



HeartGuard: Predictive Cardiac Care

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Integración de Aplicaciones Computacionales

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November 22 2025

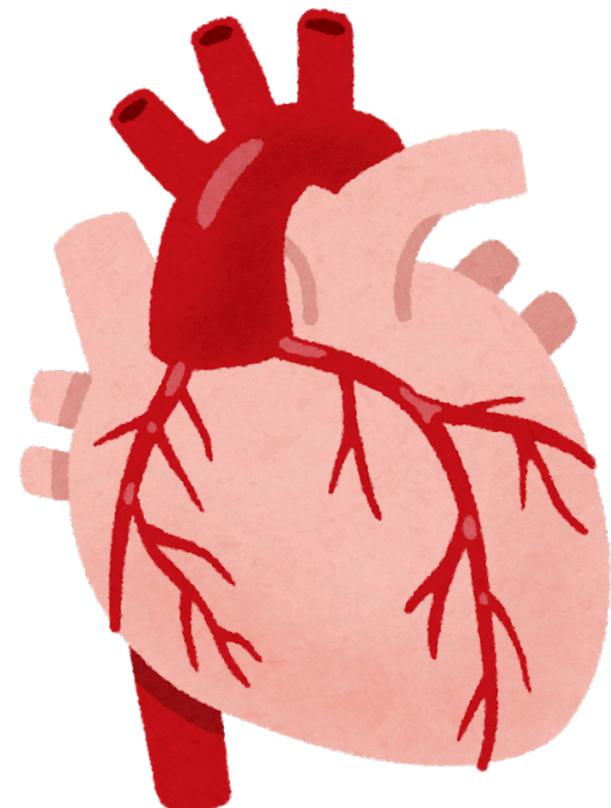


Context and Problem

Cardiovascular disease is the leading cause of death in Mexico (INEGI, 2021).



- 226,000 cardiovascular deaths annually—one every 2 minutes (INEGI, 2021)
- Intermittent monitoring fails to capture continuous vital sign changes before emergencies escalate
- 13.6-minute average response resulted in 0% survival in documented cardiac arrests (Morales-Cané et al., 2015)

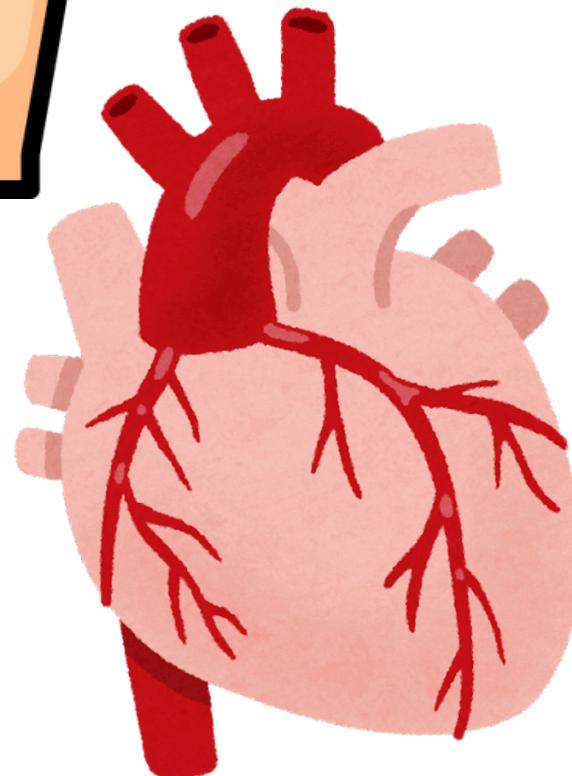




Objective

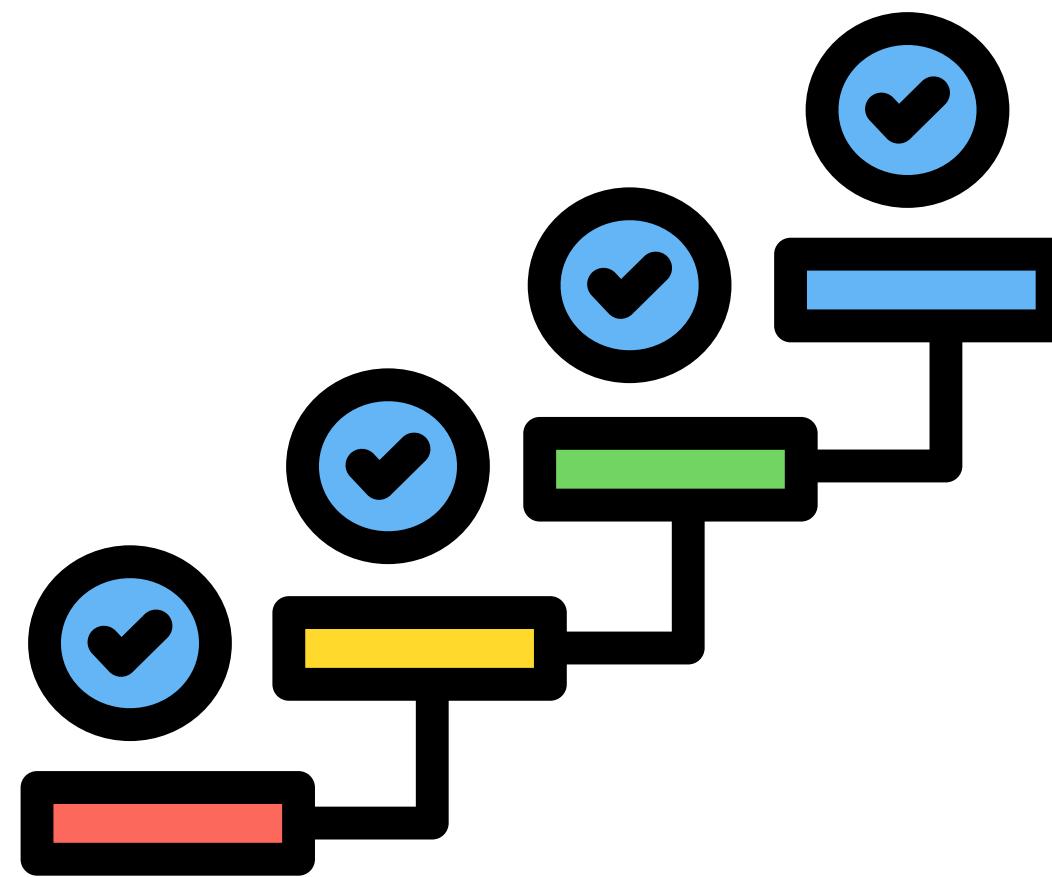
Automate and centralize cardiovascular emergency monitoring to enable faster, data-driven medical responses.

- Reduce response time to critical alerts from minutes to seconds.
- Minimize human errors in data entry and patient monitoring.
- Provide real-time, reliable health data for doctors and administrators.
- Improve patient outcomes through early risk detection.



