

Sanitas Hospital at Home: IoT as a Cornerstone of a Liquid Hospital

HEALTHCARE

CONNECTED TRANSPORT

MANUFACTURING

ENERGY AND UTILITIES

BUILDINGS & INFRASTRUCTURE

OPEN INDUSTRY

ENABLING IoT



Sanitas

Head of Internal Medicine, Digital Medicine Unit
Hospital Sanitas CIMA
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Director of Technology and Business Transformation
@JVelazquezMoro

WHY CONNECTED HEALTH?



Sanitas

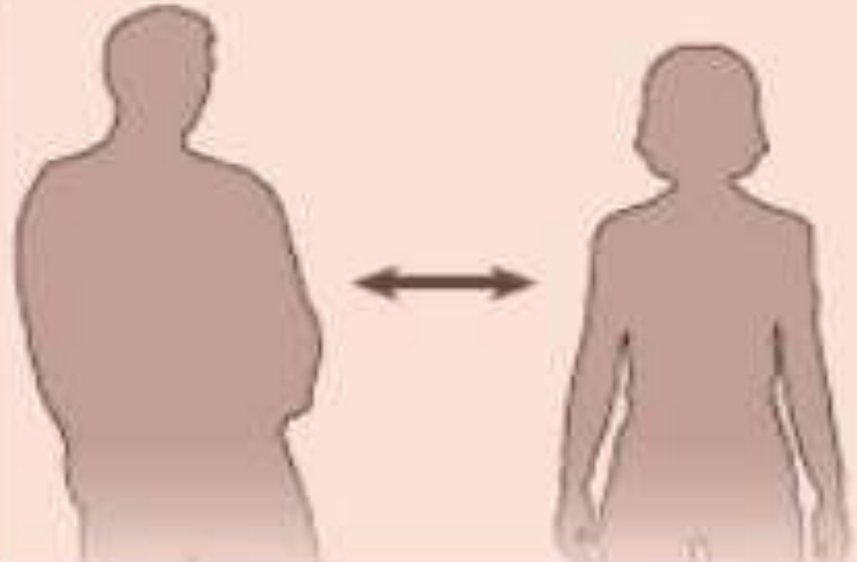

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Scientific evidence for connected health

SPECIAL REPORT

Telehealth

Reed V. Tuckson, M.D., Margo Edmunds, Ph.D., and Michael L. Hodgkins, M.D., M.P.H.
 N Engl J Med 2017; 377:1585-1592 | [October 19, 2017](#) | DOI: 10.1056/NEJMSr1503323

	TELEMEDICINE TOOLS	TELEMEDICINE SERVICES
Clinician to Patient 	Video Phone E-mail Remote wireless monitoring Internet	Care for chronic conditions Medication management Wound care Counseling Postdischarge follow-up Mental health
Patient to Mobile Health Technology 	Wearable monitors Smartphones Mobile apps Video E-mail Web portals Games	Health education Monitoring of physical activity Monitoring of diet Medication adherence Cognitive fitness

Circulation

Recommendations for the Implementation of Telehealth in Cardiovascular and Stroke Care: A Policy Statement From the American Heart Association

Lee H. Schwamm, Neale Chumbler, Ed Brown, Gregg C. Fonarow, David Berube, Karin Nystrom, Robert Suter, Mirian Zavala, Daniel Polsky, Kavita Radhakrishnan, Nathaniel Lacktman, Katherine Horton, Mary-Beth Malcarney, John Halamka, A. Colby Tiner
and On behalf of the American Heart Association Advocacy Coordinating Committee



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DOI <https://doi.org/10.1161/CIR.0000000000000475>
Circulation. 2017;135:e24-e44

- Reducing transportation costs. Rural or low-income populations may struggle with the significant transportation costs, time, and effort required to visit practitioners at
- Improving patient safety. Because telehealth can offer continuous monitoring and the transmission of real-time data between providers and patients, it improves patient safety.
- Enhancing patient engagement. Telehealth can provide an effective platform for patients to be involved in their own decision making.
- Improving medication adherence. Telehealth programs can reduce nonadherence to medication protocols, a common cause of preventable harm in CVD and stroke.²⁰



JACC

JOURNAL OF THE AMERICAN COLLEGE OF CARDIOLOGY

Journal of the American College of Cardiology

Volume 71, Issue 11 Supplement, March 2018

DOI: 10.1016/S0735-1097(18)31187-2

 [PDF Article](#)

CONTINUOUS WEARABLE MONITORING ANALYTICS PREDICT HEART FAILURE DECOMPENSATION: THE LINK-HF MULTI-CENTER STUDY

Josef Stehlik, Carsten Schmalfuss, Biykem Bozkurt, Jose Nativi-Nicolau, Stephan Wegerich, Kevin Rose, Ranjan Ray, Richard Schofield, Anita Deswal, Jadranka Sekaric, Sebastian Anand, Dylan Richards, Heather Hanson, Matthew Pipke and Michael Pham

Conclusion

Multivariate physiological telemetry from disposable wearable sensors provided accurate early detection of impending rehospitalization with a predictive accuracy comparable to implanted devices. The generalizability of this low-cost non-invasive approach to rehospitalization mitigation should be further tested.



JAMA Cardiology
Journals
Enter Search Term

More ▾

New Online
Views **1,589** | Citations **0** | Altmetric **652**

Original Investigation
 March 21, 2018

Passive Detection of Atrial Fibrillation Using a Commercially Available Smartwatch

Geoffrey H. Tison, MD, MPH¹; José M. Sanchez, MD¹; Brandon Ballinger, BS²; [et al](#)
 » Author Affiliations
 JAMA Cardiol. Published online March 21, 2018. doi:10.1001/jamacardio.2018.0136

JAMA*
Journals
Enter Search Term

More ▾

This Issue
Views **731** | Citations **0** | Altmetric **91**

Original Investigation
 July 10, 2018

Effect of a Home-Based Wearable Continuous ECG Monitoring Patch on Detection of Undiagnosed Atrial Fibrillation
 The mSToPS Randomized Clinical Trial

Steven R. Steinhubl, MD^{1,2}; Jill Waalen, MD, MPH¹; Alison M. Edwards, MStat³; [et al](#)
 » Author Affiliations
 JAMA. 2018;320(2):146-155. doi:10.1001/jama.2018.8102



Journal
Expert Review of Respiratory Medicine ›
 Volume 12, 2018 - Issue 4

Enter keywords, authors, DOI etc.

Original Research

Telemonitoring and home hospitalization in patients with chronic obstructive pulmonary disease: study TELEPOC

Manuel Mirón Rubio ✉, Rocío Ceballos Fernández, Inmaculada Parras Pastor, Amaya Palomo Iloro, Borja Manuel Fernández Félix, Jenifer Medina Miralles, ...show all

Results: The number of COPD exacerbations during the study period did not reduce but the number of hospital admissions decreased by 60% and the number of emergency room visits by 38%. On average, costs related to utilization of healthcare resources were reduced by €1,860.80 per patient per year.





EUROPEAN RESPIRATORY *journal*
FLAGSHIP SCIENTIFIC JOURNAL OF ERS

Making sense of telemedicine in the management of COPD

Jean Bourbeau, Raquel Farias

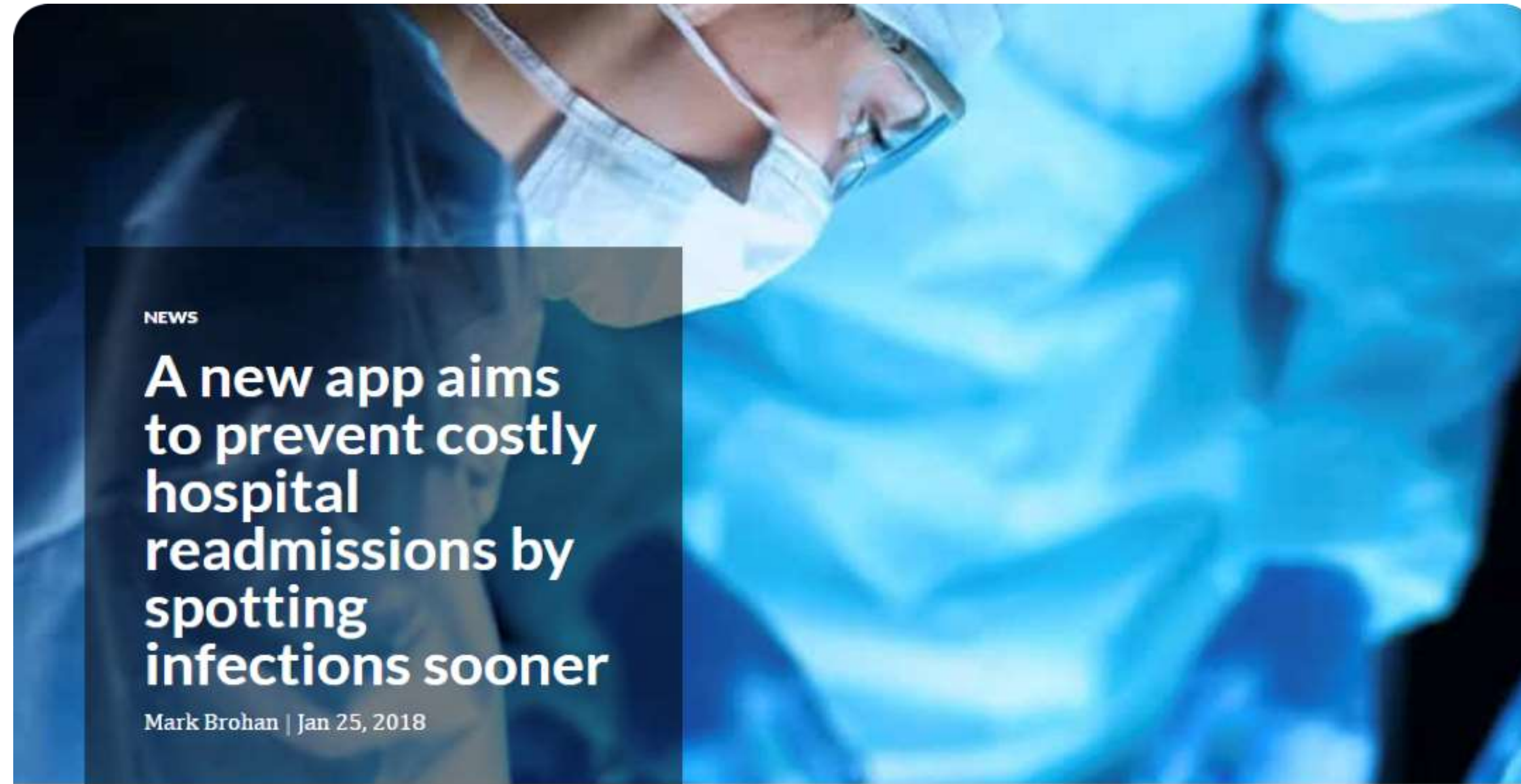
European Respiratory Journal 2018 51: [1800851](#); DOI: 10.1183/13993003.00851-2018

Tweetable abstract @ERSpublications



We should see telemedicine as an adjunct to self-management approaches, assisting proper healthcare coaching and helping patients to be more adherent in problem solving, decision making and acting earlier in the course of COPD exacerbations






Telemedicine is not just about wearables, it's about **coaching patients in problem solving**. Patient recognition of worsening symptoms with e-surveys might be more sensitive than physiological measures.



NEWS

A new app aims to prevent costly hospital readmissions by spotting infections sooner

Mark Brohan | Jan 25, 2018

Share:     

The Apple WoundCare app enables patients to remotely send images of their surgical wounds for monitoring by nurses.



CURRENT ISSUE ARCHIVE SUBSCRIBE RESOURCES ABOUT AUTHORS REPR
MAG Online Library > Journal of Wound Care > List of Issues > Volume 27, Issue 3 Use of photo

Use of photograph-based telemedicine in postoperative wound assessment to diagnose or exclude surgical site infection

Joshua P. TottyMBBS, , Amy E. HarwoodPhD , Tom WallaceMD, NIHR , George ... show all
+AFFILIATIONS

<https://doi.org/10.12968/jowc.2018.27.3.128>
Published Online: March 06, 2018

Conclusion:

Our data shows that, in the assessment of SSI, there is good correlation between face-to-face clinical and remote photographic review. Incorporating this method of wound assessment into a postoperative follow-up care pathway may save patients and clinicians from unnecessary hospital visits, particularly when conducting health research.



