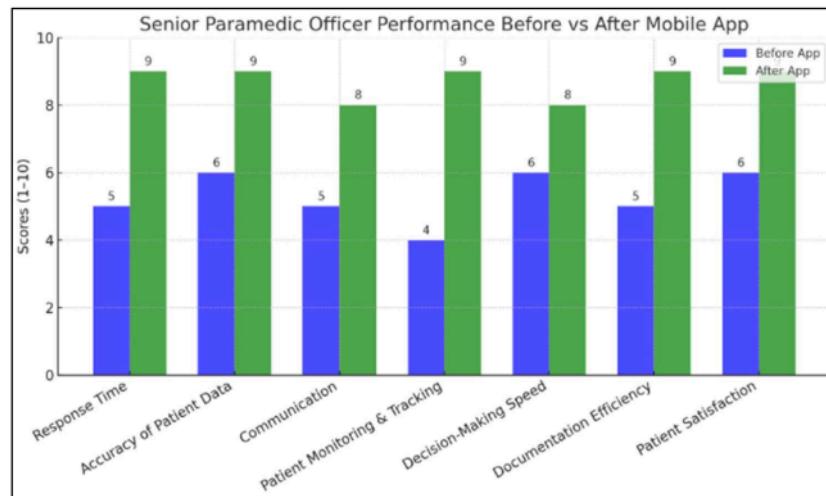
Highly determined and committed towards offering prompt, accurate care for patients.

### Backstory:

Martin has played a key role in the past 7 years at Waikato District Hospital. He worked in both rural and urban areas. In past years, he also identified key issues in the system and their impact to the hospital and also on the patients. Some of the issues are in complete detail of patients' and mainly communication issues. Martin has a passion for patient well-being, and he is also looking for solutions to sort out the issues in emergency services.

#### **Primary activities:**

- Registration to the application, Login and Logout from the application.
- Login and push notifications.
- Language settings.
- Two-factor authentication.
- Secure messaging within the other departments in the hospital.
- Role-based access.
- Offline support in limited connect zones.



*Figure 7 Senior Paramedic Officer Performance chart (from ChatGPT)*

## 5. Conclusion

During Sprint 2, the project team has explicitly outlined the main issue that is faced by the Waikato District Health Board, and that has been further highlighted by the recent cyberattack that interfered with the delivery of the necessary services. The review identified that the organization's reliance on old systems and poor accessibility of mobile devices was the cause of inefficiencies, delays in its operations, as well as increased security risk. They decided to prevent those difficulties by developing a mobile and wireless strategy. This plan also combines safe entry to Electronic Health Records (EHRs), enables instant communications, and embraces higher levels of cybersecurity by using FHIR API and encrypted messaging facilities.

Under this sprint, we proceeded to synthesize these findings with efforts on eliciting user needs through hypothetical interviews, and call interview with the users, and the development of user personas. There have been four main categories of users formed: doctors and nurses, administrative, paramedics, and pharmacists, as well as the IT/security personnel. Their opinions highlighted the utmost significance of on-demand connectivity, secure transmission links, and system stability to improve healthcare service provision. The resultant personas have served as a complex insight into the workflow, problems, and expectations of the users, hence validating the nature of the specified problem as related to the needs of the users.

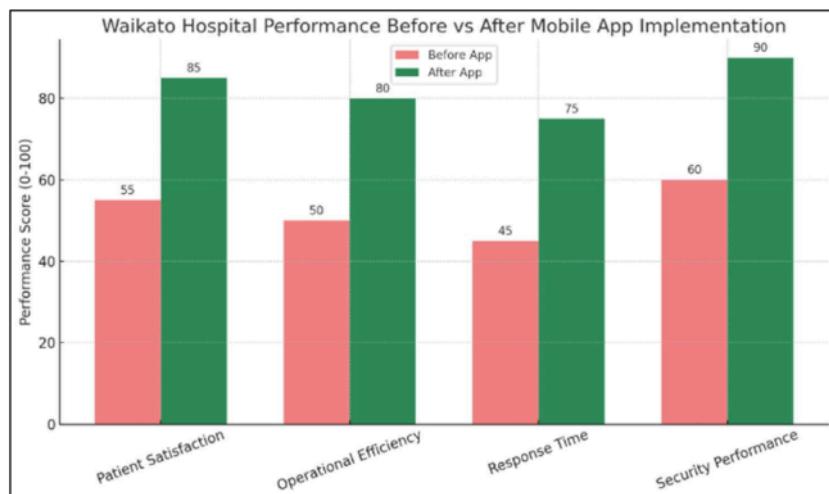
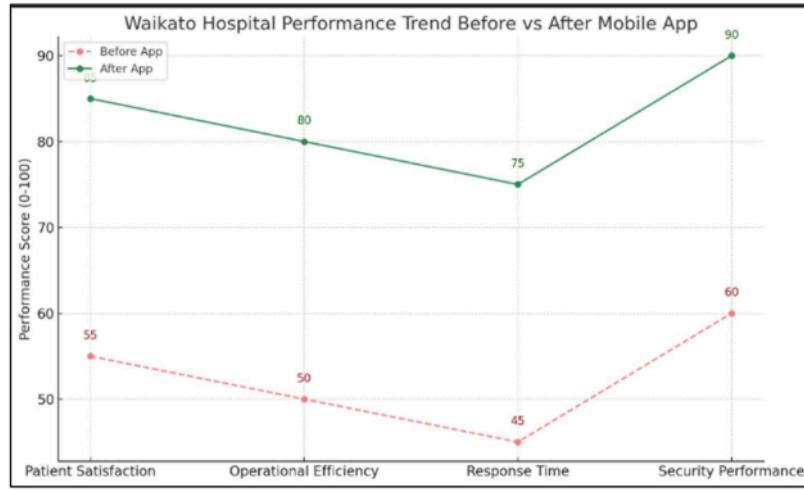
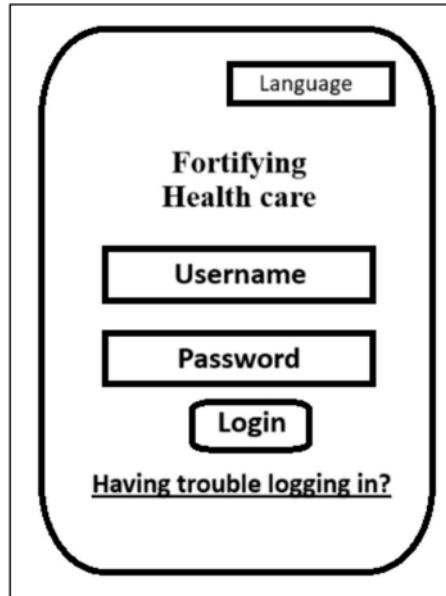


Figure 8 Waikato hospital performance chart (from ChatGPT)



*Figure 9 Line chart (from ChatGPT)*

In coming sprint, the project will shift gears towards prototyping of the user stories, use cases, and low-fidelity wireframes. This will not only give it a systematic platform to consider the functionality and usability of the solution that is being proposed in the future.



*Figure 10 Login screen wireframe (references from ChatGPT)*

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