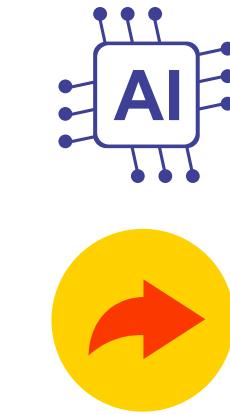


SOLUTION



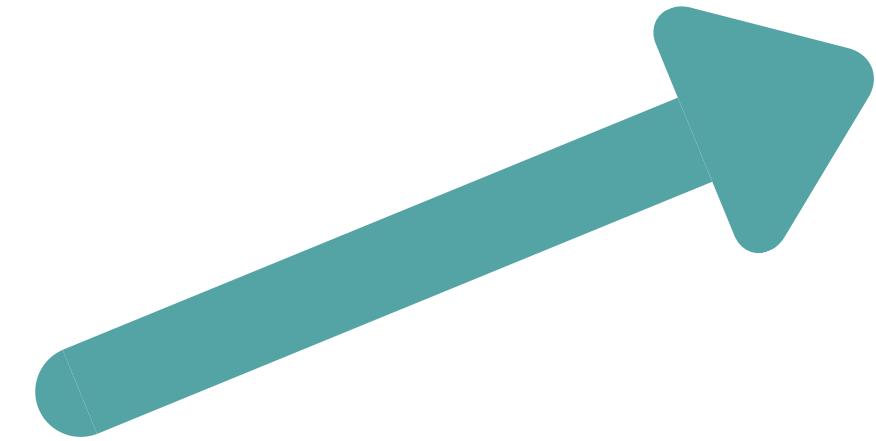


How it works



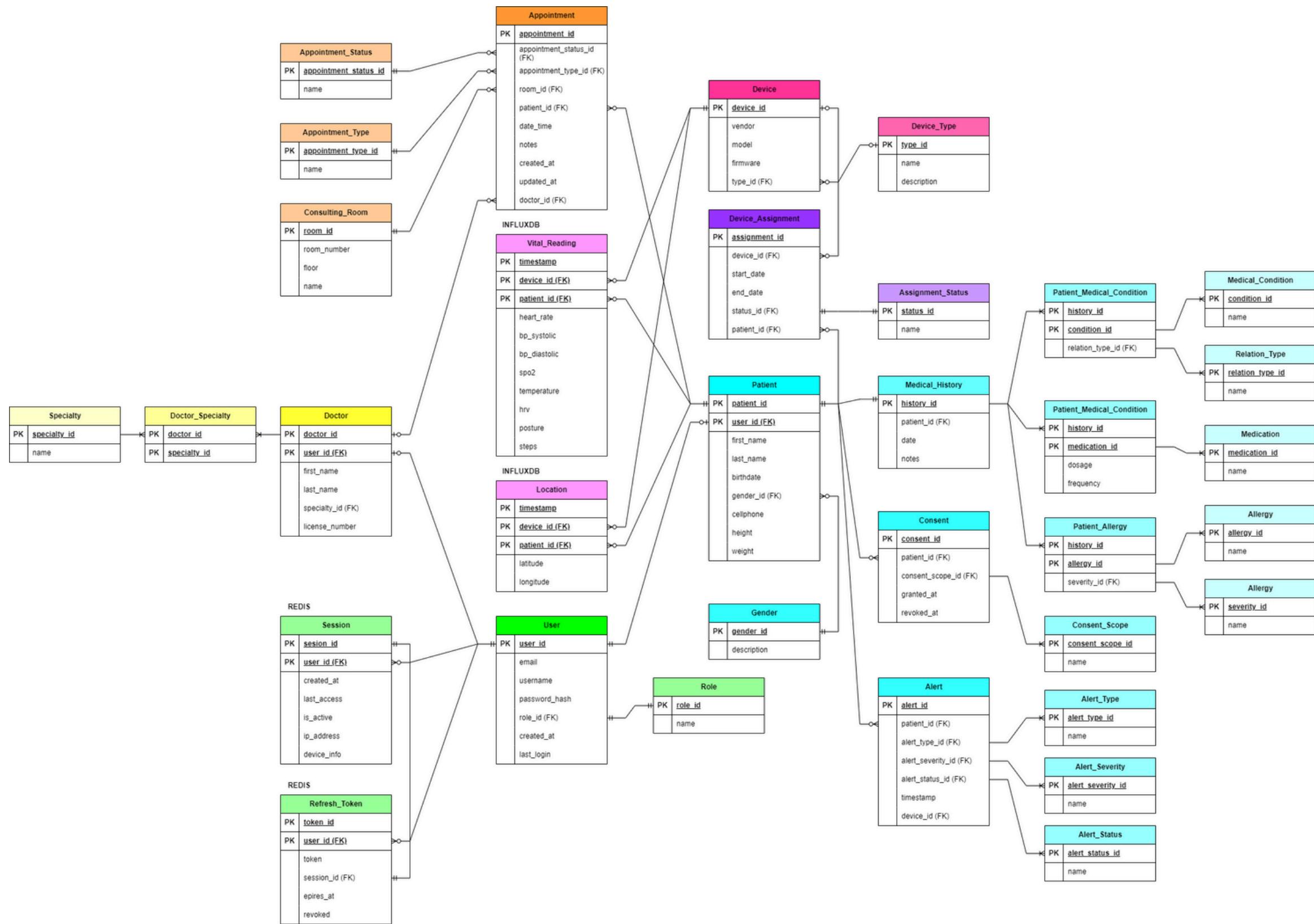


Structure



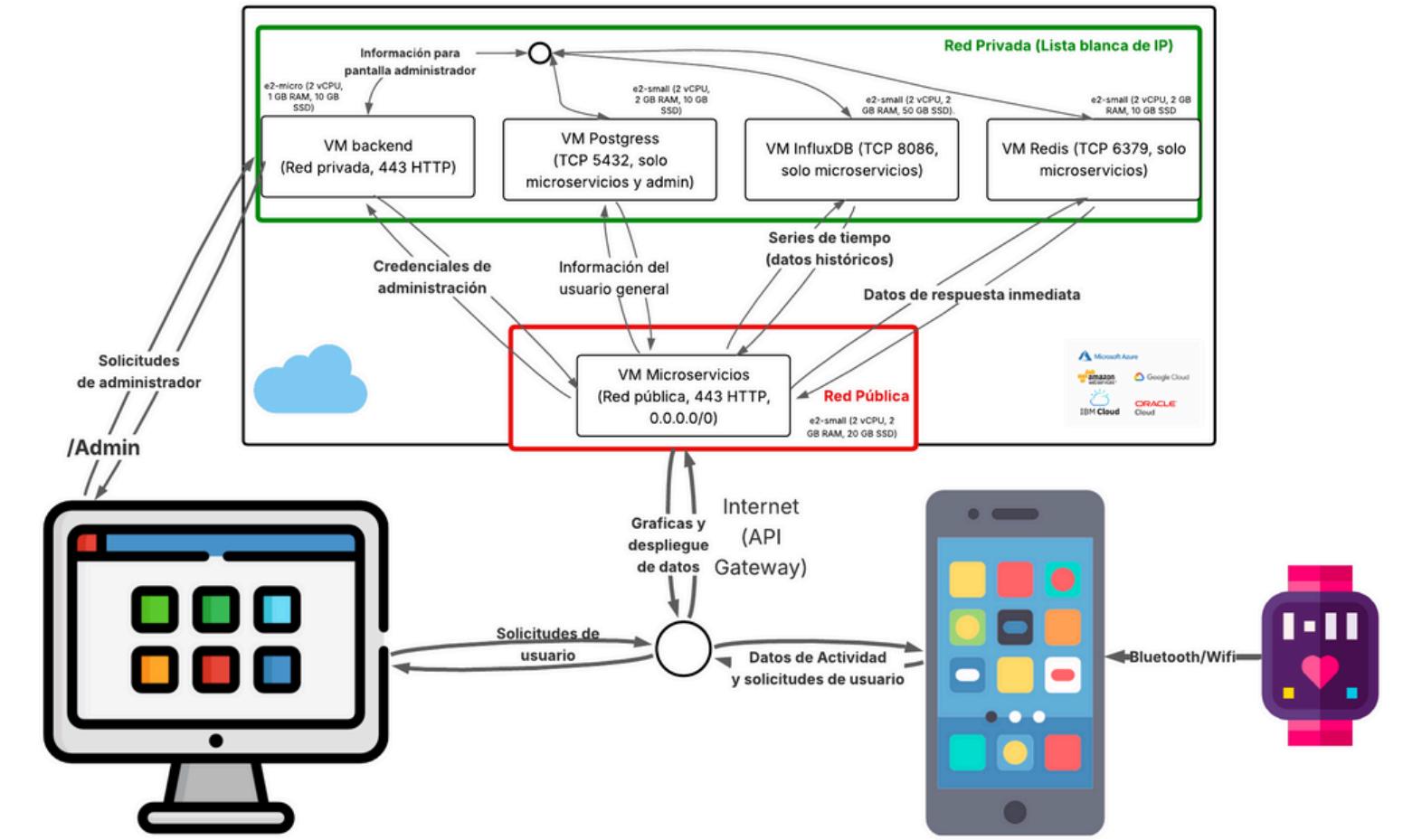
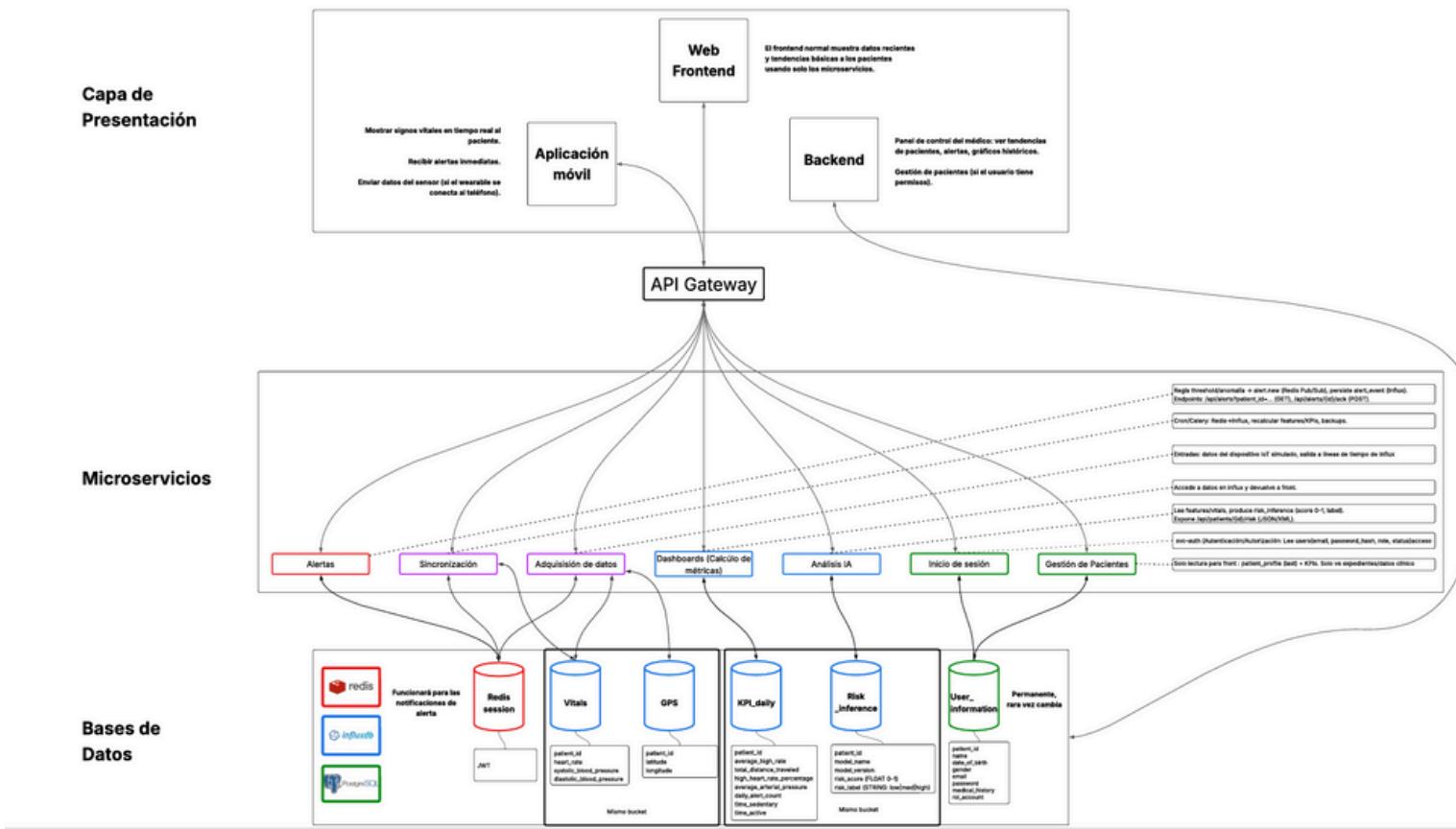