CURRENT ISSUE ARCHIVE SUBSCRIBE RESOURCES ABOUT AUTHOR:
MAG Online Library > Journal_of_Wound_Care > List of Issues > Volume 27, Issue 3 Rer

Remote monitoring—the rise of the wound selfie



Biotech Innovations

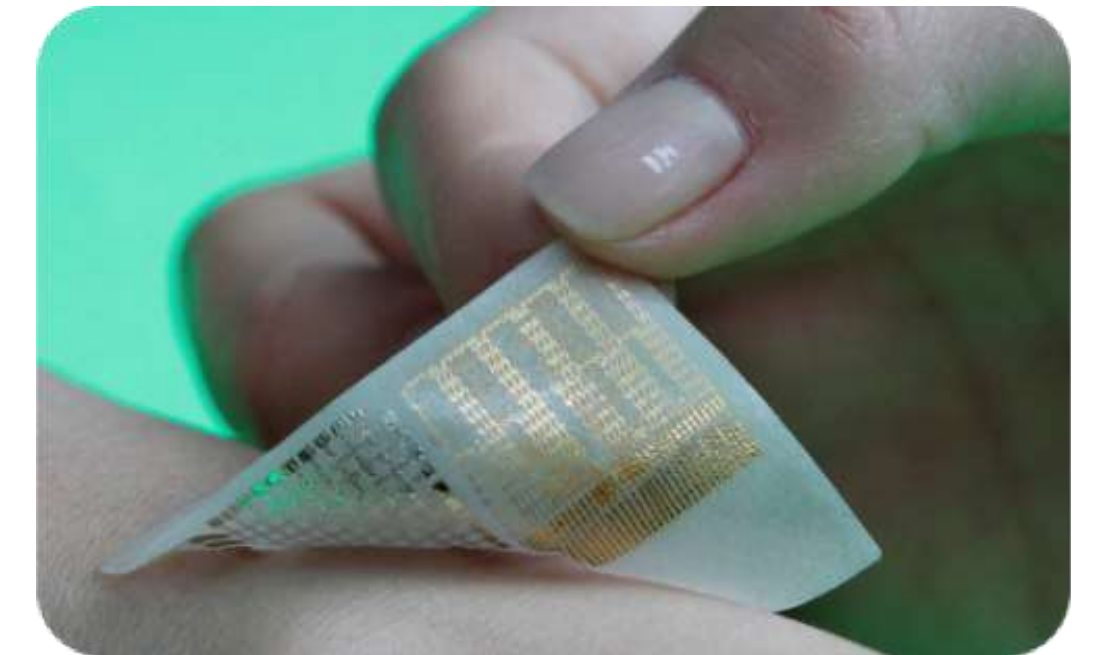
August 8, 2017

Wearable Digital Thermometer Improves Fever Detection

Jennifer Abbasi

JAMA. 2017;318(6):510. doi:10.1001/jama.2017.10248

A digital thermometer in the form of a wearable patch detected increases in body temperature up to 180 minutes earlier than standard monitoring in a small **study** of patients admitted for stem cell transplant or high-dose chemotherapy for leukemia at University Hospitals (UH) Seidman Cancer Center in Cleveland. The Bluetooth-enabled patch measures temperature every 10 minutes instead of every 4 hours—the current usual care—and sends measurements to Apple- or Android-compatible mobile devices.





First Digital Pill Approved to Worries About Biomedical 'Big Brother'



An Overview of the ABILIFY MYCITE® System:

A Pill

An aripiprazole tablet embedded with an Ingestible Event Marker (IEM) sensor: ABILIFY MYCITE® (aripiprazole tablets with sensor).

A Patch

The IEM sensor activates once you have taken your tablet, and communicates to a wearable sensor called the MYCITE® Patch. The patch detects and records the date and time of ingestion, as well as your activity level.

An App

The information in the patch is communicated to the MYCITE® APP, a smartphone application (app) on a compatible mobile device. The app allows you to review your medication ingestion data and activity level, as well as self-reported mood and quality of rest.

Only functions related to tracking drug ingestion have been evaluated or approved by FDA.

The Dashboard

The dashboard is a secure, web-based portal that gives your healthcare provider access to your medication ingestion information over time, as well as information about other health measures that you choose to share.

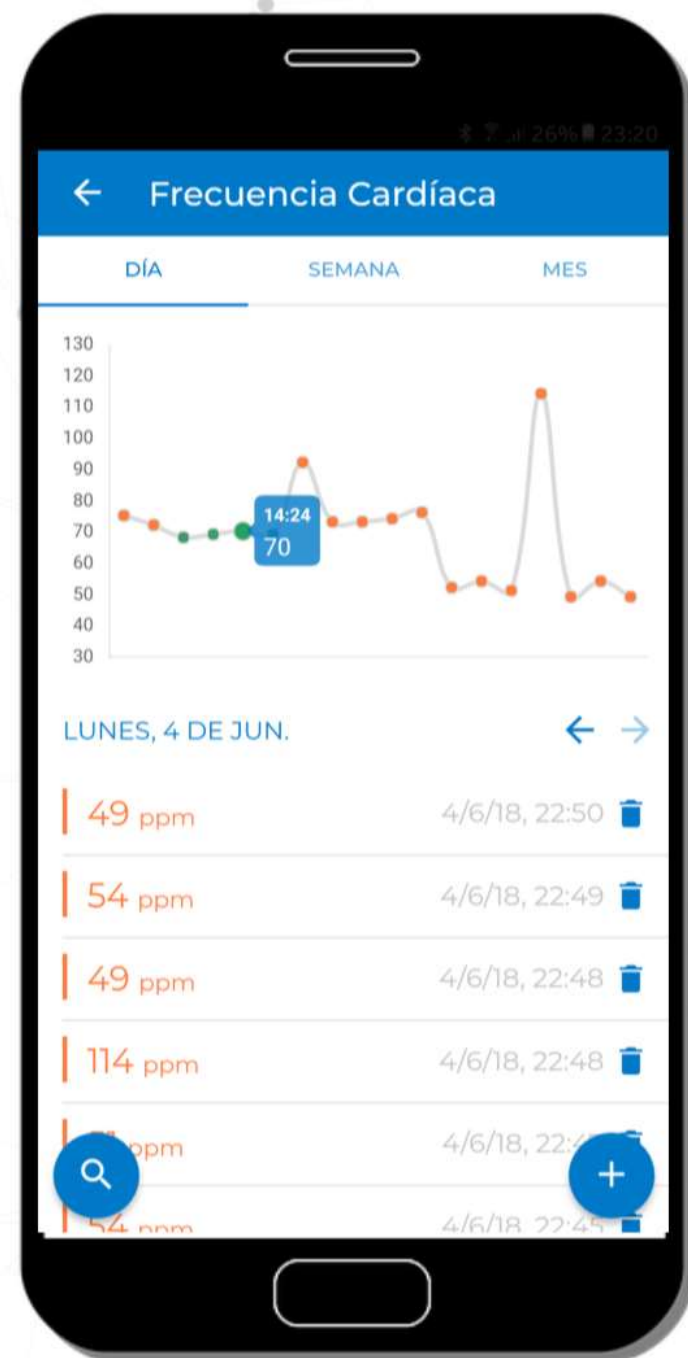
You can also give other members of your care team and family access to selected information on the dashboard. You choose who can

Your Daily Dose of Better Health

Pillo is a voice activated at-home companion that manages a total wellness program for you and your loved ones.

WATCH THE VIDEO

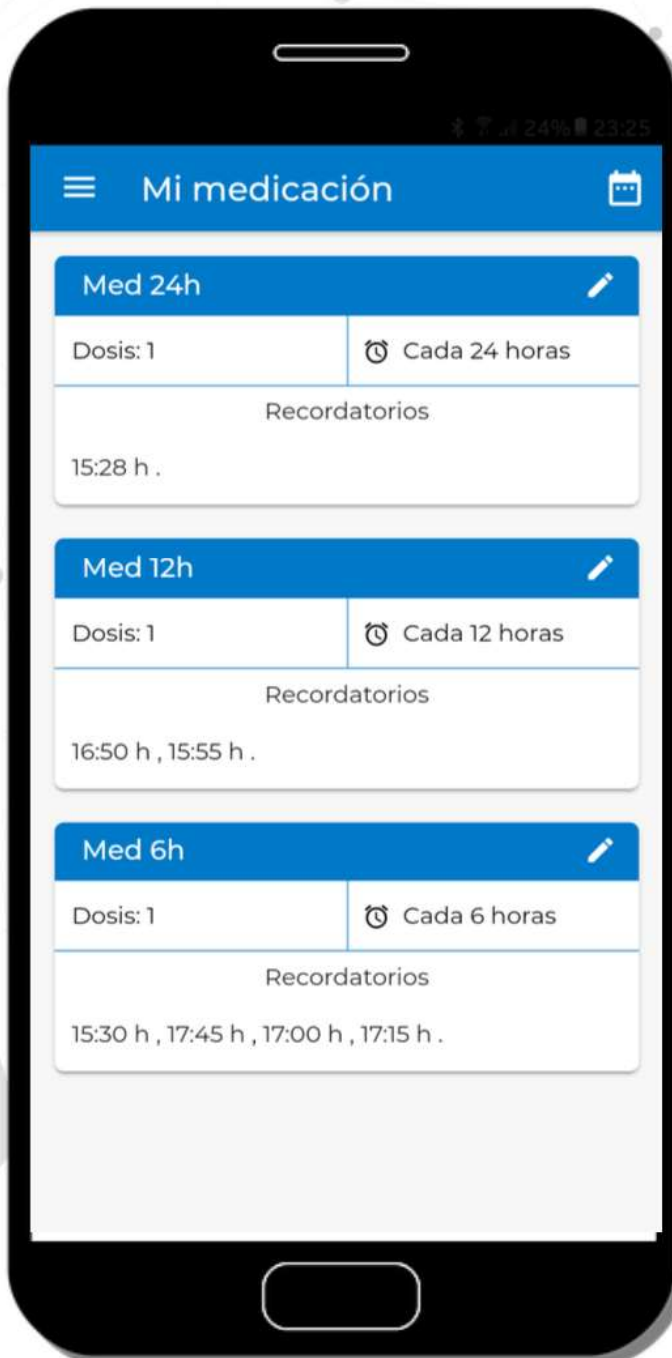




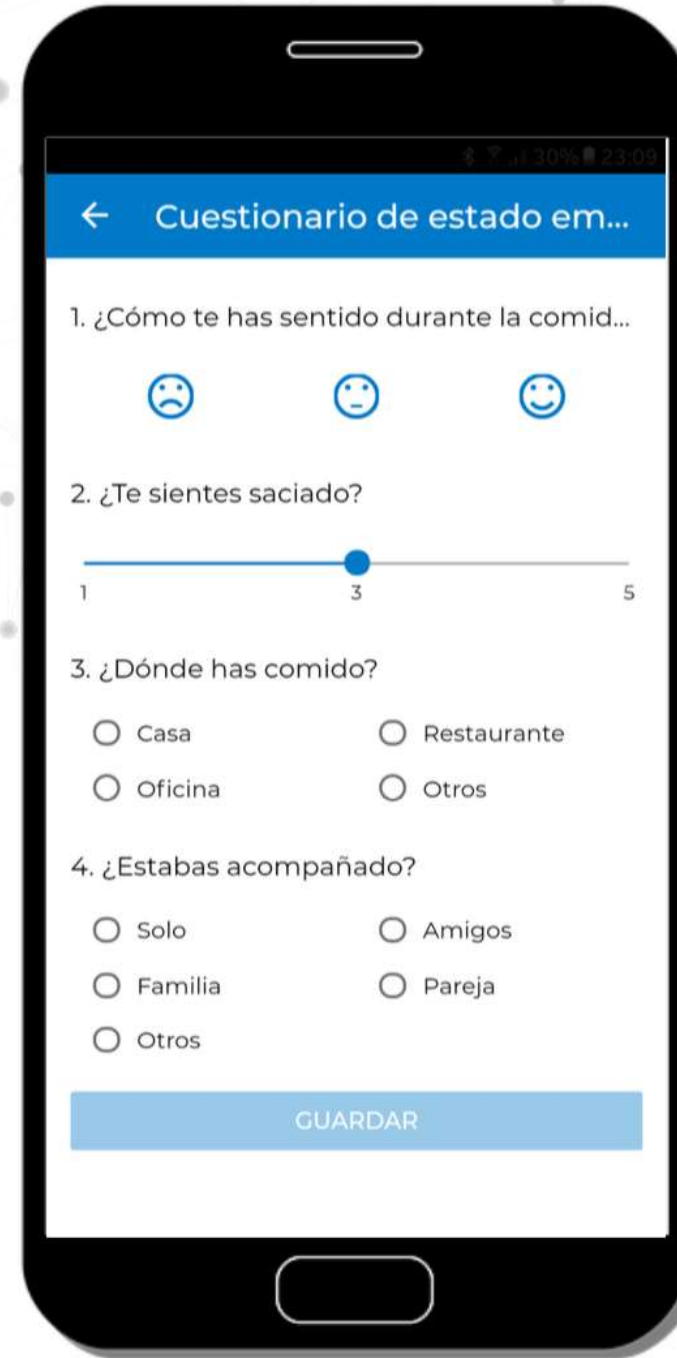
Progress



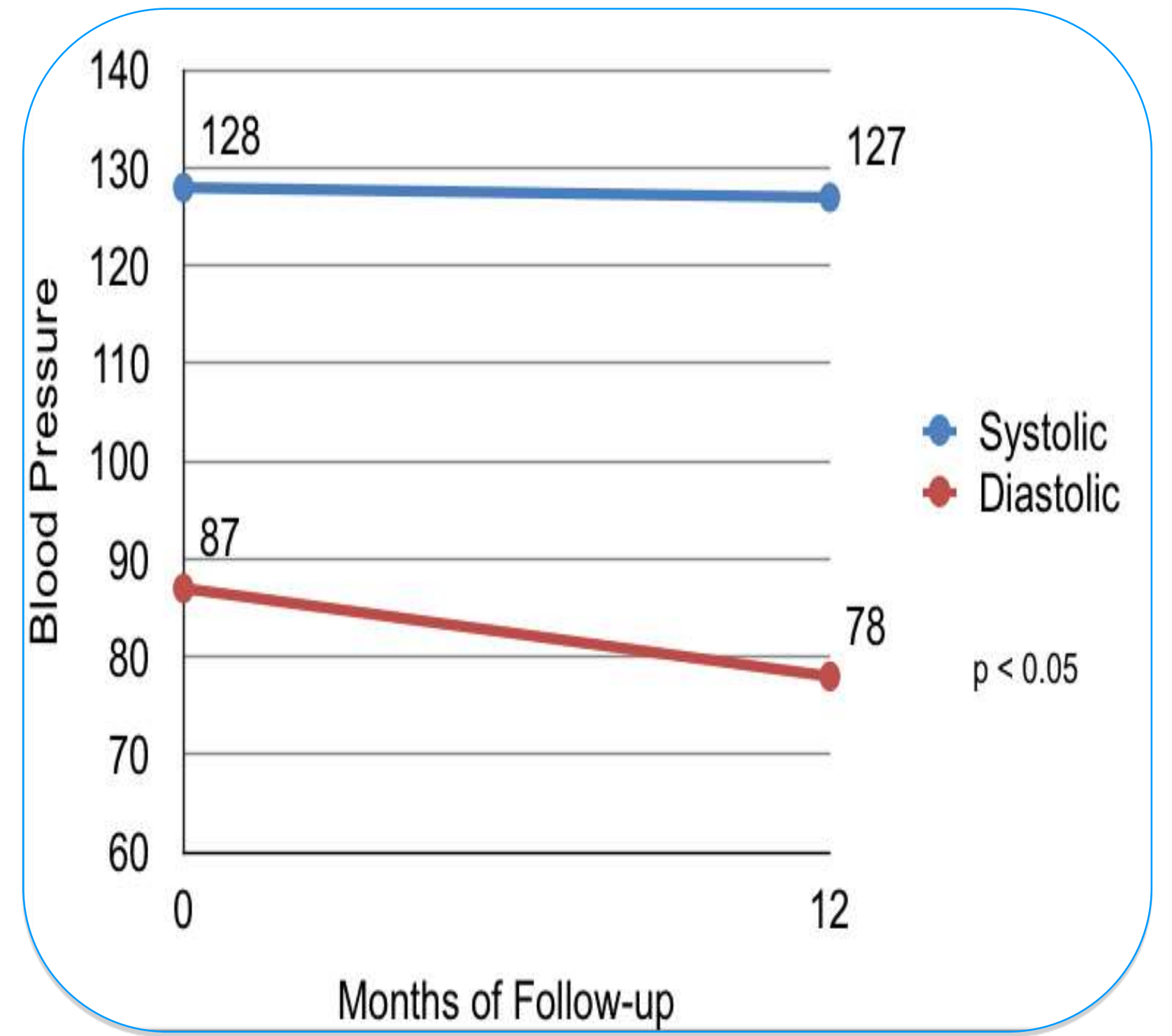
Education



Medication



Tests



THE LANCET

Hypertension: time for doctors to switch the driver's seat?

Ernst R Rietzschel , Marc L De Buyzere

A feasible future scenario could be GPs acting as highly educated central health-care managers who not only treat individual patients but also orchestrate community health through a digital infrastructure, designed in conjunction with the medical end-user and relying on dedicated artificial intelligence.



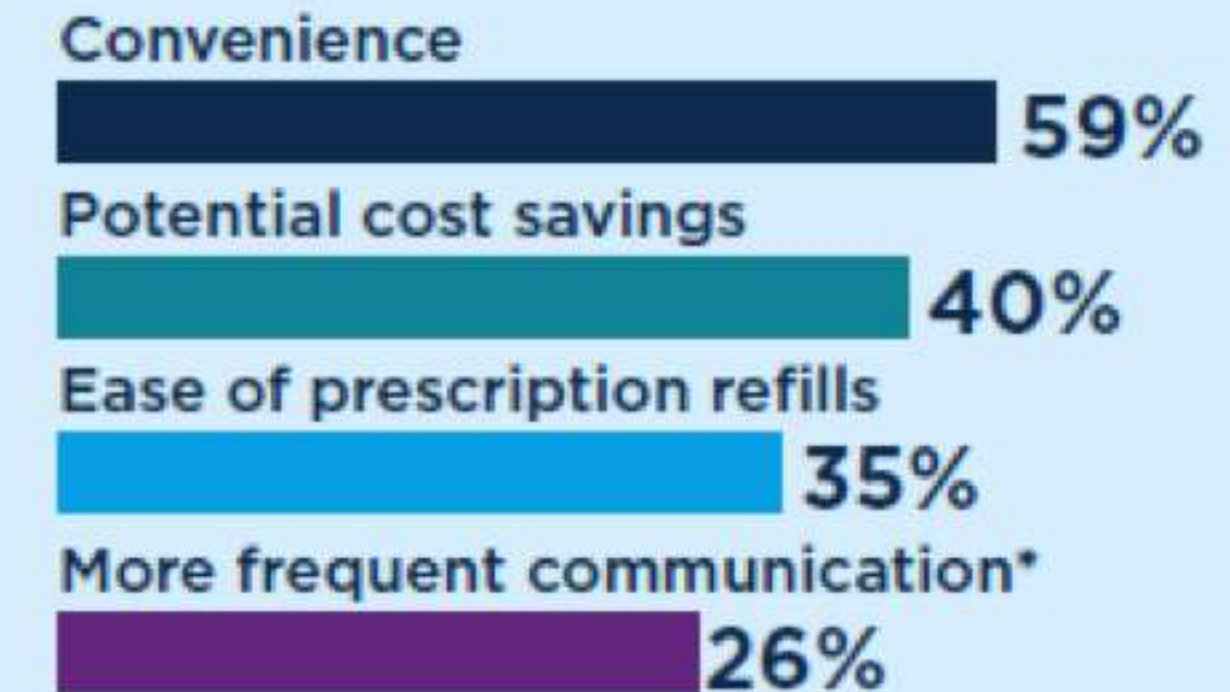
Health provider view Top Reasons:

- Opportunity to earn more income.
- Be on the leading edge of telemedicine.
- Attract new patients to my practice.
- Retain existing patients.

Video visits ...and length of visit

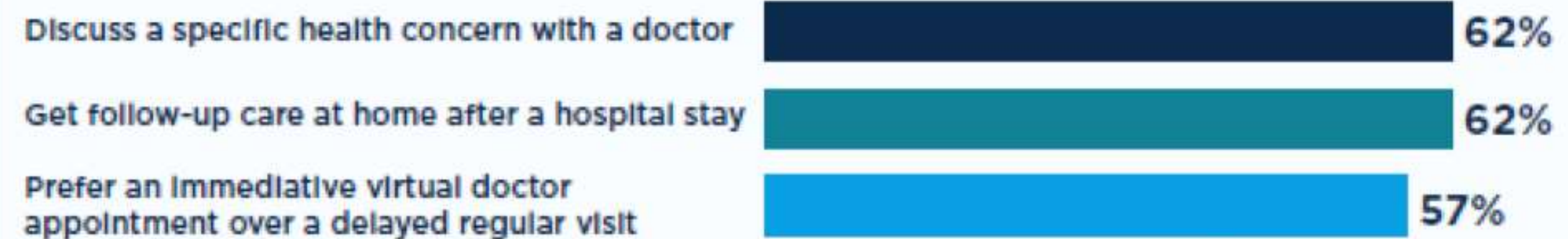


Patient view What they see as the top benefits.



*With health-care professional

A growing appetite for virtual healthcare:



Source: Accenture survey of 2,301 consumers.



MANAGED
Care

SEEDS OF INNOVATION

Inpatient beds? We don't need no stinkin' inpatient beds.

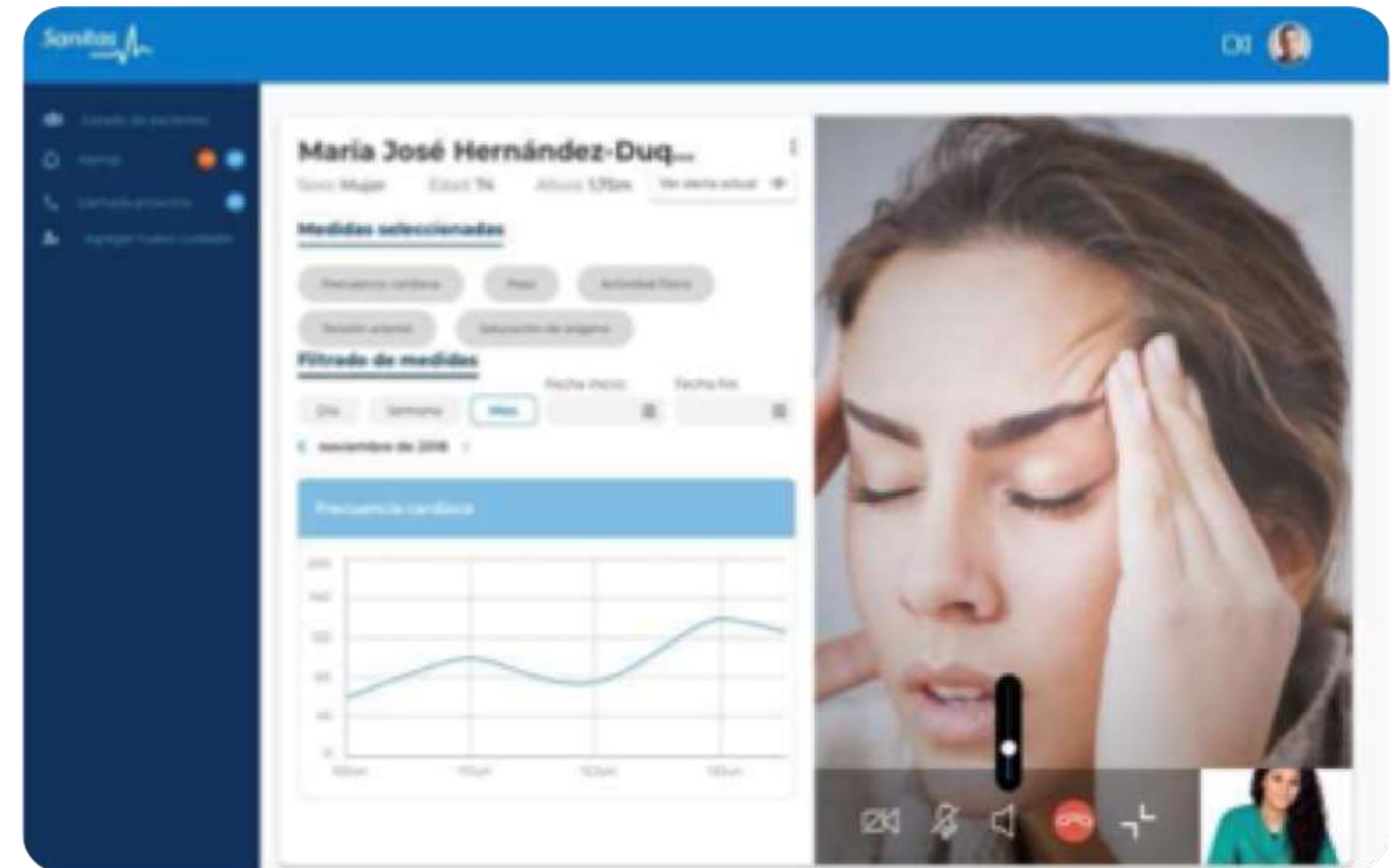
Use telehealth to avoid expensive inpatient care and deliver excellent care to even the most remote places.