ER Diagram





Arquitecturas



SW

HW



Monitored Vital Signs

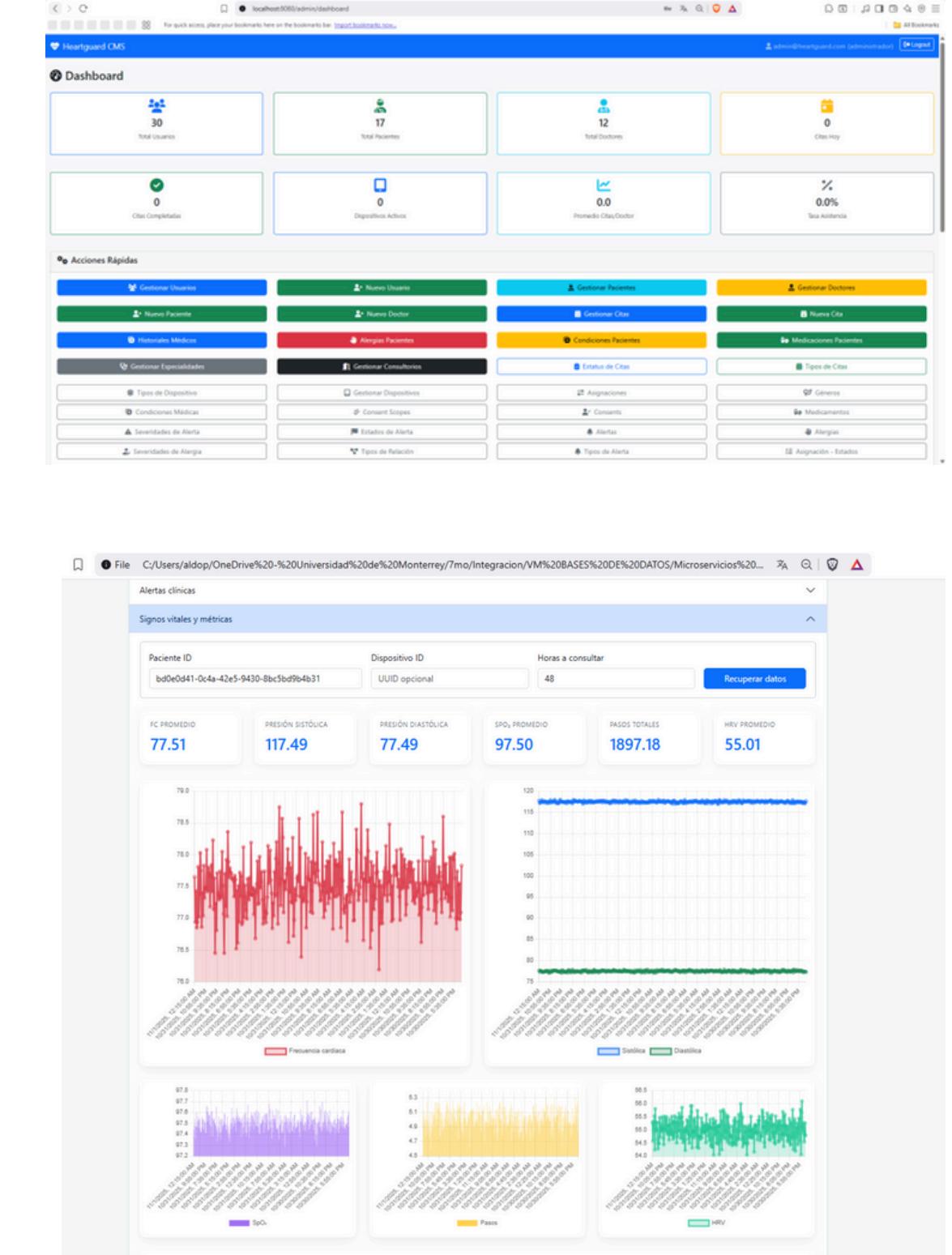
Heart Rate: Can spot irregular rhythms or early signs of a heart attack.

Blood Pressure: Warns if pressure gets dangerously high or low.

SpO₂ (Oxygen): Shows if the heart or lungs aren't working well.

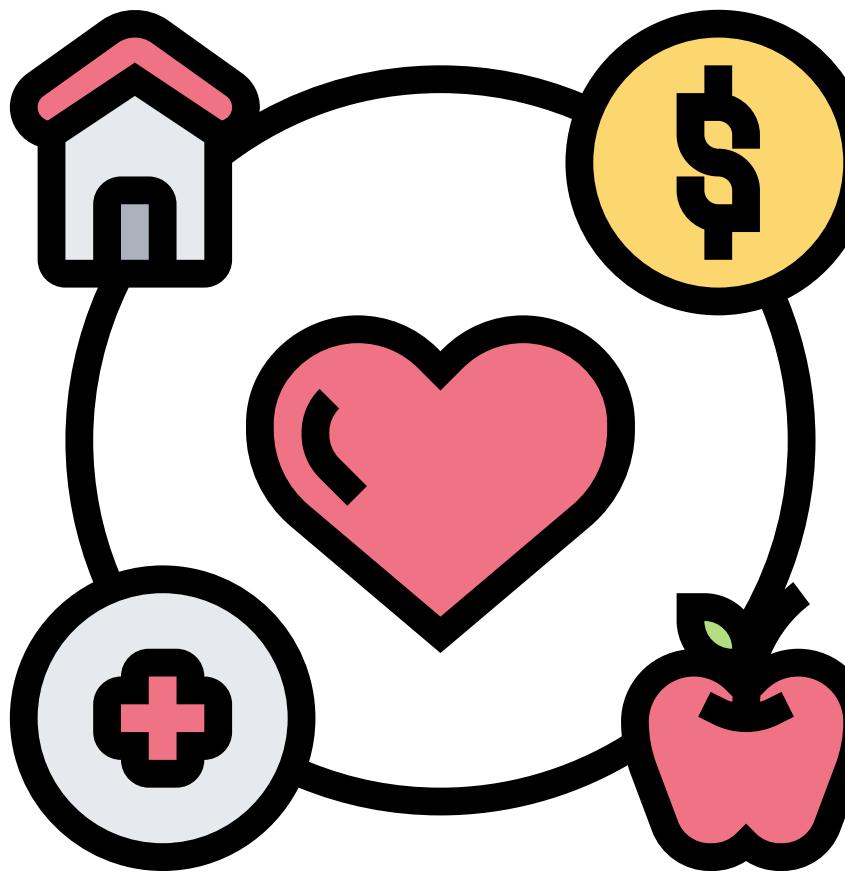
Posture: Detects sudden falls that might happen from fainting.

Steps: Fewer steps can mean the person's health or strength is declining.





Benefits

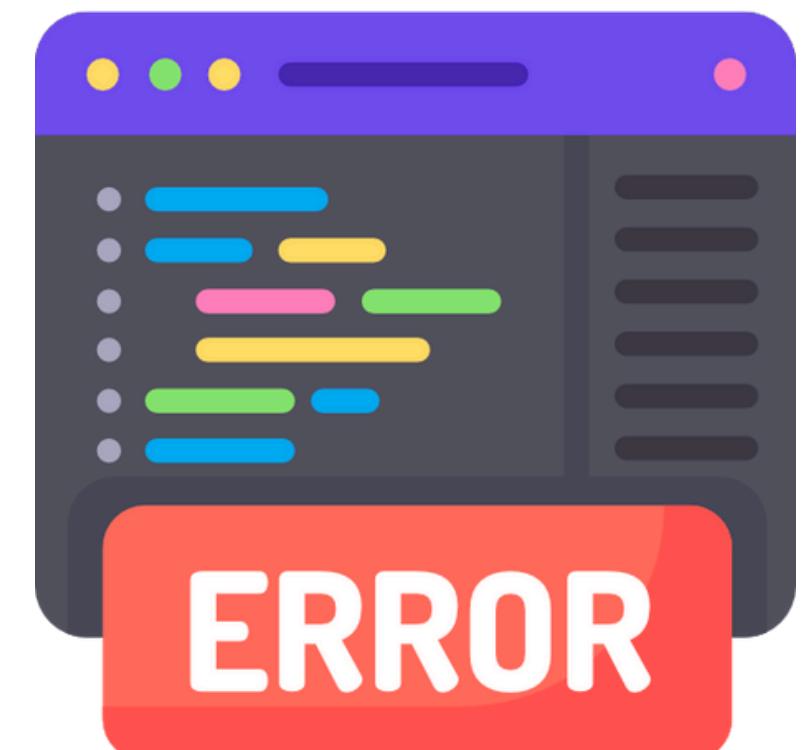
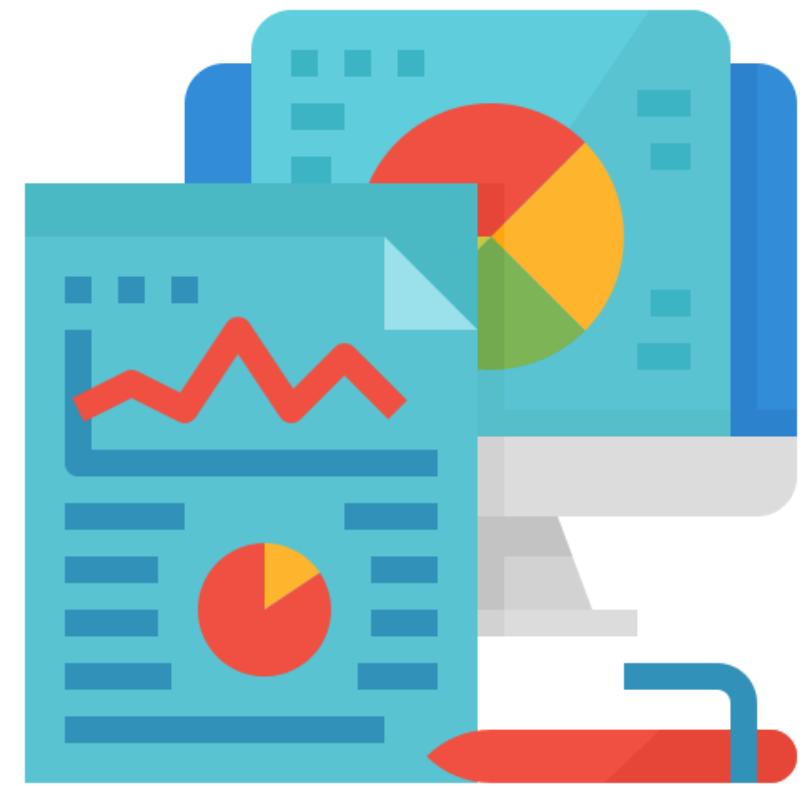




Quantitative

Response Time Reduction:

- From 13.6 minutes average to <30 seconds for critical alerts
- 49+ minutes saved per patient per day in monitoring time (PMC study, 2023)



Error Reduction:

- 100% elimination of manual data entry errors
- 80-95% fewer false alarms with AI pattern analysis (Implicity European Heart Journal study; VirtuSense VSTOne, 2024)



Quantitative

Survival Impact:

- Response <5 minutes increases cardiac arrest survival from 0% to 40-50% (American Heart Association, 2020)
- Early detection reduces cardiovascular emergency hospitalizations by 30-40% (Koehler et al., 2018)
- 23% reduction in hospital readmissions for heart failure patients (Geisinger Health Plan study, 2012)



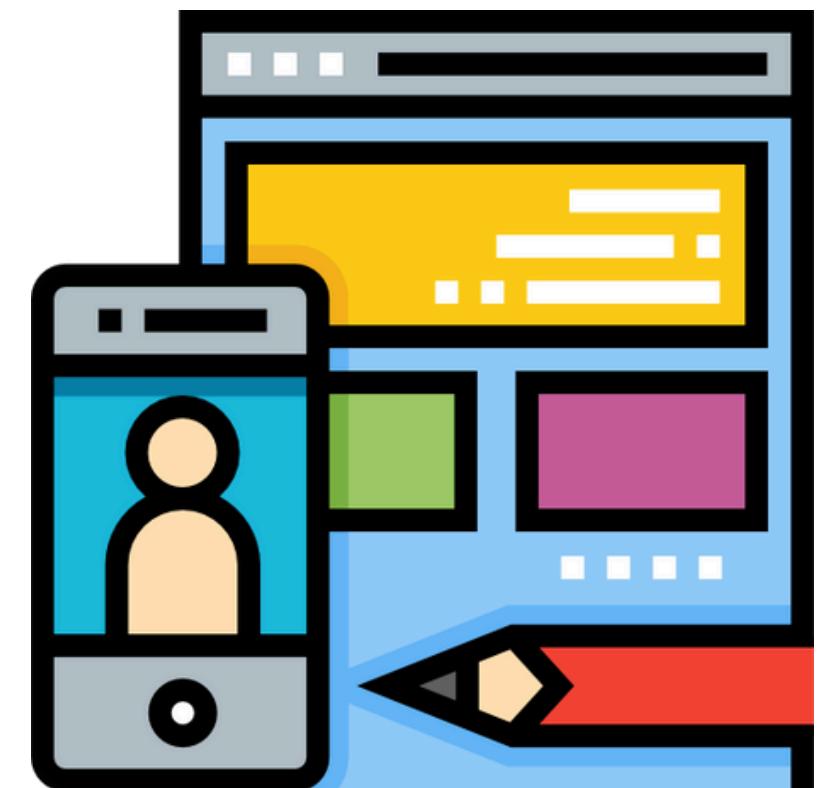


Qualitative

✓ Better Patient Experience: Continuous monitoring provides peace of mind, reduces unnecessary hospital visits