July 31, 2018

SUSAN LADIKA



Who says a hospital needs to have beds?



WHAT IS CONNECTED HEALTH PLATFORM?

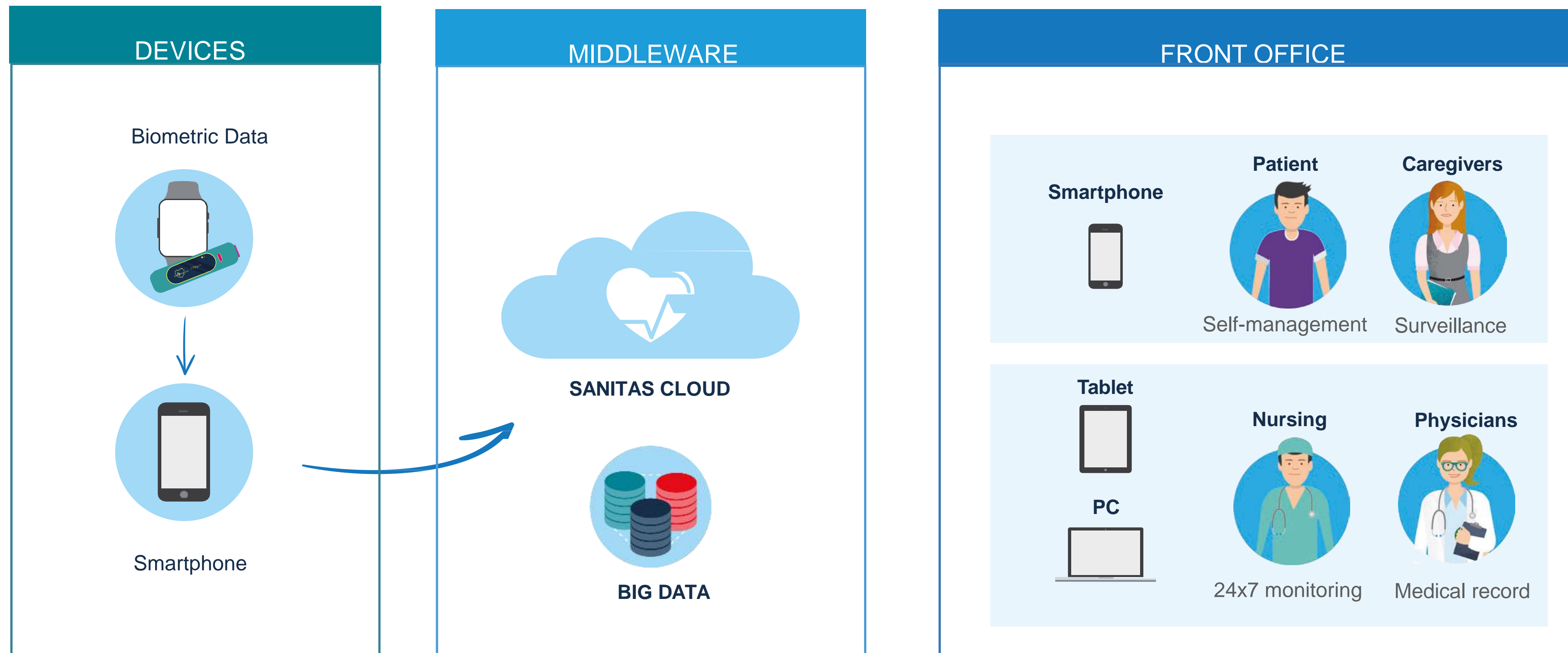


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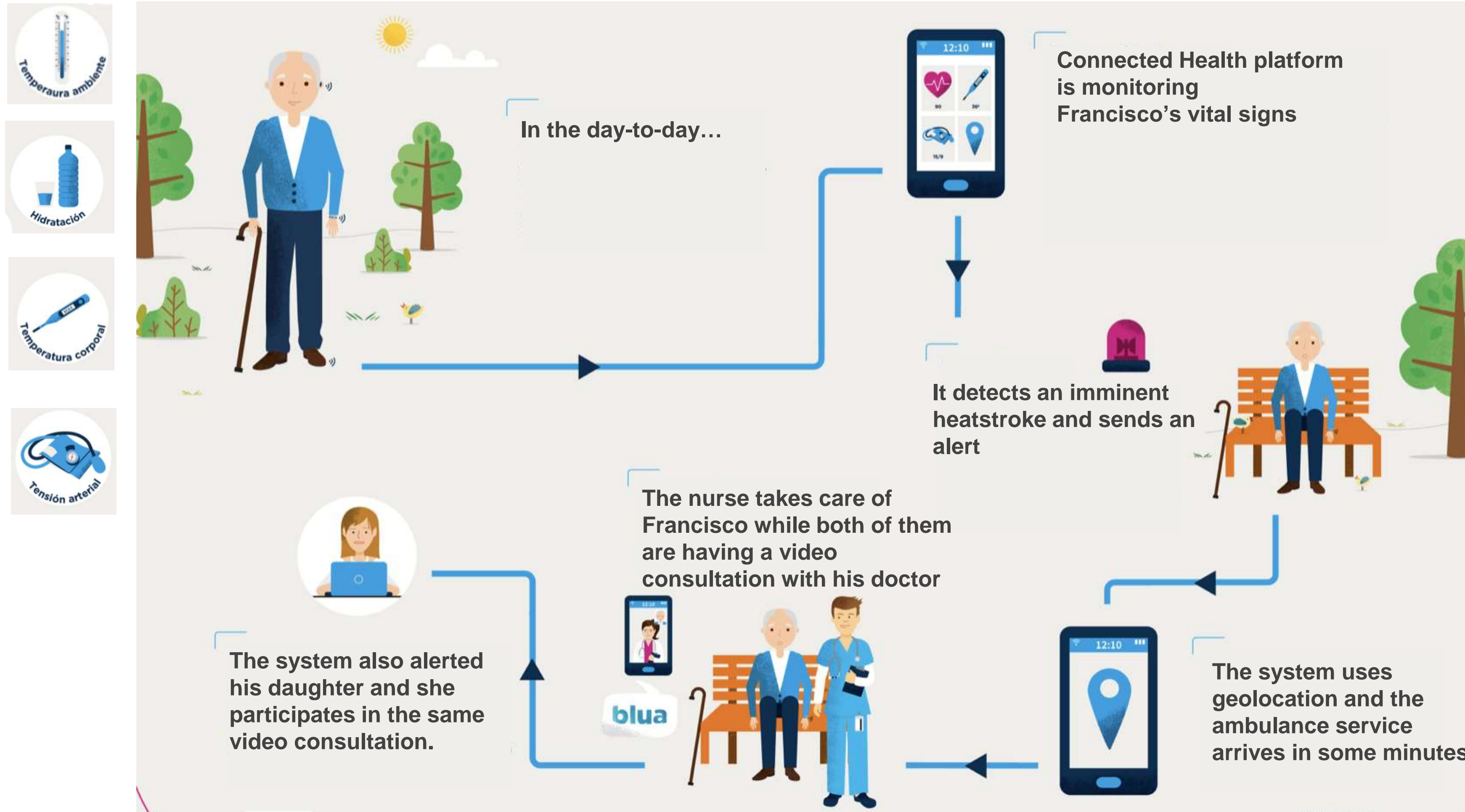


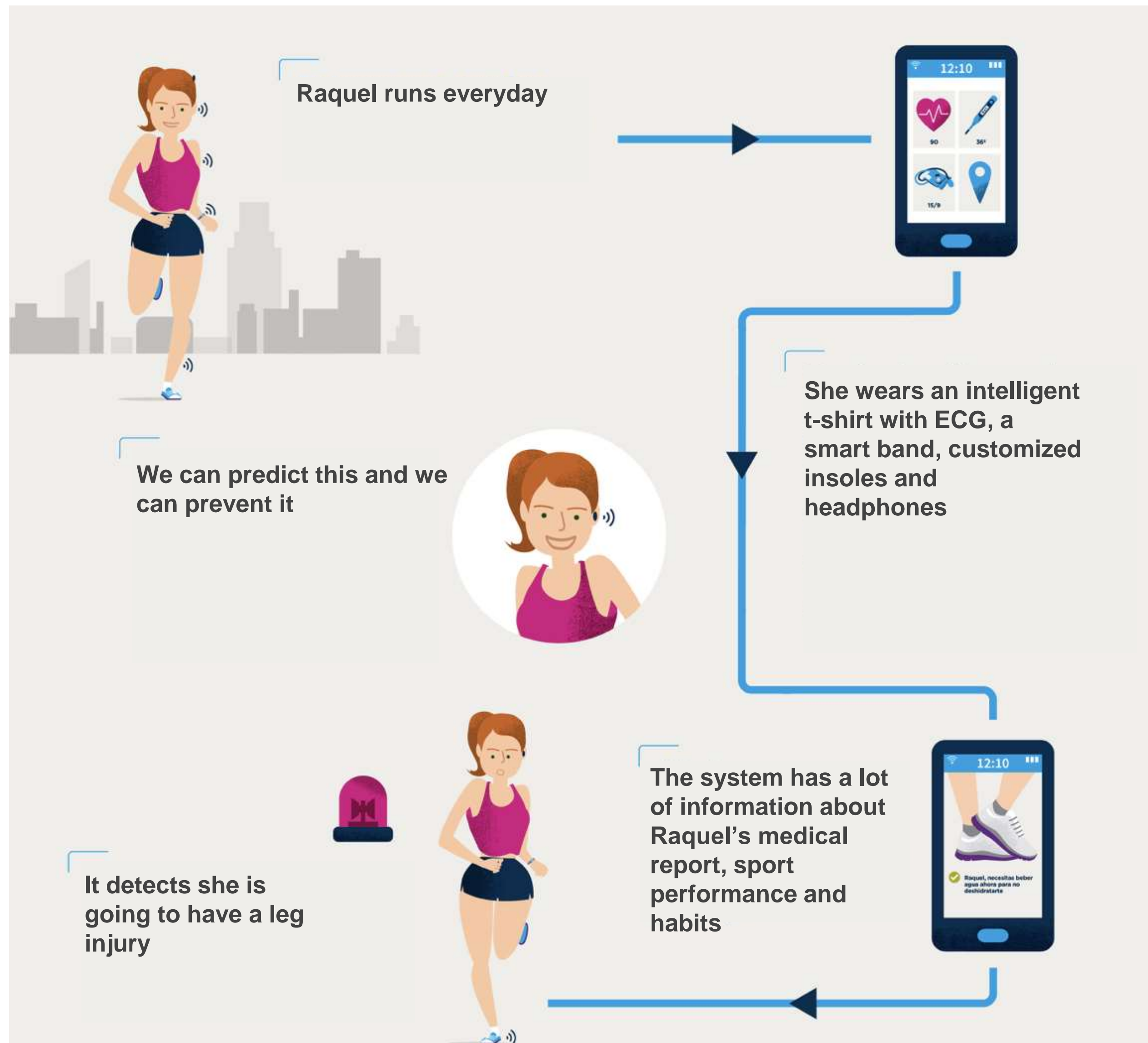
Connected health is a platform that allows remote patient monitoring “Anytime, anywhere”



An integrated healthcare service for a better patient experience

Salud
Conectada

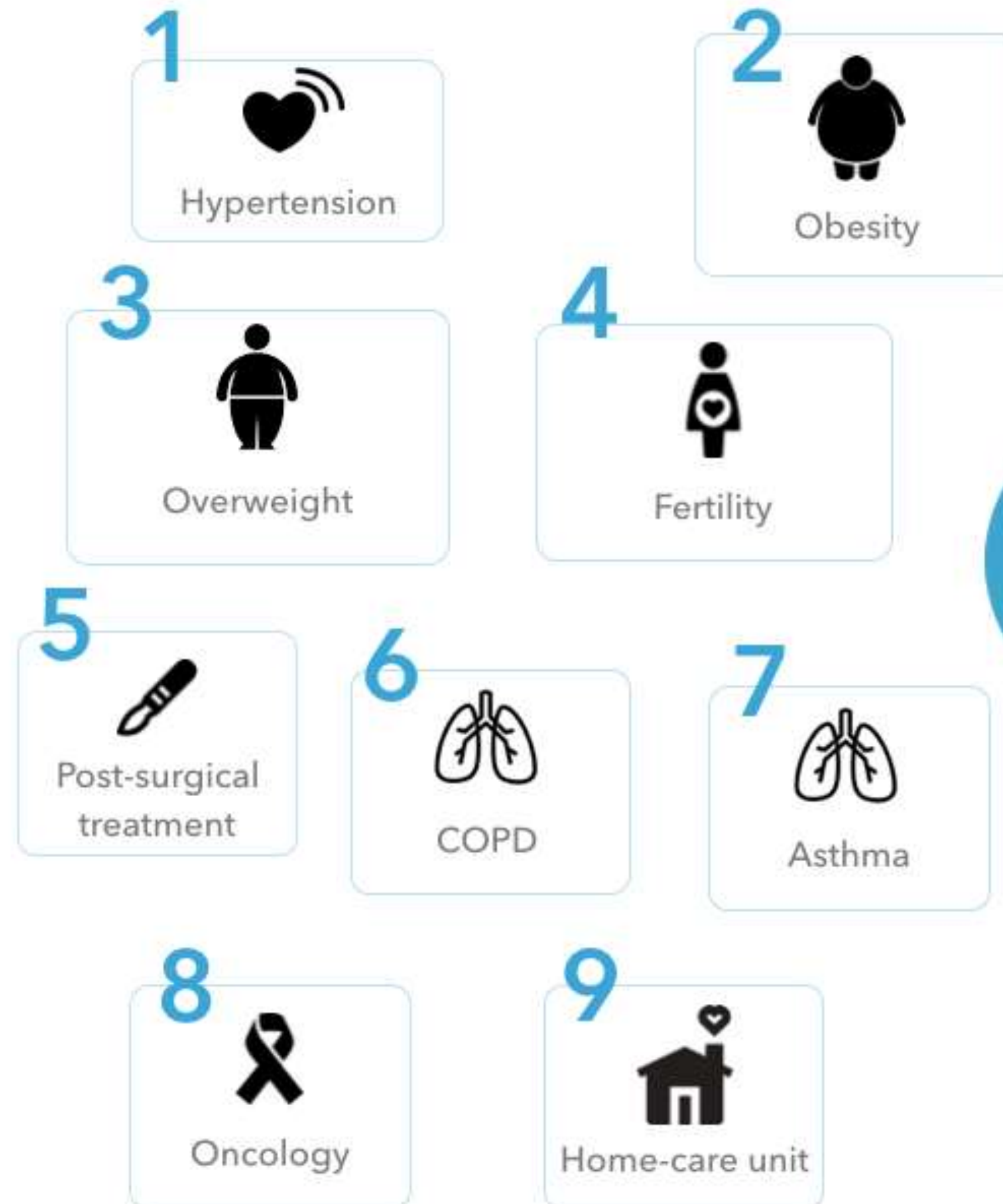




The first step towards
predictive medicine



9 uses cases



connected devices



Smart Hospital



9



Home-care unit



Connected Home

Patient



Self-management

Caregivers



Surveillance

Nursing

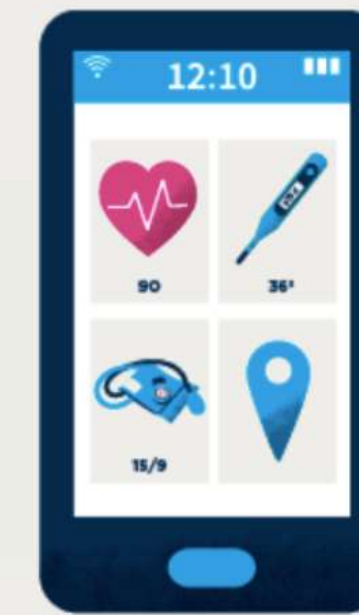


24x7 monitoring

Physicians



Medical record

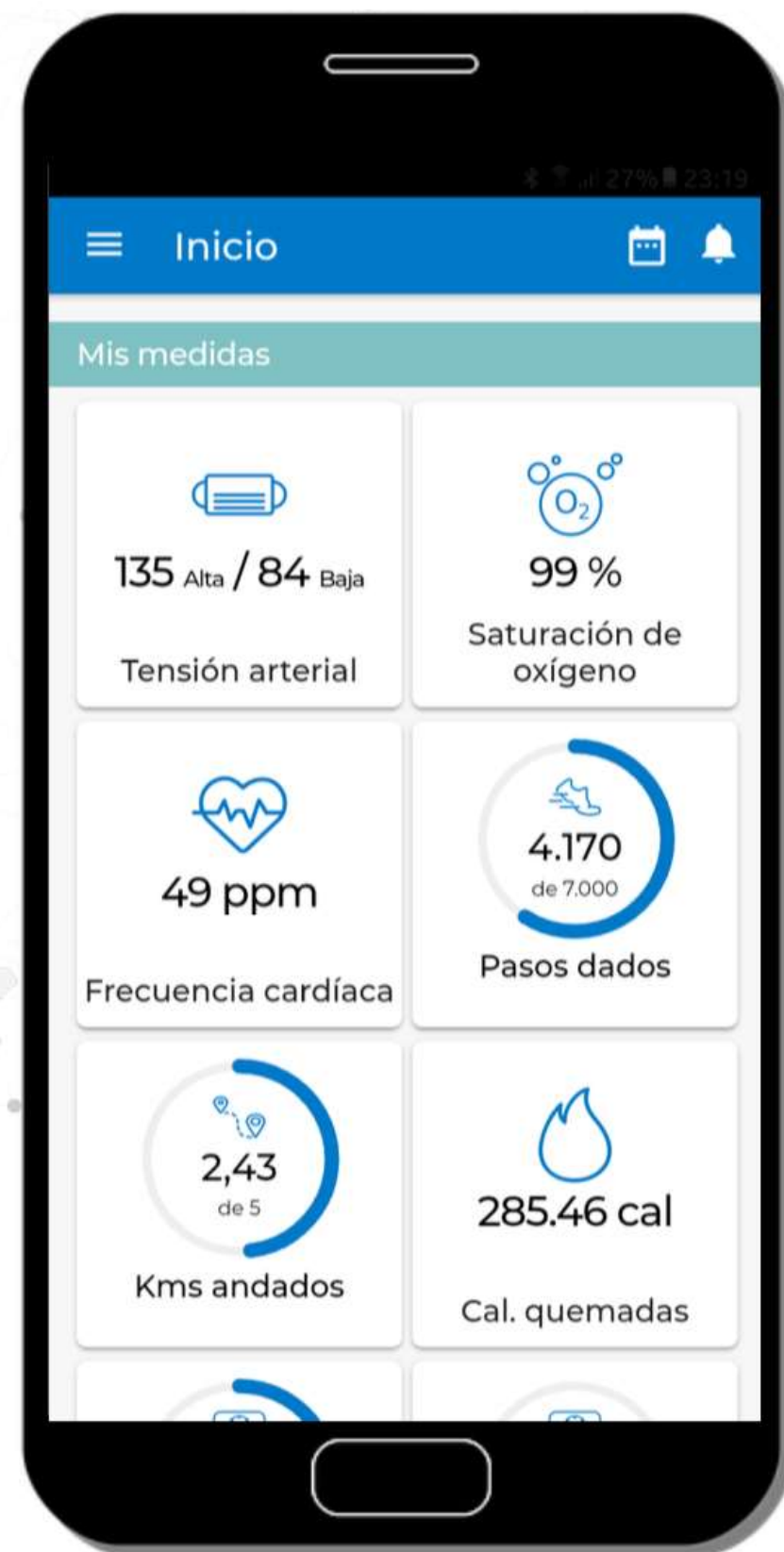


I.A. & Big data





A mobile app for patients and caregivers



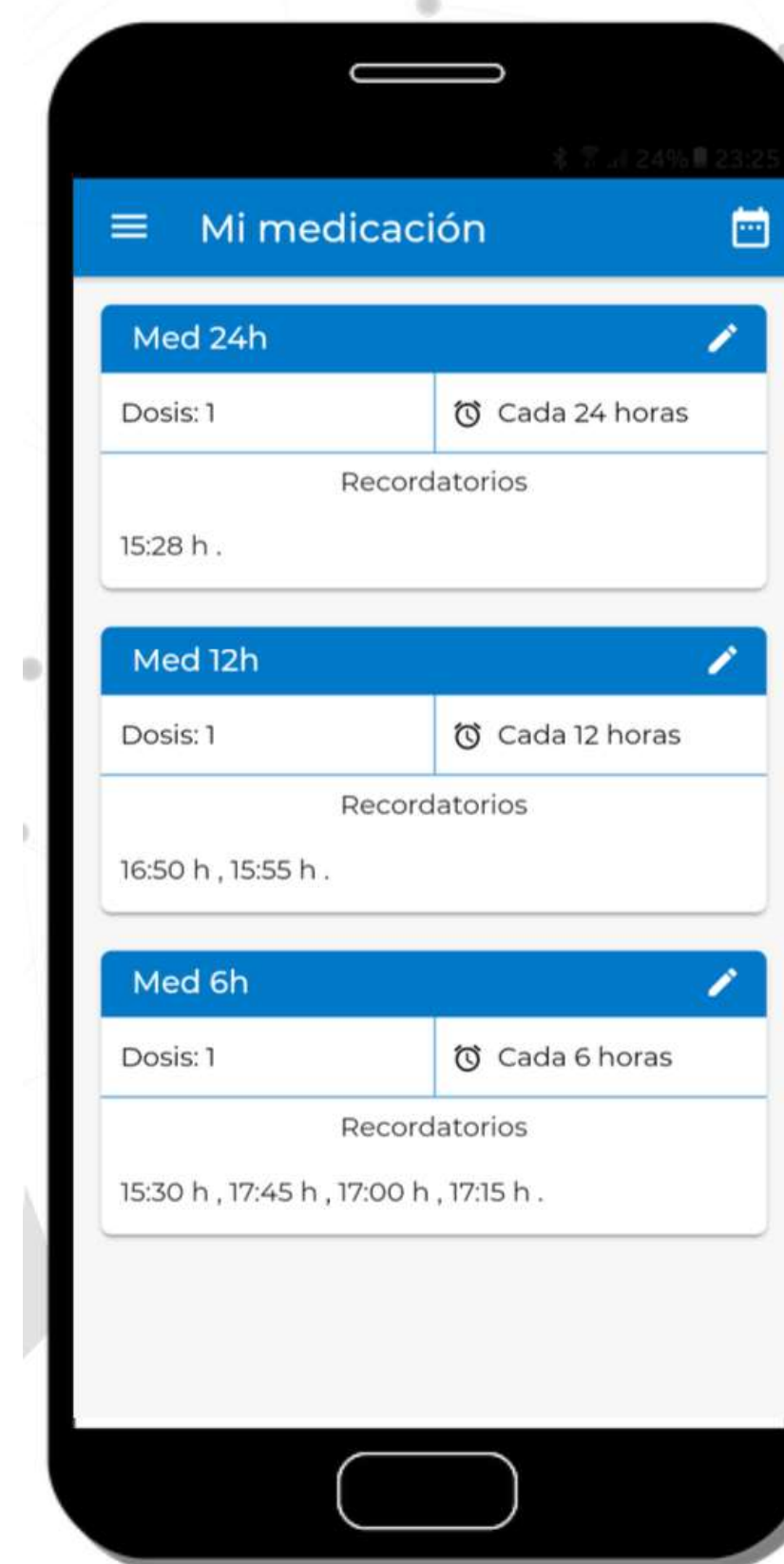
Biometric data
& habits



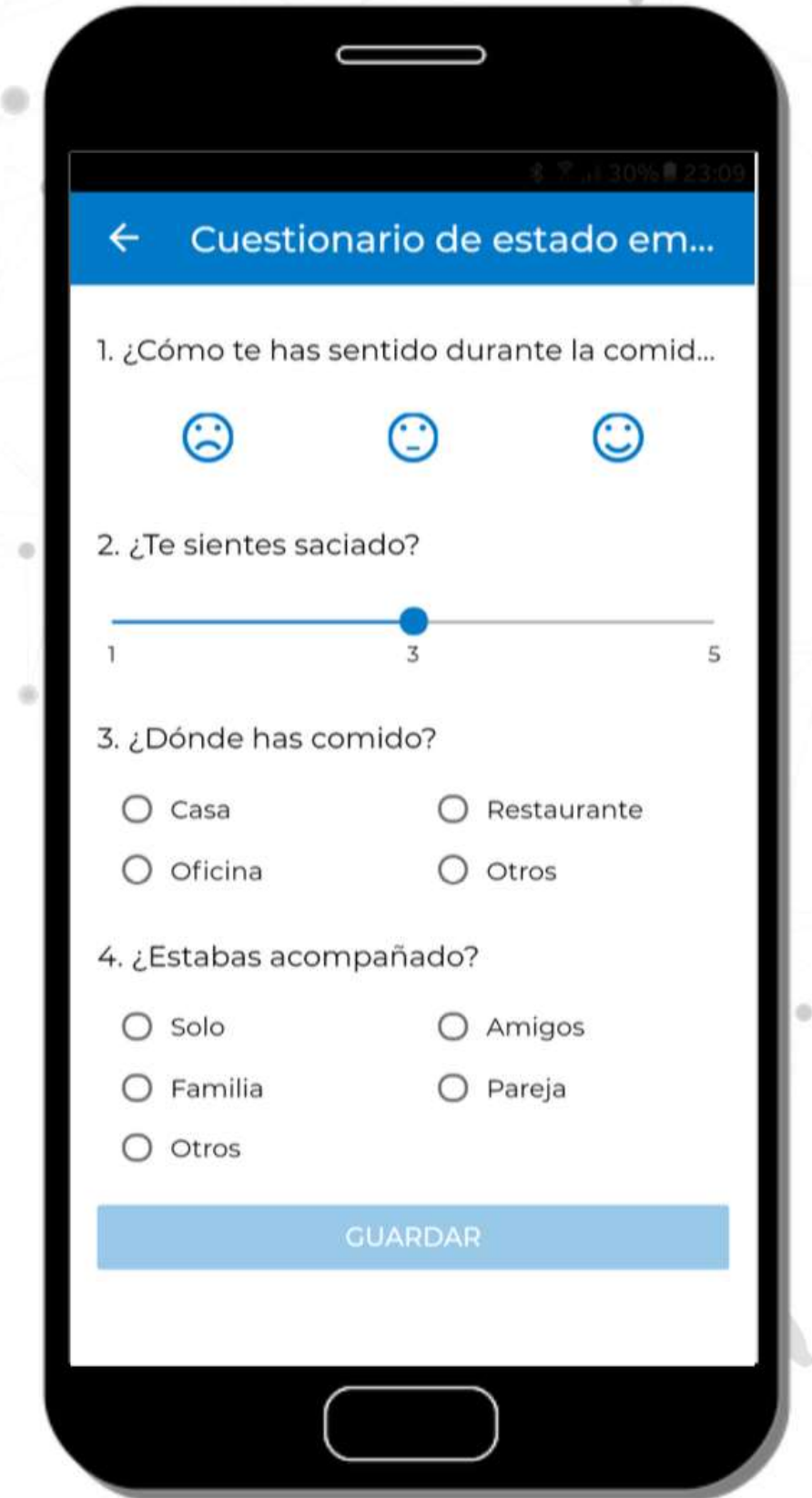
Progress



Education





Medication



Tests

A dashboard for doctors (prescriber)






- Mis pacientes
- Alertas
- Agregar nuevo paciente
- Estadísticas generales

Mis pacientes

Cambiar a vista simplificada ☒

Andre Hunt	Edad: 74	Altura: 1,75m	Peso: 78Kg	Localidad: Madrid
Hilda Goodwin	Edad: 74	Altura: 1,75m	Peso: 78Kg	Localidad: Barcelona
Chad Hill	Edad: 74	Altura: 1,75m	Peso: 78Kg	Localidad: Barcelona
Dale Rodgers	Edad: 74	Altura: 1,75m	Peso: 78Kg	Localidad: Barcelona
Gabriel Bush	Edad: 74	Altura: 1,75m	Peso: 78Kg	Localidad: Madrid
Delia Owen	Edad: 74	Altura: 1,75m	Peso: 78Kg	Localidad: Madrid
Devin Richards	Edad: 74	Altura: 1,75m	Peso: 78Kg	Localidad: Madrid
Annie Gibson	Edad: 74	Altura: 1,75m	Peso: 78Kg	Localidad: Madrid
Joshua Phelps	Edad: 74	Altura: 1,75m	Peso: 78Kg	Localidad: Madrid
Johnny Ingram	Edad: 74	Altura: 1,75m	Peso: 78Kg	Localidad: Barcelona
Hallie Underwood	Edad: 74	Altura: 1,75m	Peso: 78Kg	Localidad: Madrid
Isaiah Johnston	Edad: 74	Altura: 1,75m	Peso: 78Kg	Localidad: Madrid
Barry Barrett	Edad: 74	Altura: 1,75m	Peso: 78Kg	Localidad: Madrid

- Mis pacientes
- Alertas
- Agregar nuevo paciente
- Estadísticas generales

Alta nuevo paciente

Alta nuevo paciente / Datos generales / Perfilado / Medidas

- Datos generales
- Perfilado
- Medidas
- Medicación
- Alta

Medidas

Tensión arterial

Frecuencia cardiaca

Saturación oxígeno

Actividad física


Peso / IMC Composición corporal

Espirometría


Geolocalización

Atrás
Continuar

A dashboard for doctors (prescriber)




- Mis pacientes
- Alertas
- Agregar nuevo paciente
- Estadísticas generales


amunozlomba@sanitas.es

Paciente

Ficha paciente / José Miguel Rodríguez del Fresno Fernández



José Miguel Rodríguez del Fresno Fernández

Sexo: Varón
Edad: 74
Altura: 1,75m
Peso: 78Kg

Resultados

Histórico

Perfil paciente

Alertas activas

24/03/2018 11:46h
- Superado el límite de tensión arterial diastólica
José Miguel Rodríguez del Fresno Fernández

24/03/2018 11:46h
- Superado el límite de tensión arterial diastólica
José Miguel Rodríguez del Fresno Fernández

24/03/2018 04:22h
- Bajo límite de tensión arterial sistólica
José Miguel Rodríguez del Fresno Fernández

24/03/2018 - 20:48h
- María Carmen Hoyos González

All the drugs offered on the site are priced lower than they are on the Medicare prescription drug plan and it offers the most popular medications for your pets as well. - Safe Alternatives-The company deals only with drug facilities that are approved by the FDA and the WHO, meaning the safety and efficacy of its drugs are strictly regulated. Additionally, the brand names it offers are identical to the brand names available.