✓ Data-Driven Decisions: Complete historical data enables more accurate diagnoses and evidence-based treatment adjustments



✓ Less Manual Dependency: System works 24/7 without additional staff, scales without proportional hiring



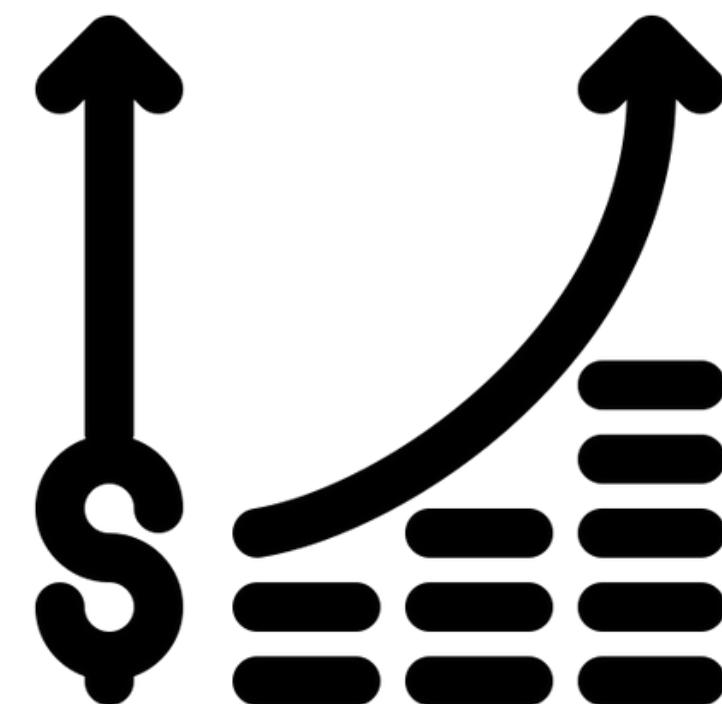
ROI

Investment: \$150,000 - \$200,000 USD

Annual Returns: \$280,000 - \$350,000 USD



- Avoided hospitalizations: \$200k/year (20-30 events @ \$10k each, based on Brockton Hospital achieving zero readmissions and \$27k+ per patient savings)
- Monitoring staff savings: \$50k/year
- Increased capacity: \$80k/year (based on 5x patient capacity increase)
- Reduced malpractice risk: \$50k/year





ROI

Payback Period: 6-8 months

- Studies show 90% of healthcare executives report positive ROI from RPM programs (Sage Growth Partners, 2024), with programs typically breaking even at 2-3 months.





Scope

In Scope (Core Functionality):

- Remote Patient Monitoring (RPM) Platform.
- Centralized Doctor/Admin Dashboard.
- Real-time vital sign tracking (HR, BP, SpO2, Posture, Steps).
- AI-powered predictive alerts for cardiovascular events.



Out of Scope (Current Limits):

- Not an automated diagnostic tool (it provides data to doctors).
- Not a hardware/wearable manufacturer (it integrates existing tech).
- Not an emergency dispatch service (it generates the alert).





Scope

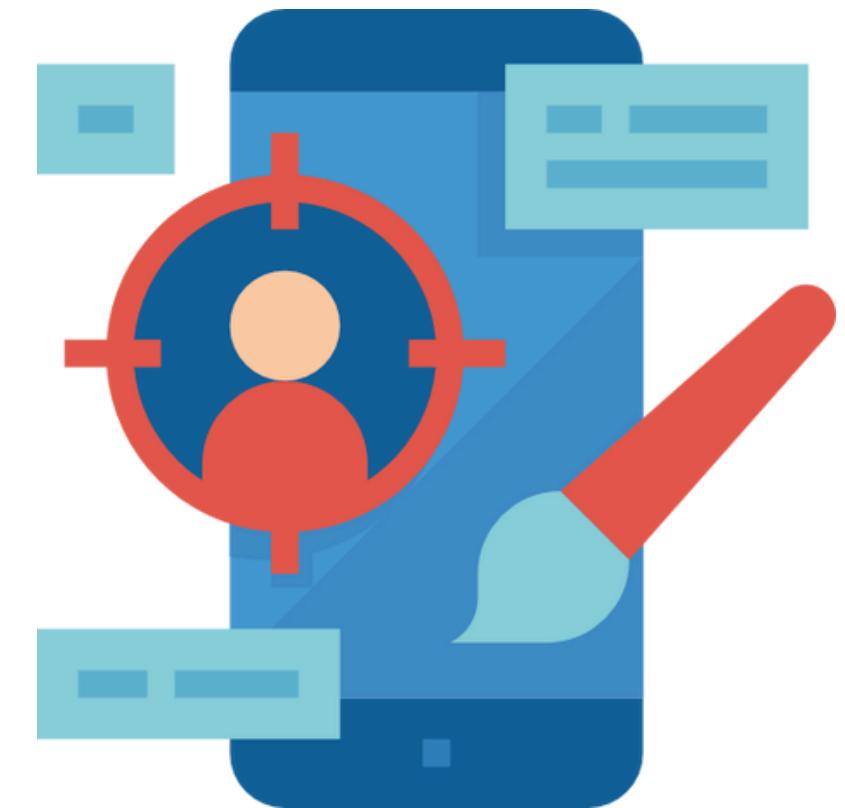
Stakeholders:

- Development: Academic Project (Computational Application Integration).
- Target Users: Physicians, Hospital Administrators, and Patients.



Next Steps:

- Complete prototype validation (Live Demo).
- Present as Final Evaluation Project (PEF) for the course.
- Explore clinical validation or post-graduate development.





Roadmap

Phase 1: Analysis & Design (Aug - Sep)

- Defined problem, objectives, and architecture.

Phase 2: MVP Development (Sep - Oct)

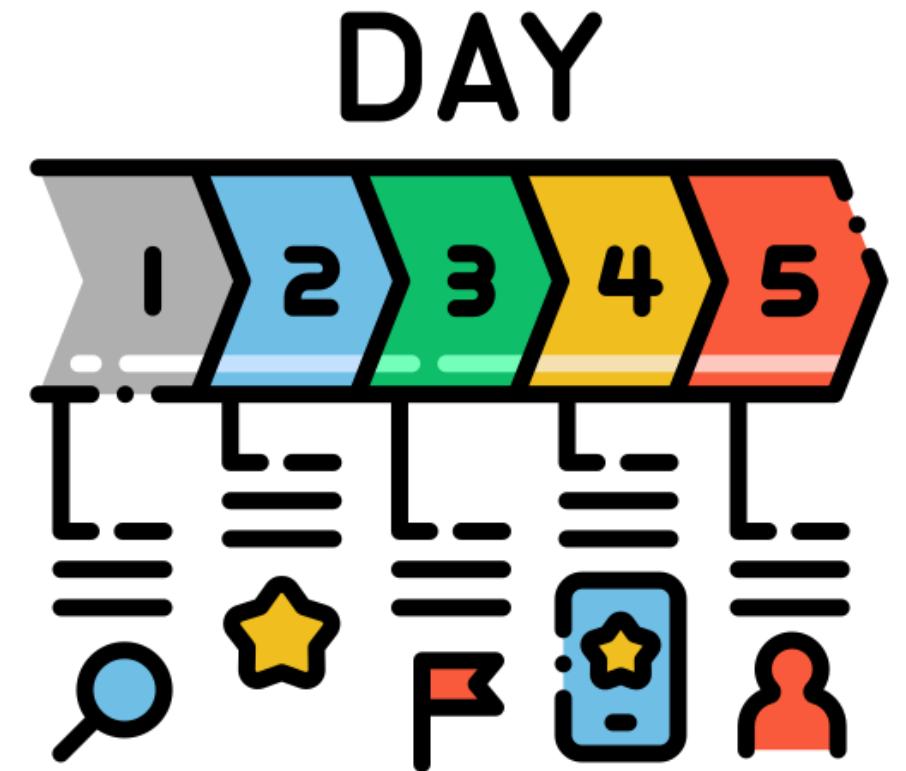
- Built Dashboard, APIs, and data integration.

Phase 3: Testing & Demo Prep (Oct - Nov)

- Conducted internal testing and prepared the live demo.

Phase 4: Final Presentation (Nov 13, 2025)

- Live demo and final delivery.





Resources & Budget

Team (Projected Roles):

- Project Lead / Management
- Full-Stack Developers
- Data Scientists (for AI model)
- QA & Testing

Budget (Projected Commercial Investment):

- Total Investment: \$150,000 - \$200,000 USD
- Covers: Infrastructure (Cloud), R&D / Development, API Licenses.

Implementation Model:

- Current: Internal Academic Development.
- Future: Internal development to operate as a SaaS (Software as a Service) platform.





Risks & Mitigation

- Risk: Low User Adoption
 - Mitigation: Focus on usability and demonstrating clear value.
- Risk: Data Integration Failure
 - Mitigation: Standardize APIs and prioritize key devices first.
- Risk: AI Inaccuracy (False Alarms)
 - Mitigation: Continuous model training and validation.
- Risk: Data Privacy Breach
 - Mitigation: Implement robust encryption and access controls.





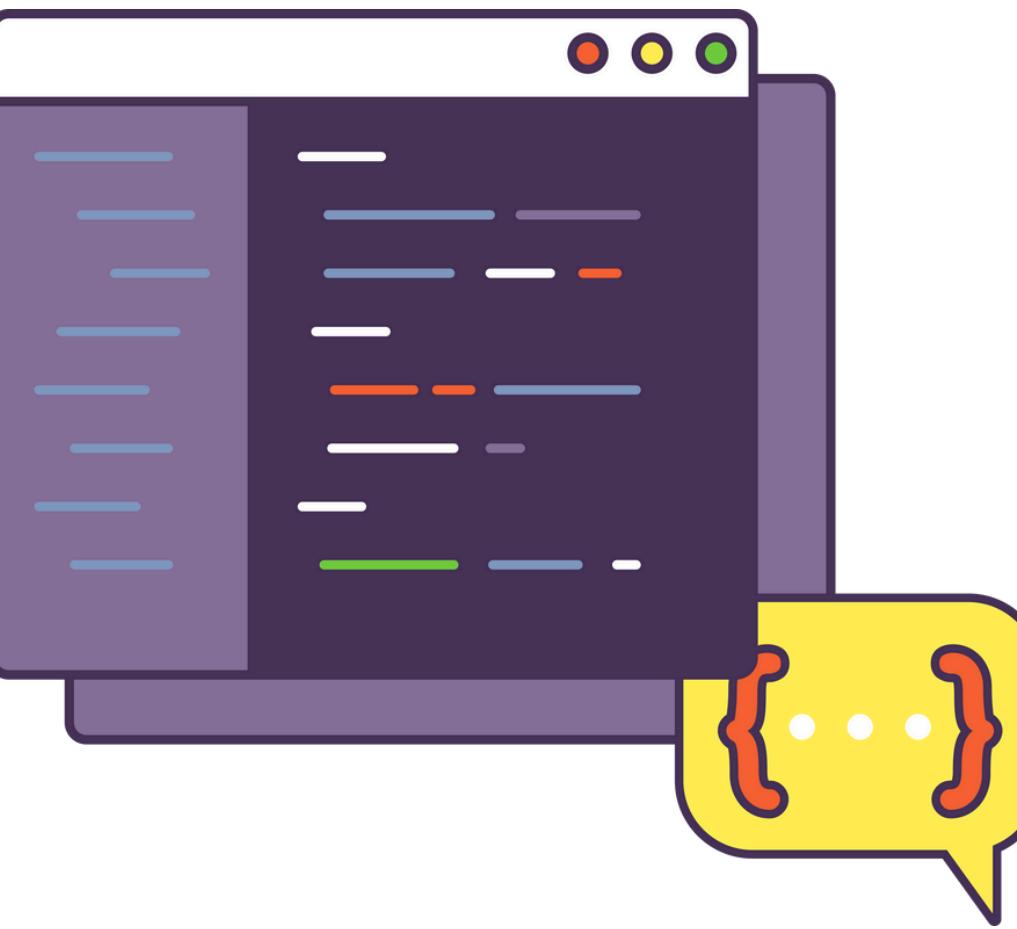
Next steps

- Required Approvals (Audience):
 - Approval of the Final Evaluation Project.
 - Validation of the prototype and live demo.
- What is Needed from the Audience:
 - Feedback on the project's technical and clinical viability.
 - Define the project's potential for future development (post-graduate or incubation).





Interfaces





CMS

A screenshot of a web browser showing the login page for the Heartguard CMS. The URL in the address bar is `localhost:8080/login`. The page has a blue background with a central orange login form. The form features a heart icon at the top, followed by the text "Heartguard CMS" and "Sistema de Gestión Cardiovascular". It contains two input fields: one for "Email" with placeholder text "tu@email.com" and another for "Contraseña" with placeholder text "*****". Below the inputs is a red button labeled "Iniciar Sesión" with a right-pointing arrow icon.

localhost:8080/login

Heartguard CMS
Sistema de Gestión Cardiovascular

Email
tu@email.com

Contraseña

Iniciar Sesión



Screenshot of the Heartguard CMS Admin Dashboard at localhost:8080/admin/dashboard.

The dashboard displays the following key statistics:

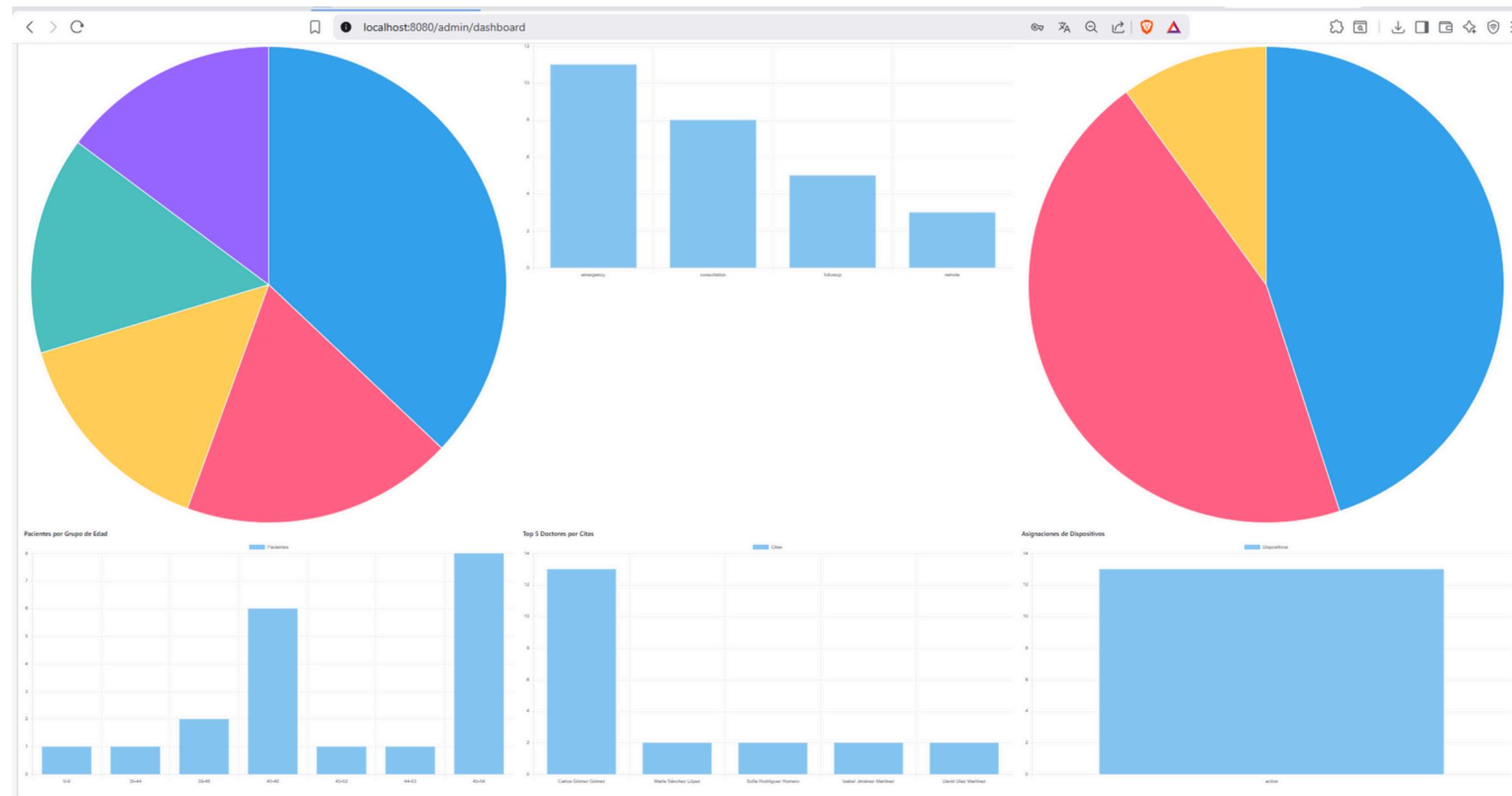
Metric	Value
Total Usuarios	33
Total Pacientes	20
Total Doctores	13
Citas Hoy	0
Citas Completadas	0
Dispositivos Activos	0
Promedio Citas/Doctor	0.0
Tasa Asistencia	0.0%

The "Acciones Rápidas" (Quick Actions) section provides links to various management functions:

Category	Action
User Management	Gestionar Usuarios
	Nuevo Usuario
	Gestionar Pacientes
	Gestionar Doctores
Patient Management	Nuevo Paciente
	Nuevo Doctor
	Gestionar Citas
	Nueva Cita
Medical Record Management	Historiales Médicos
	Alergias Pacientes
	Condiciones Pacientes
	Medicaciones Pacientes
Specialty and Clinic Management	Gestionar Especialidades
	Gestionar Consultorios
	Estatus de Citas
	Tipos de Citas
Device and Alert Management	Tipos de Dispositivo
	Gestionar Dispositivos
	Asignaciones
	Géneros
Medication and Condition Management	Condiciones Médicas
	Consent Scopes
	Consents
	Medicamentos
Alert and Alert Status Management	Severidades de Alerta
	Estados de Alerta
	Alertas
	Alergias



CMS





CMS

localhost:8080/admin/appointments

Heartguard CMS Hola, admin@heartguard.com Cerrar Sesión

Gestión de Citas

+ Nueva Cita

Paciente	Doctor	Fecha/Hora	Estado	Tipo	Sala	Acciones
Miguel Martínez López	Carlos Gómez Gómez	18/02/2026 11:00	cancelled	consultation	Consultorio 310	
Miguel Romero Martínez	Carlos Gómez Gómez	31/12/2025 22:01	confirmed	consultation	Consultorio 310	
Miguel Romero Martínez	Carlos Gómez Gómez	18/12/2025 15:01	cancelled	consultation	Consultorio 310	
Miguel Romero Martínez	Carlos Gómez Gómez	21/11/2025 15:00	cancelled	consultation	Consultorio 310	
Miguel Martínez López	Carlos Gómez Gómez	21/11/2025 11:00	cancelled	consultation	Consultorio 310	
Miguel Romero Martínez	Carlos Gómez Gómez	21/11/2025 08:32	confirmed	consultation	Consultorio 310	
David Ruiz Romero	Carlos Gómez Gómez	10/11/2025 09:00	no_show	emergency.	Consultorio 205	
Sofía Moreno Hernández	Carlos Gómez Gómez	08/11/2025 09:42	scheduled	consultation	Área de Telemedicina	
Fernando Moreno Pérez	Sofía Rodríguez Romero	08/11/2025 08:30	no_show	followup	N/A	
Mónica González Ruiz	María Sánchez López	04/11/2025 14:42	completed	emergency.	Sala de Urgencias 1	
David Ruiz Romero	Javier Ruiz Rodríguez	01/11/2025 15:42	cancelled	emergency.	Área de Telemedicina	
Miguel Martínez López	María Sánchez López	01/11/2025 08:42	cancelled	emergency.	Área de Telemedicina	
Miguel Martínez López	Juan Martínez Ruiz	29/10/2025 14:42	completed	followup	Consultorio 205	
David Ruiz Romero	Carlos Gómez Gómez	28/10/2025 15:42	no_show	emergency.	Consultorio 205	
Mónica González Ruiz	Carmen Jiménez Rodríguez	27/10/2025 14:42	scheduled	emergency.	N/A	
David Ruiz Romero	Isabel Jiménez Martínez	26/10/2025 14:42	confirmed	remote	Consultorio 311	
Sofía Moreno Hernández	Carlos Gómez Gómez	24/10/2025 12:42	no_show	emergency.	Consultorio 311	
Sofía Moreno Hernández	Luis Romero Hernández	23/10/2025 12:42	no_show	emergency.	Consultorio 310	
Miguel Romero Martínez	Isabel Jiménez Martínez	23/10/2025 12:42	cancelled	remote	N/A	
Patricia Moreno Martínez	Sofía Rodríguez Romero	23/10/2025 10:42	completed	emergency.	N/A	
Mónica Fernández Díaz	David Díaz Martínez	21/10/2025 09:42	scheduled	followup	Consultorio 205	
Sofía Moreno Hernández	Laura Hernández Díaz	20/10/2025 08:42	cancelled	emergency.	N/A	



CMS

Nueva Cita

Paciente	Doctor
Seleccionar paciente	Seleccionar doctor
Fecha y Hora	Duración (minutos)
mm/dd/yyyy -::-- --	30
Estado	Tipo de Cita
Seleccionar estado	Seleccionar tipo
Sala de Consulta	
Seleccionar sala (opcional)	
Notas	
Notas adicionales sobre la cita...	
<button>Cancelar</button> <button>Crear Cita</button>	



DOCTOR

The screenshot shows a web browser window displaying the "HeartGuard · Vista Doctor" login interface. The title bar indicates the file path: C:/Users/aldop/OneDrive%20-%20Universidad%20de%20Monterrey/7mo/Proyecto%20Final%20Integracion/FrontEndXML%20Doctor/frontEndD... . The main content area is titled "HeartGuard · Vista Doctor" and describes it as a "Panel clínico integral para seguimiento de pacientes, citas, alertas y métricas." A blue header bar labeled "Acceso seguro" contains fields for "Usuario o correo" and "Contraseña". A large blue button labeled "Iniciar sesión" is centered below the input fields. In the top right corner of the header, there is a small "Doctores" tab. The bottom right corner of the page features a "Show hidden icons" link.