24/03/2018 - 20:36h
- María Carmen Hoyos González

All the drugs offered on the site are priced lower than they are on the Medicare prescription drug plan and it offers the most popular medications for your pets as well. -

24/03/2018 - 20:30h
- María Carmen Hoyos González

All the drugs offered on the site are priced lower than they are on the Medicare prescription drug plan and it offers the most popular medications for your pets as well. -

24/03/2018 11:46h
- Superado el límite de tensión arterial diastólica
José Miguel Rodríguez del Fresno Fernández

Medidas seleccionadas

Añadir nuevas medidas +

Frecuencia cardiaca

Peso

Actividad física

Tensión arterial

Saturación de oxígeno

Filtrado de medidas

Fecha inicio:


Fecha fin:

Día

Semana

Mes

Frecuencia cardiaca



66ppm


Media

58ppm

Minima

120ppm

Máxima



amunozlomba@sanitas.es

Mis pacientes

Alertas

Agregar nuevo paciente

Estadísticas generales

Alta nuevo paciente

Alta nuevo paciente / Datos generales / Perfilado / Medidas / Medicación / Alta

Datos generales

Perfilado

Medidas

Medicación

Alta

Alertas seleccionadas

Añadir o editar alertas

Estos son los límites y las alertas que están activas:

☒ Tensión arterial

Sistólica: mín: 12 cmHg / máx: 16 cmHg
Diastólica: mín: 6 cmHg / máx.: 12 cmHg

☒ Frecuencia cardiaca

Mín: 50 ppm/min / Máx: 150 ppm/min

☒ Saturación de oxígeno

Mín: 95% / Máx: 100%

☒ Actividad física

Mín: 95% / Máx: 100%

☒ Peso / IMC / Composición corporal

80 kg / 16 IMC / 17 %

☒ Espirometría

Mín.: / Máx.:

☒ Geolocalización

Radio seguridad: 10Km

Atrás

Guardar

© 2018 Sanitas





A dashboard for nursing (24x7 monitoring)

- Mis Pacientes
- Usuarios
- Usuarios desactivados
- Alertas** 31 0
- Agregar nuevo paciente
- Agregar nuevo personal
- Estadísticas generales

Ultimas alertas (31/10)

Seguimiento (0/0)

Alerta de tensión sistólica: **Ha superado su limite máximo: Valor - 141.0 Limite - 140.0**

12/10/2018 00:22

David Majo Prats

Atender

Alerta de tensión sistólica: **Ha superado su limite máximo: Valor - 151.0 Limite - 140.0**

12/10/2018 01:32

Juan alberto Gomez Calvente

Atender

Alerta de tensión sistólica: **Ha superado su limite máximo: Valor - 143.0 Limite - 140.0**

12/10/2018 10:01

Miguel Martinez Riquelme

Atender








Alerta de tensión sistólica: **Ha superado su limite mínimo: Valor - 129.0 Limite - 140.0**

12/10/2018 18:15

Mercedes luisa Feliz Perez

Atender

A dashboard for nursing (24x7 monitoring)

-  Mis Pacientes
-  Usuarios
-  Usuarios desactivados
-  Alertas 31 0
-  Agregar nuevo paciente
-  Agregar nuevo personal
-  Estadísticas generales

Manuel Villodres Campillos

Ver Perfil 

Teléfono Personal: **651613651** Teléfono Cuidador:

Ha superado su limite mínimo: Valor - 79.0 Limite - 90.0

La tensión diastólica del paciente ha superado los límites establecidos min: **90** / max: **115**

Alertas relacionadas

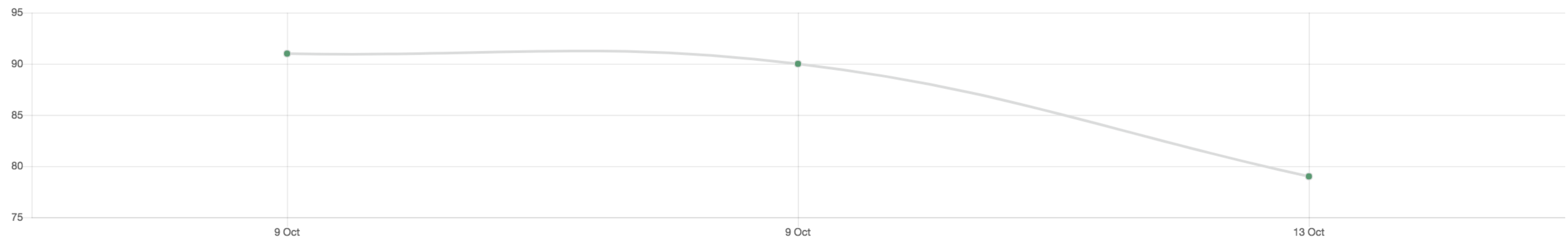
Alerta de tensión sistólica: **Ha superado su limite mínimo: Valor - 79.0 Limite - 90.0**