HeartGuard · Vista Doctor

Panel clínico integral para seguimiento de pacientes, citas, alertas y métricas.

Acceso seguro

Usuario o correo

Contraseña

Iniciar sesión

Doctores

Show hidden icons



DOCTOR

File C:/Users/aldop/OneDrive%20-%20Universidad%20de%20Monterrey/7mo/Proyecto%20Final%20Integracion/FrontEndXML%20Doctor/frontEndD... A | 🔍

HeartGuard · Vista Doctor
Panel clínico integral para seguimiento de pacientes, citas, alertas y métricas.

Sesión iniciada correctamente. X

Doctor Sesión iniciada 11/22/2025, 4:49:30 PM Cerrar sesión

Pacientes Citas

BUSCAR PACIENTES

Nombre, apellido o ID del paciente Buscar Borrar selección Agendar con este paciente

Escribe una letra o parte del nombre, apellido o ID para ver coincidencias en tiempo real.

Nuevo paciente

Registrar paciente
Captura los datos básicos para agenda y monitoreo.

IDENTIDAD Y ACCESO

Nombre(s) * Apellidos *
Juan Pérez

Correo * Contraseña *
correo@ejemplo.com Temporal

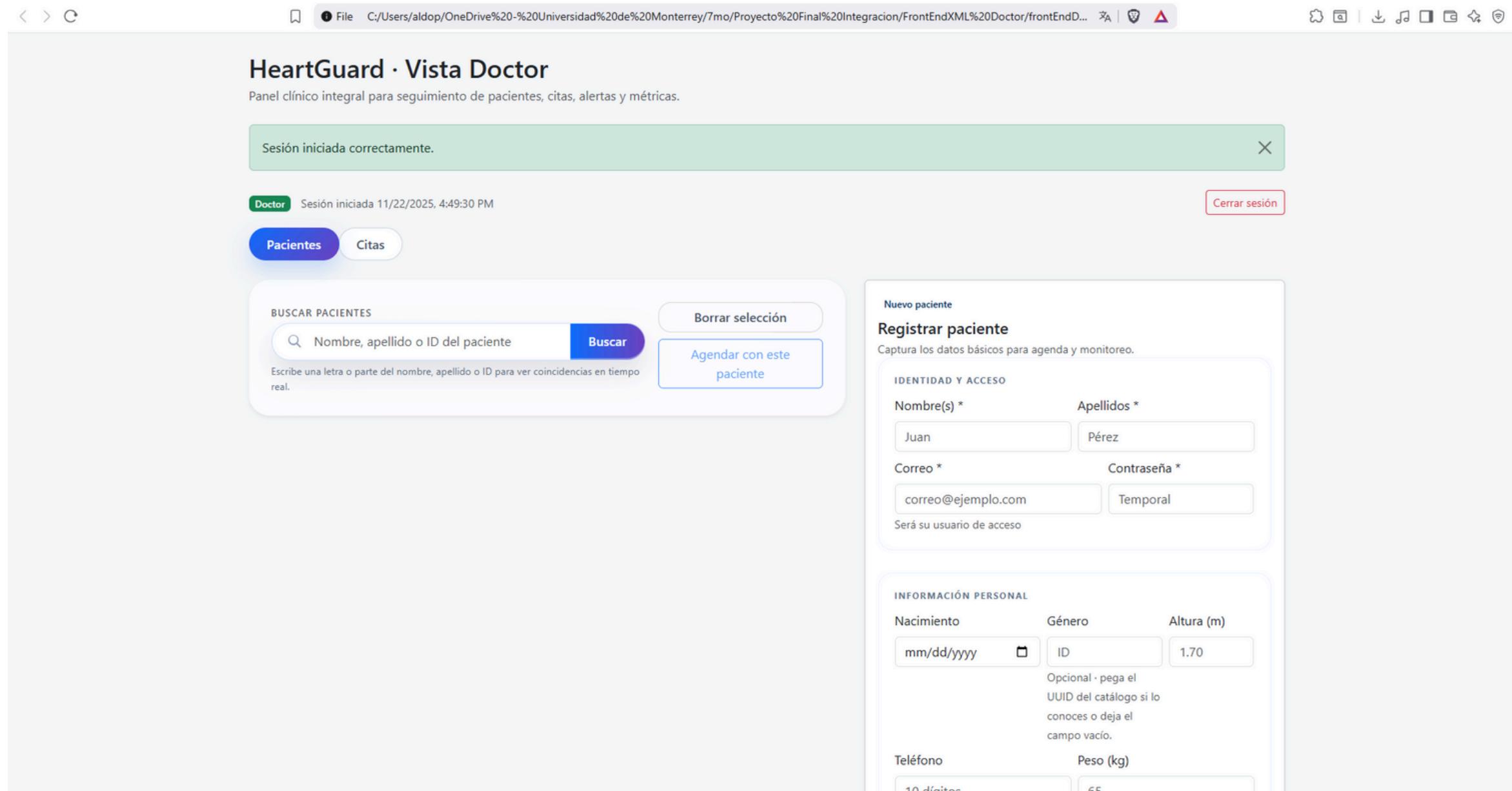
Será su usuario de acceso

INFORMACIÓN PERSONAL

Nacimiento Género Altura (m)
mm/dd/yyyy ID 1.70

Opcional - pega el
UUID del catálogo si lo
conoces o deja el
campo vacío.

Teléfono Peso (kg)
10 dígitos 65





DOCTOR

Miguel Romero Martínez

Última actualización: 10/10/2025
Tel. 555-0209
miguel.romero9@example.com

45 años · ID: c72bcc17
Sin indicadores críticos

EDAD: 45 años

IMC: 24.38 (Rango saludable)

PESO: 81.66 kg

ALTURA: 1.83 m

Histórico médico
Últimas notas y antecedentes clínicos

HISTÓRICO MÉDICO

Última nota
10/10/2025, 6:00:00 PM
Actualización automática cada consulta

CONDICIONES: 1

MEDICAMENTOS: 1

ALERGIAS: 1

RESUMEN CLÍNICO:
Historial médico inicial del paciente.

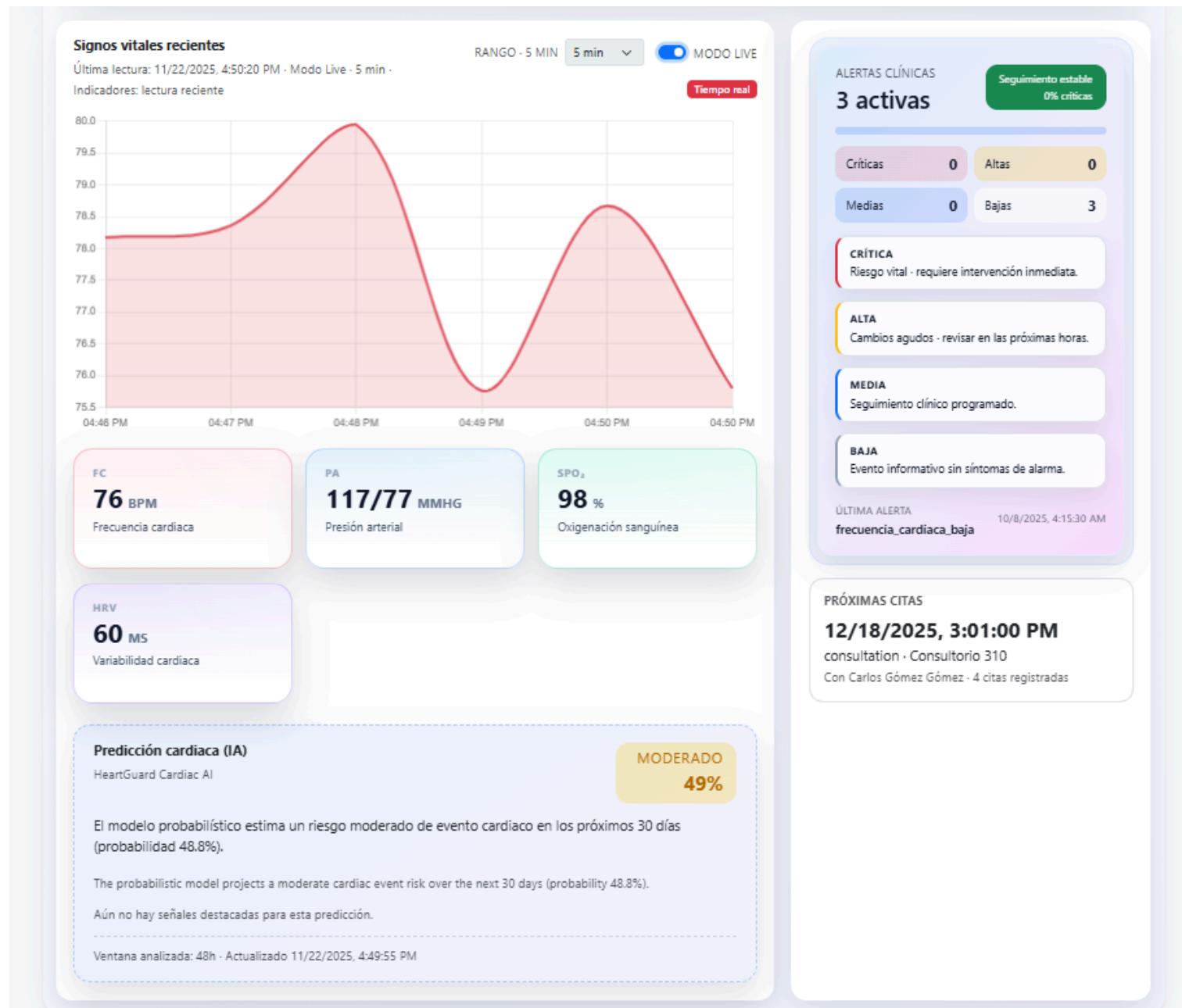
CONDICIONES: coronary_disease - personal

MEDICAMENTOS: metformina (10mg, Cada 12 horas)

ALERGIAS: cacahuate - leve



DOCTOR





DOCTOR

HeartGuard · Vista Doctor

Panel clínico integral para seguimiento de pacientes, citas, alertas y métricas.

Doctor Sesión iniciada 11/22/2025, 4:49:30 PM

Pacientes Citas

Consultar citas
Filtrar por paciente o rango de fechas sin usar el UUID.
AGENDA ACTIVA **LOOKUP INTELIGENTE**

Paciente (usuario/correo)
Ej. juan.perez o correo
Desde mm/dd/yyyy Hasta mm/dd/yyyy

Buscar

VISTA GENERAL SIN FILTROS ACTIVOS.
USA LOS FILTROS O LOS ACCESOS RÁPIDOS PARA COMENZAR.

PRÓXIMA CITA Sin resultados Aplica filtros para ver detalle
CONFIRMADAS 0 En el rango consultado
TELEMEDICINA 0% 0 citas del total

Sin resultados todavía.
Sin información cargada.

Agendar nueva cita
Busca al paciente por usuario/correo, elige horario y listo.
Cambiar paciente (Miguel Romero Martínez) Hoy +30 min Ajustes

PASO 1 Paciente Conéctate con la persona correcta
Busca por usuario, correo o nombre.
miguel.romero9@example.com Buscar Limpiar
Paciente seleccionado: Miguel Romero Martínez - c72bcc17

Cerrar sesión

Agenda personal
Últimos 14 días - Actualizado 11/22/2025, 4:49:30 PM

VENTANA 14 días Actualizar

TOTAL (14 DÍAS) 5 **CITAS HOY 0**

PACIENTES ÚNICOS 4
11/8/2025 → 11/22/2025
Vista histórica - mostrando las citas más recientes disponibles.

No se encontraron futuras dentro de este rango.

Últimos 14 días
11/8/2025 → 11/22/2025
HISTÓRICO RECIENTE

HOY: 0 **ÚLTIMOS 7 DÍAS: 3**

11/21/2025 FRIDAY
3 cita(s)
Miguel Romero Martínez 08:32 AM confirmed
Miguel Martínez López 11:00 AM cancelled
Miguel Romero Martínez 03:00 PM cancelled

11/10/2025 MONDAY
1 cita(s)
David Ruiz Romero 09:00 AM no_show

11/8/2025 SATURDAY
1 cita(s)
Sofía Moreno Hernández 09:42 AM scheduled

12/18/2025, 3:01:00 PM Miguel Romero Martínez 2 En el rango consultado 0% 0 de 4 citas

MIÉRCOLES 31 dic 2025 - 10:01 PM Confirmed Consultation
PACIENTE Miguel Romero Martínez ID -c72bcc17
CONSULTORIO Consultorio 310 DURACIÓN 30 min DOCTOR Carlos Gómez Gómez
ID -9410fd24 En 39 d Ver detalle

JUEVES 18 dic 2025 - 03:01 PM Cancelled Consultation
PACIENTE Miguel Romero Martínez ID -c72bcc17
CONSULTORIO Consultorio 310 DURACIÓN 30 min DOCTOR Carlos Gómez Gómez
ID -f95b3f7a En 26 d Ver detalle

VIERNES 21 nov 2025 - 03:00 PM Cancelled Consultation
PACIENTE Miguel Romero Martínez ID -c72bcc17
CONSULTORIO Consultorio 310 DURACIÓN 30 min DOCTOR Carlos Gómez Gómez
ID -f653fc9 Hace 1 d Ver detalle

VIERNES 21 nov 2025 - 08:32 AM Confirmed Consultation
PACIENTE Miguel Romero Martínez ID -c72bcc17

11/21/2025 - 11/22/2025
Vista histórica - mostrando las citas más recientes disponibles.

No se encontraron futuras dentro de este rango.

ÚLTIMOS 14 DÍAS
11/8/2025 → 11/22/2025
HISTÓRICO RECIENTE

HOY: 0 **ÚLTIMOS 7 DÍAS: 3**

11/21/2025 FRIDAY
3 cita(s)
Miguel Romero Martínez 08:32 AM confirmed
Miguel Martínez López 11:00 AM cancelled
Miguel Romero Martínez 03:00 PM cancelled

11/10/2025 MONDAY
1 cita(s)
David Ruiz Romero 09:00 AM no_show

11/8/2025 SATURDAY
1 cita(s)
Sofía Moreno Hernández 09:42 AM scheduled



DOCTOR

VIERNES
21 de noviembre de 2025
08:32 AM - 30 min
Hace 1 d

PACIENTE Miguel Romero Martínez
Sin contacto registrado

CONFIRMED
CONSULTATION
ID -e67ef23a

Imprimir resumen Notificar paciente
Copiar ID

DOCTOR
Carlos Gómez Gómez
Sin contacto registrado

CONSULTORIO
Consultorio 310
Ubicación asignada

DURACIÓN
30 min
confirmed

RESUMEN Detalle de la cita

Appointment56aad7e5-4715-ID
4b23-9cc7-fdff67ef23a
Fecha y hora exacta 21 de noviembre de 2025 - 08:32 AM
Duración 30 min
Notas Sin notas registradas.

PARTICIPANTES Participantes y sala

Doctor Carlos Gómez Gómez
Paciente Miguel Romero Martínez
Consultorio Consultorio 310
Estado confirmed
Tipo consultation

NOTAS Sin notas registradas.

NOTAS CLÍNICAS

LÍNEA DE TIEMPO Estatus de la cita

Creada Registro inicial en HeartGuard
11/21/2025, 8:32:15 AM

Estado: confirmed Actualizado - Hace 1 d
11/21/2025, 8:32:00 AM

Consulta programada Consultorio 310 - 30 min



PATIENT

The screenshot shows a Java development environment with the following details:

- IDE:** Eclipse IDE (JavaSE-21 LTS)
- Project:** HeartGuardApp
- Code Editor:** AlertsController.java (selected tab)
- Code Preview:** A modal window titled "HeartGuard – Paciente" displays a simple UI with fields for "Nombre" and "Contraseña" and a "Iniciar sesión" button.
- Terminal:** Shows Maven build logs for "javafx:0.0.8:run" and "compiler:3.11.0:compile".
- File Explorer:** Shows the project structure under "HEARTGUARDAPP" including ".github", ".vscode", "src", "heartguard", and "model" packages.
- Status Bar:** Shows the date and time as 22/11/2025 and 05:59 p.m.

The screenshot shows the same Java development environment as the first one, but with the following changes:

- User Input:** The "Nombre" field in the "HeartGuard – Paciente" modal now contains "miguel.romero9@exmaple.com".
- Code Preview:** The "Contraseña" field is partially filled with three dots ("...").
- Terminal:** The Maven build logs remain the same.
- File Explorer:** The project structure is identical to the first screenshot.
- Status Bar:** Shows the date and time as 22/11/2025 and 06:00 p.m.



PATIENT

HeartGuard – Panel del Paciente

HeartGuard – Panel del Paciente Paciente conectado: miguel.romero9@example.com Cerrar sesión

Menú

- Calendar icon Citas
- Medical history icon Historial médico
- Graph icon Monitoreo Gráficas
- Heart and KPI icon Monitoreo KPIs
- Bell icon Alertas
- Device icon Dispositivos y consentimiento

Bienvenido a HeartGuard

Selecciona una opción del menú para ver tus datos.



24° Cloud icon Windows Start button Search icon File Explorer icon Microsoft Edge icon OneDrive icon Outlook icon Teams icon PowerShell icon Calculator icon Google Chrome icon Firefox icon Gears icon File icon OneNote icon Skype icon Task View icon Volume icon Network icon Power icon Display icon Help & Support icon Language icon Signal strength icon Battery icon 06:00 p. m. 22/11/2025



PATIENT

HeartGuard – Panel del Paciente

HeartGuard – Panel del Paciente Paciente conectado: miguel.romero9@example.com

Cerrar sesión

Menú

- Citas
- Histórico médico
- Monitoreo Gráficas
- Monitoreo KPIs
- Alertas
- Dispositivos y consentimiento

Historial de Citas

Actualizar

Fecha	Doctor	Estado	Tipo	Consultorio
2026-01-01T04:01:00+00:00	Carlos Gómez Gómez	confirmed	consultation	Consultorio 310
2025-12-18T21:01:00+00:00	Carlos Gómez Gómez	cancelled	consultation	Consultorio 310
2025-11-21T21:00:00+00:00	Carlos Gómez Gómez	cancelled	consultation	Consultorio 310
2025-11-21T14:32:00+00:00	Carlos Gómez Gómez	confirmed	consultation	Consultorio 310
2025-10-23T18:42:55.271028+00:00	Isabel Jiménez Martínez	cancelled	remote	null

HeartGuard – Panel del Paciente

HeartGuard – Panel del Paciente Paciente conectado: miguel.romero9@example.com

Cerrar sesión

Menú

- Citas
- Histórico médico
- Monitoreo Gráficas
- Monitoreo KPIs
- Alertas
- Dispositivos y consentimiento

Historial de Citas

Actualizar

Fecha
2026-01-01T04:01:00+00:00
2025-12-18T21:01:00+00:00
2025-11-21T21:00:00+00:00
2025-11-21T14:32:00+00:00
2025-10-23T18:42:55.271028+00:00

Detalles de la cita

Fecha: 2025-12-18T21:01:00+00:00

Doctor: Carlos Gómez Gómez

Tipo: consultation

Estado: cancelled

Consultorio: Consultorio 310

Ubicación: Frente a recepción

Notas: Seguimiento clínico · Generado automáticamente.

Cerrar

HeartGuard – Panel del Paciente

HeartGuard – Panel del Paciente Paciente conectado: miguel.romero9@example.com

Cerrar sesión

Menú

- Citas
- Histórico médico
- Monitoreo Gráficas
- Monitoreo KPIs
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- Dispositivos y consentimiento

Historial de Citas

Actualizar

Fecha
2026-01-01T04:01:00+00:00
2025-12-18T21:01:00+00:00
2025-11-21T21:00:00+00:00
2025-11-21T14:32:00+00:00
2025-10-23T18:42:55.271028+00:00

Detalles de la cita

Fecha: 2025-12-18T21:01:00+00:00

Doctor: Carlos Gómez Gómez

Tipo: consultation

Estado: cancelled

Consultorio: Consultorio 310

Ubicación: Frente a recepción

Notas: Seguimiento clínico · Generado automáticamente.