13/10/2018 13:29

Alerta de tensión sistólica: **Ha superado su limite mínimo: Valor - 124.0 Limite - 140.0**

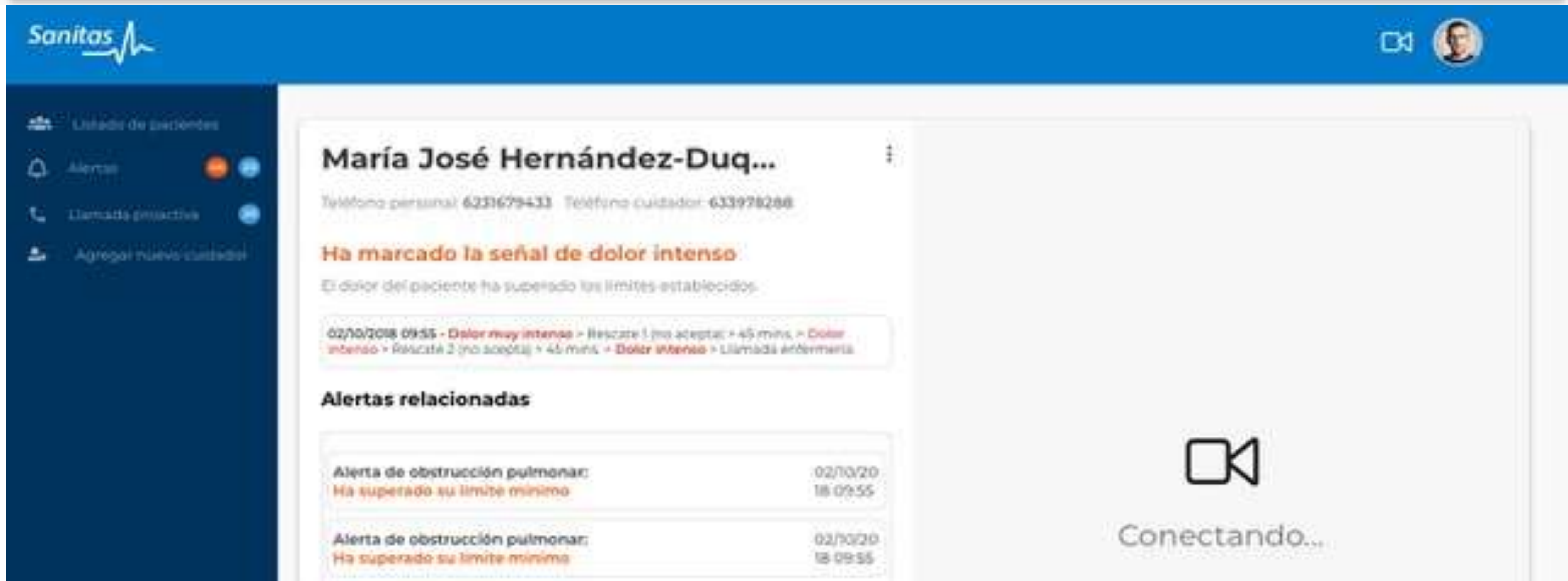
13/10/2018 13:29

Medidas de Tensión arterial



Resultados cuestionarios dolor

24/07/2018 15:10 - **Dolor intenso** > Rescate 1 (acepta) > 45 mins. > **Dolor intenso** > Rescate 2 (acepta) > 45 mins. > **Dolor muy intenso** > Llamada enfermería



The screenshot shows the Sanitas patient monitoring interface. At the top, there's a blue header with the Sanitas logo and a user profile icon. On the left, a dark blue sidebar contains navigation options: 'Unidad de pacientes', 'Alertas', 'Llamada proactiva', and 'Agregar nuevo cuidador'. The main content area displays patient information for 'María José Hernández-Duq...' and a critical alert: 'Ha marcado la señal de dolor intenso'. Below this, a timeline of events shows a sequence of pain levels and rescue attempts. A section titled 'Alertas relacionadas' lists two alerts for pulmonary obstruction. On the right, a large video call window shows a 'Conectando...' status with a video camera icon.

Sanitas

Unidad de pacientes

Alertas

Llamada proactiva

Agregar nuevo cuidador

María José Hernández-Duq...

Teléfono personal: 6231679433 Teléfono cuidador: 633978288

Ha marcado la señal de dolor intenso

El dolor del paciente ha superado los límites establecidos.

02/10/2018 09:55 - **Dolor muy intenso** > Rescate 1 (no acepta) > 45 mins. > **Dolor intenso** > Rescate 2 (no acepta) > 45 mins. > **Dolor intenso** > Llamada enfermería

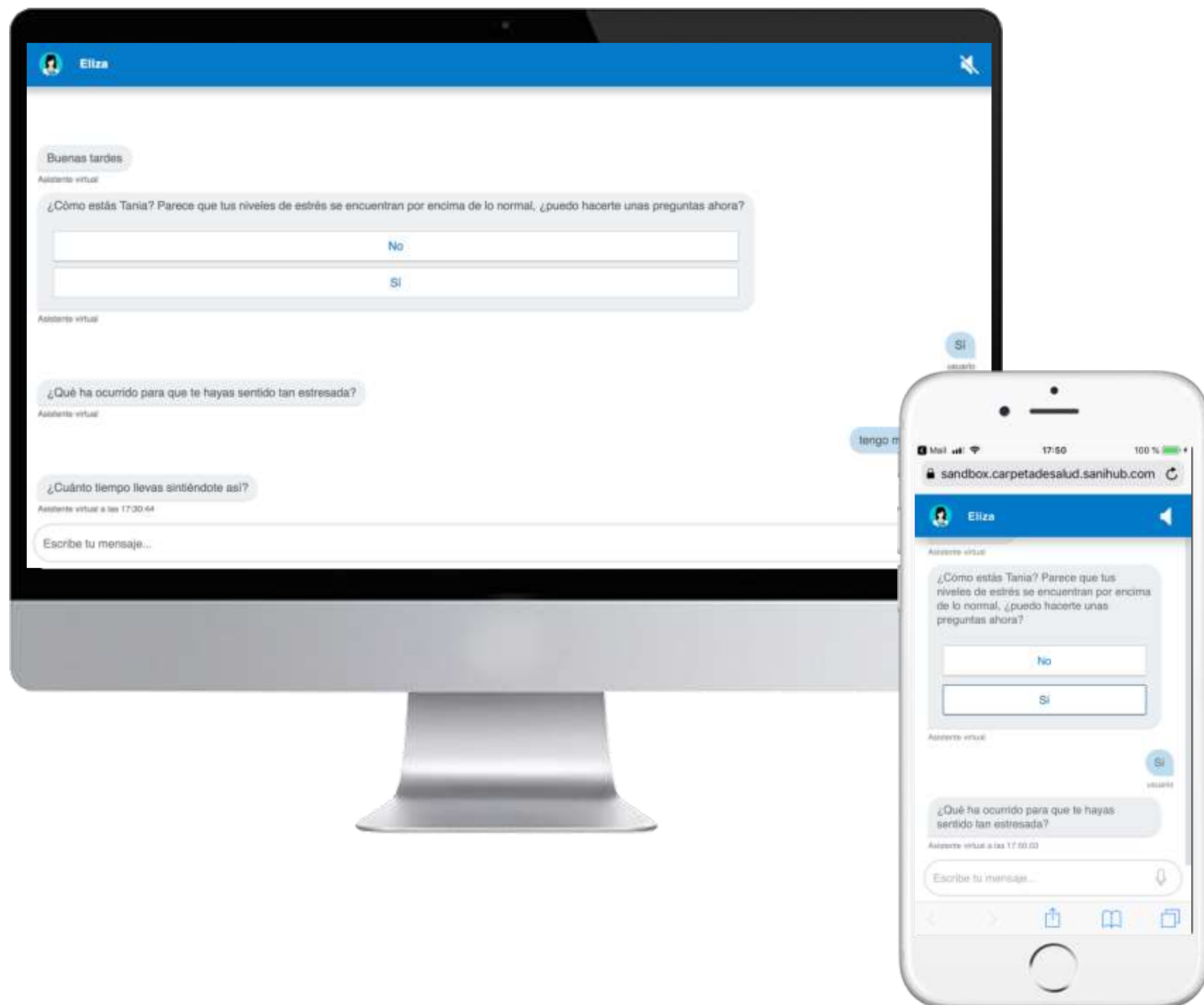
Alertas relacionadas

Alerta de obstrucción pulmonar: Ha superado su límite mínimo	02/10/2018 09:55
Alerta de obstrucción pulmonar: Ha superado su límite mínimo	02/10/2018 09:55

Conectando...

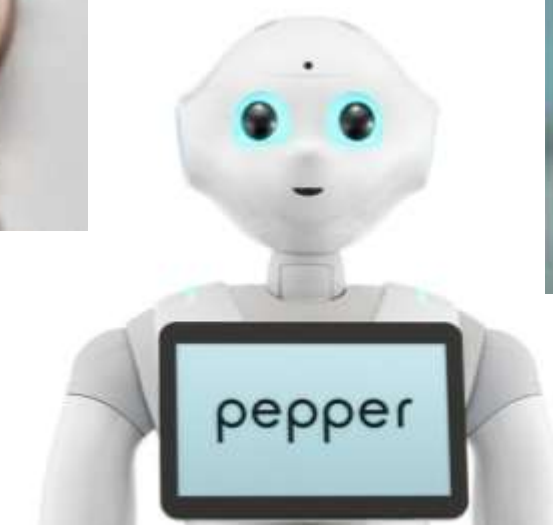
Virtual Assistants: Artificial Intelligence