Cerrar



PATIENT

The screenshot shows the HeartGuard - Panel del Paciente application window. The title bar at the top left displays the logo and the title "HeartGuard – Panel del Paciente". On the right side of the title bar are standard window control buttons (minimize, maximize, close). Below the title bar, the header "HeartGuard – Panel del Paciente" is followed by the text "Paciente conectado: miguel.romero9@example.com" and a red "Cerrar sesión" (Logout) button. The main content area features a sidebar on the left titled "Menú" containing links to "Citas", "Historial médico", "Monitoreo Gráficas", "Monitoreo KPIs", "Alertas", and "Dispositivos y consentimiento". The central part of the screen displays the title "Historial médico de Miguel Romero Martínez". Below this title is a table with two columns: "Fecha" and "Notas". The table contains one row with the date "2025-10-11" and the note "Historial médico inicial del paciente.". To the right of the table, there is a section titled "Detalles del historial seleccionado:" which includes fields for "Fecha:", "Notas:", "Condiciones:", "Medicamentos:", and "Alergias:". The bottom of the screen shows a taskbar with various icons for system functions and applications, and the system tray on the far right shows the date and time as "06:01 p. m. 22/11/2025".



PATIENT

HeartGuard – Panel del Paciente

HeartGuard – Panel del Paciente

Paciente conectado: miguel.romero9@example.com

Cerrar sesión

Menú

- Citas
- Historial médico
- Monitoreo Gráficas
- Monitoreo KPIs
- Alertas
- Dispositivos y consentimiento

Historial médico de Miguel Romero Martínez

Fecha	Notas
2025-10-11	Historial médico inicial del paciente.

Detalles del historial seleccionado:

Fecha: 2025-10-11

Notas: Historial médico inicial del paciente.

Condiciones:

- coronary_disease (personal)

Medicamentos:

- metformina | Dosis: 10mg | Frecuencia: Cada 12 horas

Alergias:

- cacahuate (Severidad: leve)

24°

Windows Start button

Search icon

File Explorer icon

Microsoft Edge icon

Outlook icon

OneDrive icon

PowerPoint icon

Excel icon

OneNote icon

File icon

Gears icon

Task View icon

Calculator icon

File History icon

System tray icons: battery, signal, volume, etc.

ESP LAA

06:02 p. m.

22/11/2025



PATIENT

The screenshot shows the HeartGuard - Panel del Paciente application. The top navigation bar includes the title "HeartGuard – Panel del Paciente", the connected patient information "Paciente conectado: miguel.romero9@example.com", and a "Cerrar sesión" (Logout) button. On the left, a sidebar menu lists "Citas", "Historial médico", "Monitoreo Gráficas" (selected), and "Monitoreo KPIs", "Alertas", and "Dispositivos y consentimiento". The main content area is titled "Gráficas de Signos Vitales" and displays six line graphs: Heart Rate (bpm), SpO₂ (%), Temperature (°C), Steps (sdqs), BP Systolic (mmHg), and HRV (ms). Each graph tracks data over time from 00:00 to 23:15. A blue button labeled "Actualizar gráficas (últimos 7 días)" (Update graphs (last 7 days)) is located above the graphs. The taskbar at the bottom shows various system icons and the date/time "06:04 p. m. 22/11/2025".



PATIENT

HeartGuard – Panel del Paciente

HeartGuard – Panel del Paciente

Paciente conectado: miguel.romero9@example.com

Cerrar sesión

Menú

- Citas
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Monitorización de Signos Vitales

KPIs basadas en tus dispositivos médicos

Avg Heart Rate (bpm)

78.39

Avg SpO₂ (%)

97.36

Avg Temp (°C)

--

Total Steps

1002.36

Avg BP Systolic

118.14

Avg HRV (ms)

54.53

24°

ESP LAA

06:04 p. m.

22/11/2025



PATIENT

The screenshot shows the HeartGuard - Panel del Paciente application interface. The top navigation bar includes the title "HeartGuard – Panel del Paciente", the connected patient information "Paciente conectado: miguel.romero9@example.com", and a "Cerrar sesión" (Logout) button. On the left, a vertical menu lists "Citas", "Historial médico", "Monitoreo Gráficas", "Monitoreo KPIs", "Alertas", and "Dispositivos y consentimiento". The main content area displays a table titled "Alertas de Miguel Romero Martínez" with columns for "Tipo", "Severidad", "Estado", and "Fecha". Three rows of alerts are listed: "frecuencia_cardiaca_baja" (informativa, nueva, 2025-10-08T10:15:30.929938+...), "dispositivo_desconectado" (advertencia, nueva, 2025-10-04T19:31:15.250242+...), and another "dispositivo_desconectado" (advertencia, nueva, 2025-10-06T02:42:04.480762+...). To the right of the table, sections for "Detalles de la alerta:" and "Descripción:" are visible. The bottom of the screen features a taskbar with various icons and system status indicators.

Tipo	Severidad	Estado	Fecha
frecuencia_cardiaca_baja	informativa	nueva	2025-10-08T10:15:30.929938+...
dispositivo_desconectado	advertencia	nueva	2025-10-04T19:31:15.250242+...
dispositivo_desconectado	advertencia	nueva	2025-10-06T02:42:04.480762+...



PATIENT

HeartGuard – Panel del Paciente

HeartGuard – Panel del Paciente

Paciente conectado: miguel.romero9@example.com

Cerrar sesión

Menú

- Citas
- Historial médico
- Monitoreo Gráficas
- Monitoreo KPIs
- Alertas
- Dispositivos y consentimiento

Alertas de Miguel Romero Martínez

Tipo	Severidad	Estado	Fecha
frecuencia_cardiaca_baja	informativa	nueva	2025-10-08T10:15:30.929938+...
dispositivo_desconectado	advertencia	nueva	2025-10-04T19:31:15.250242+...
dispositivo_desconectado	advertencia	nueva	2025-10-06T02:42:04.480762+...

Detalles de la alerta:

Tipo: frecuencia_cardiaca_baja
Severidad: informativa
Estado: nueva
Fecha: 2025-10-08T10:15:30.929938+00:00

Descripción:

Detalles: Valor registrado: 88.27. Requiere revisión.

24°

Windows Start button

Search icon

File icon

Microsoft Edge icon

Outlook icon

OneDrive icon

PowerShell icon

Google Chrome icon

Firefox icon

Settings icon

Task View icon

Calculator icon

File Explorer icon

Control Panel icon

System icon

Network icon

Power icon

Volume icon

Screen resolution icon

Language icon

06:05 p. m.

22/11/2025



PATIENT

The screenshot shows the HeartGuard - Panel del Paciente application running on a Windows operating system. The main window title is "HeartGuard – Panel del Paciente" and the subtitle indicates the patient is connected at "miguel.romero9@example.com". The top right corner features a red "Cerrar sesión" (Logout) button. The left sidebar contains a "Menú" section with several items: "Citas" (Calendar), "Historial médico" (Medical History), "Monitoreo Gráficas" (Monitoring Graphics), "Monitoreo KPIs" (Monitoring KPIs), "Alertas" (Alerts), and "Dispositivos y consentimiento" (Devices and Consent). A secondary, semi-transparent menu is open over the "Monitoreo KPIs" item, showing sub-options: "Citas" (Calendar), "Historial médico" (Medical History), "Monitoreo Gráficas" (Monitoring Graphics), "Monitoreo KPIs" (Monitoring KPIs), "Alertas" (Alerts), and "Dispositivos y consentimiento" (Devices and Consent). The central content area is titled "Mis Dispositivos y Permisos" (My Devices and Permissions) and displays a table titled "Dispositivos Asignados" (Assigned Devices). The table has columns for Vendor, Model, Firmware, Status, and Last Seen. One entry is listed: Healthron, CardioWatch Pro, None, active, and None. The bottom of the screen shows the Windows taskbar with various pinned icons and the date/time "06:05 p.m. 22/11/2025".



PATIENT

The screenshot shows the 'HeartGuard – Panel del Paciente' application window. The top navigation bar includes the title 'HeartGuard – Panel del Paciente', the connected patient information 'Paciente conectado: miguel.romero9@example.com', and a red 'Cerrar sesión' (Logout) button. On the left, a vertical menu lists 'Citas', 'Historial médico', 'Monitoreo Gráficas', 'Monitoreo KPIs', 'Alertas', and 'Dispositivos y consentimiento'. The main content area is titled 'Mis Dispositivos y Permisos' and displays a tabbed section for 'Device Assignments' (selected), showing a table of device assignments. The table has columns for Assignment ID, Device ID, Firmware, Start Date, End Date, and Status. One row is visible, showing an assignment ID starting with '3d1dc416-71ae-460e...', a device ID 'e6c95fc8-a90e-448e-9...', 'None' firmware, a start date of 'Sat, 11 Oct 2025 05:42:5...', 'vigente' status, and a status ID 'b947c8e7-9aec-4c...'. The bottom taskbar shows various system icons and the system tray.



PATIENT

HeartGuard – Panel del Paciente

HeartGuard – Panel del Paciente Paciente conectado: miguel.romero9@example.com Cerrar sesión

Menú

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- Dispositivos y consentimiento

Mis Dispositivos y Permisos

Devices Device Assignments Consents

Permisos de Privacidad

Activo	Scope	Descripción
<input checked="" type="checkbox"/>	vital_signs	Monitoreo de signos vitales (frecuencia cardíaca, pres...
<input checked="" type="checkbox"/>	geolocation	Acceso a ubicación geográfica del dispositivo
<input type="checkbox"/>	physical_activity	Seguimiento de actividad física y ejercicio
<input type="checkbox"/>	sleep_monitoring	Monitoreo de patrones de sueño
<input checked="" type="checkbox"/>	data_sharing	Compartir datos con profesionales de salud
<input checked="" type="checkbox"/>	notifications	Recibir notificaciones y alertas médicas

24°

Cloud icon

Windows Start button

Search icon

File icon

Microsoft Edge icon

Outlook icon

OneDrive icon

PowerShell icon

Google Chrome icon

Firefox icon

Gears icon

File Explorer icon

OneDrive icon

Dog icon

Mouse icon

Up arrow icon

Down arrow icon

ESP LAA

Wi-Fi icon

Speaker icon

Battery icon

06:06 p. m.

22/11/2025

References

- INEGI (2021) - Cardiovascular mortality statistics in Mexico
- Morales-Cané et al. (2015) - Response times in cardiac emergencies
- American Heart Association (2020) - CPR and Emergency Cardiovascular Care Guidelines
- Koehler et al. (2018) - Efficacy of telemedical interventional management in heart failure patients
- PMC (2023) - Impact of Remote Patient Monitoring Systems on Nursing Time
- Implicit/European Heart Journal - AI reduction of false positivity rate by 80% with 99% sensitivity
- VirtuSense (2024) - VSTOne 95% reduction in false alarms with 98% detection accuracy
- Geisinger Health Plan (2012) - 23% reduction in hospital readmissions for heart failure
- Business Wire (2024) - Brockton Hospital study showing \$27,000+ per patient cost savings
- Sage Growth Partners (2024) - Survey of 141 healthcare executives on RPM ROI