Web & Mobile



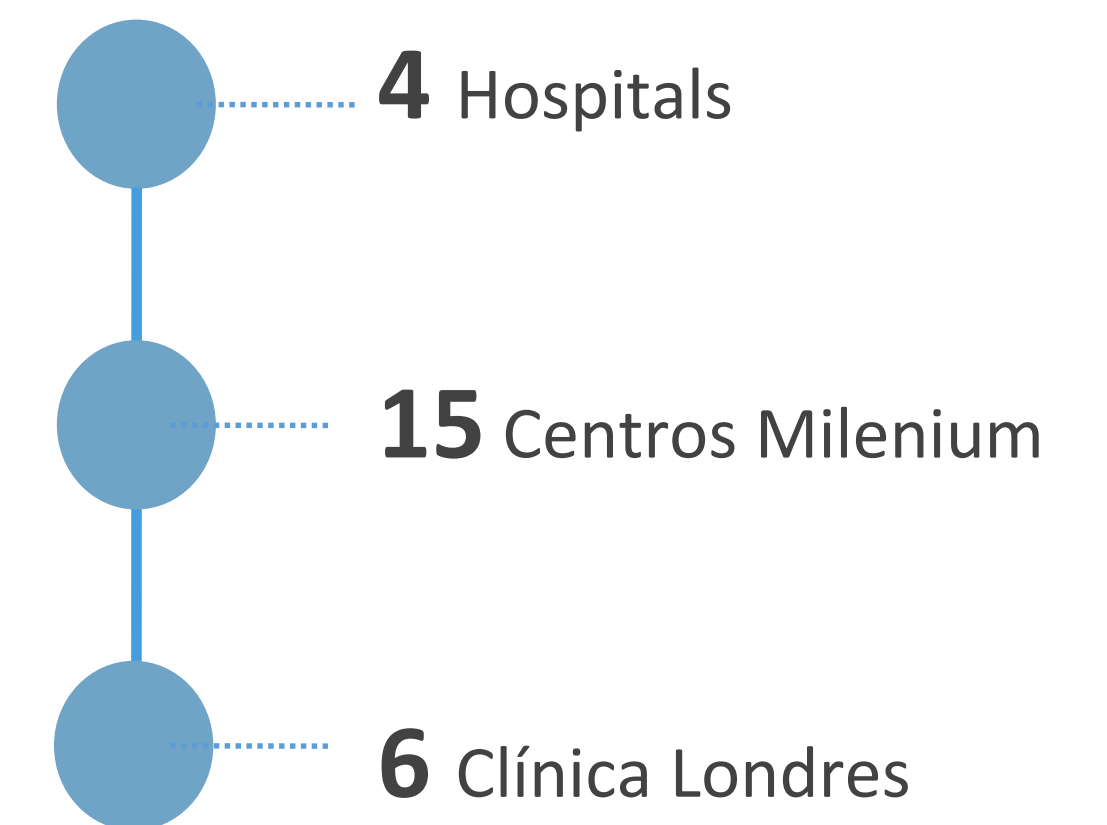
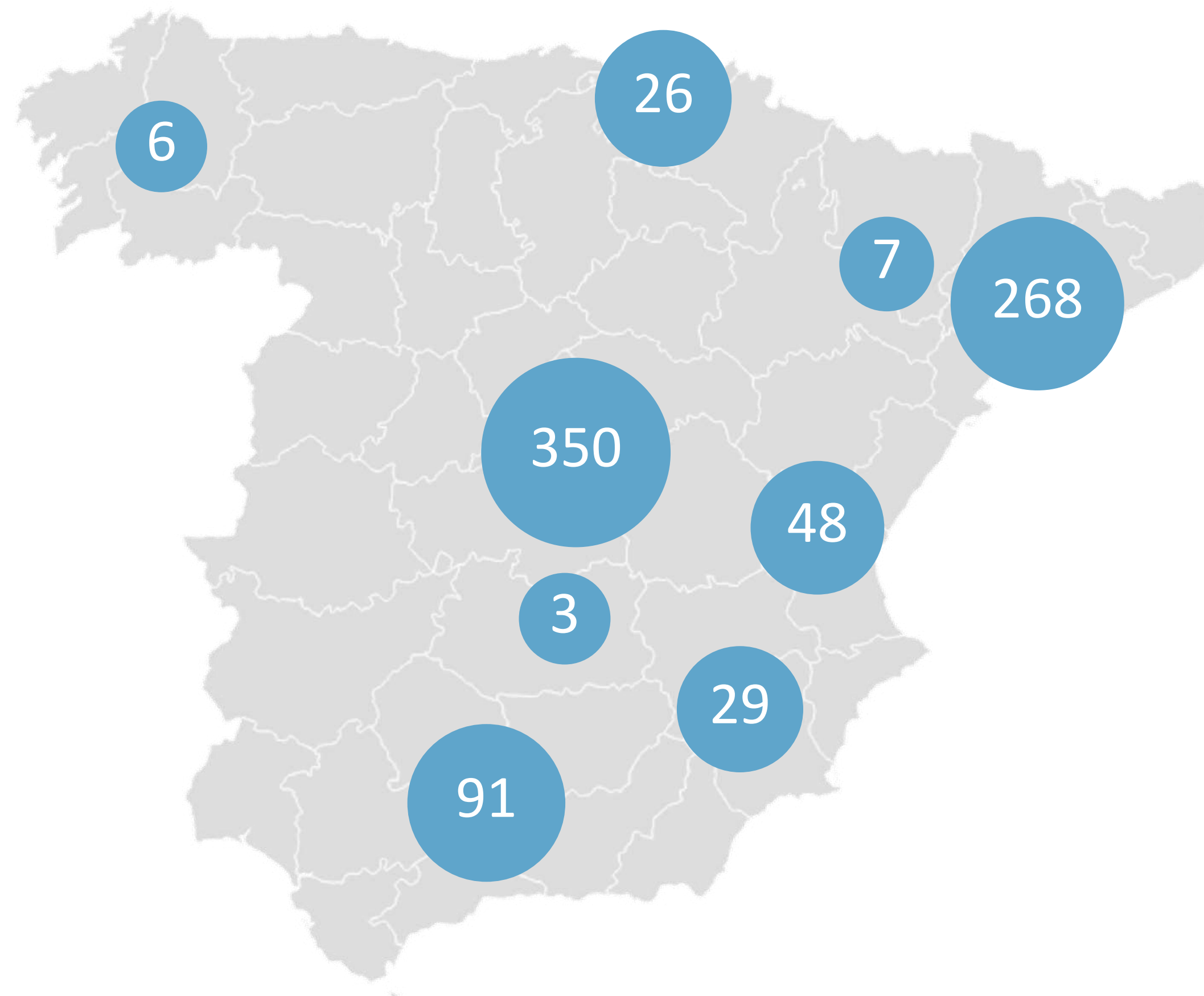
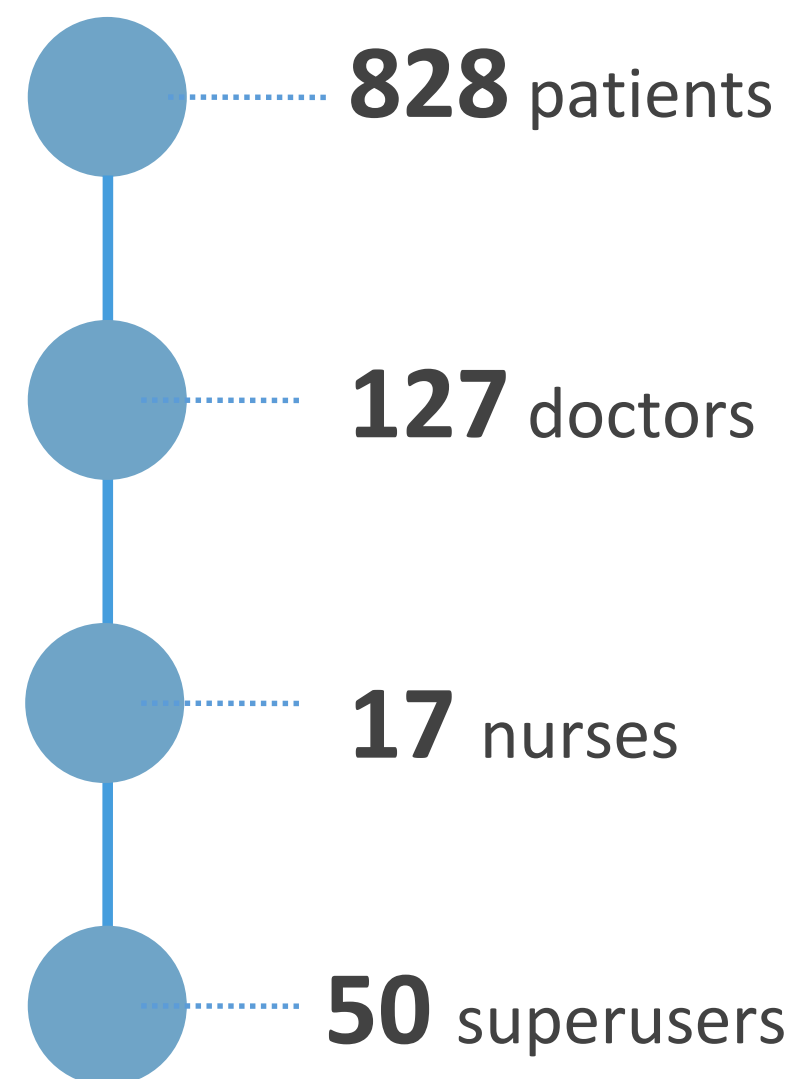
Smart Devices

Smart mirror, smart watch, robots, Google Home, Amazon Echo (Alexa), Apple HomePod (Siri), Microsoft (Cortana), telephone calls, social media



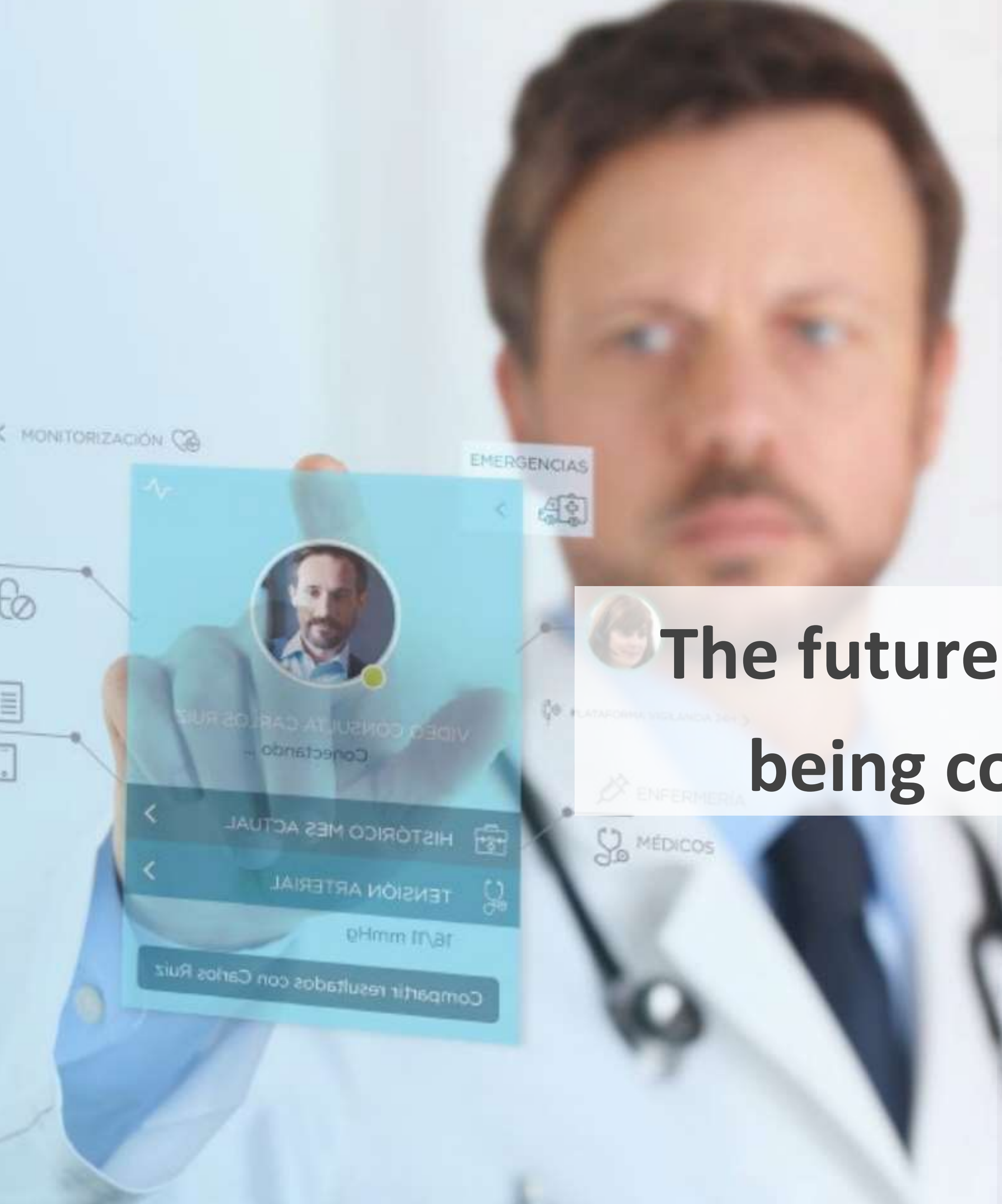


Across the entire Sanitas Hospitales network



A new service delivery model: outcomes

- **Improves patient experience.** We apply the Experience-based Codesign model
- **Optimizes patient follow-up.** “100 patients at the same time”
- **Reduces hospital stays.** From 7 to 3 days
- **Improves efficiency:** early risk detection, data-driven decisions and cost reduction
- **Sanitas as a driver of innovation and digital transformation** in the healthcare sector

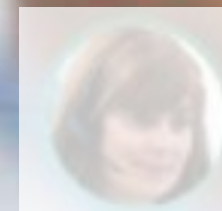


**Salud
Conectada**

Cuidamos
de tu Salud
en tiempo real

Sanitas

PARTE DE **Bupa**



**The future of health is
being connected!**





DIGITALIZING INDUSTRIES

COME JOIN US!

Thank you!

@cmorcilloserra @JVelazquezMoro



SAVE THE DATE
29 - 31 October 2019



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#IOTSWC19



FOR MORE INFO VISIT
www.iotsworldcongress.com