



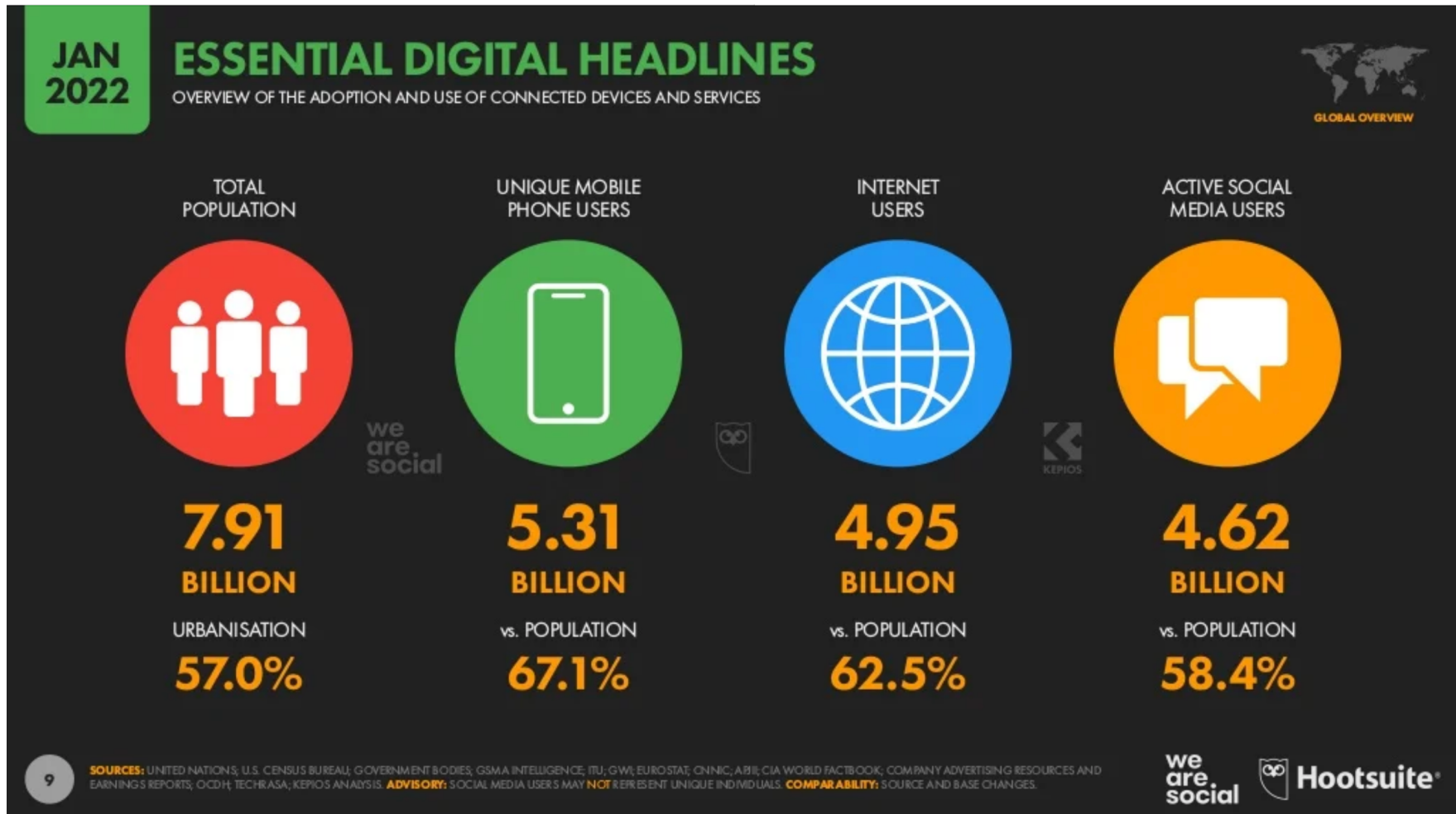
UNIVERSITÀ
DEGLI STUDI DI TRIESTE



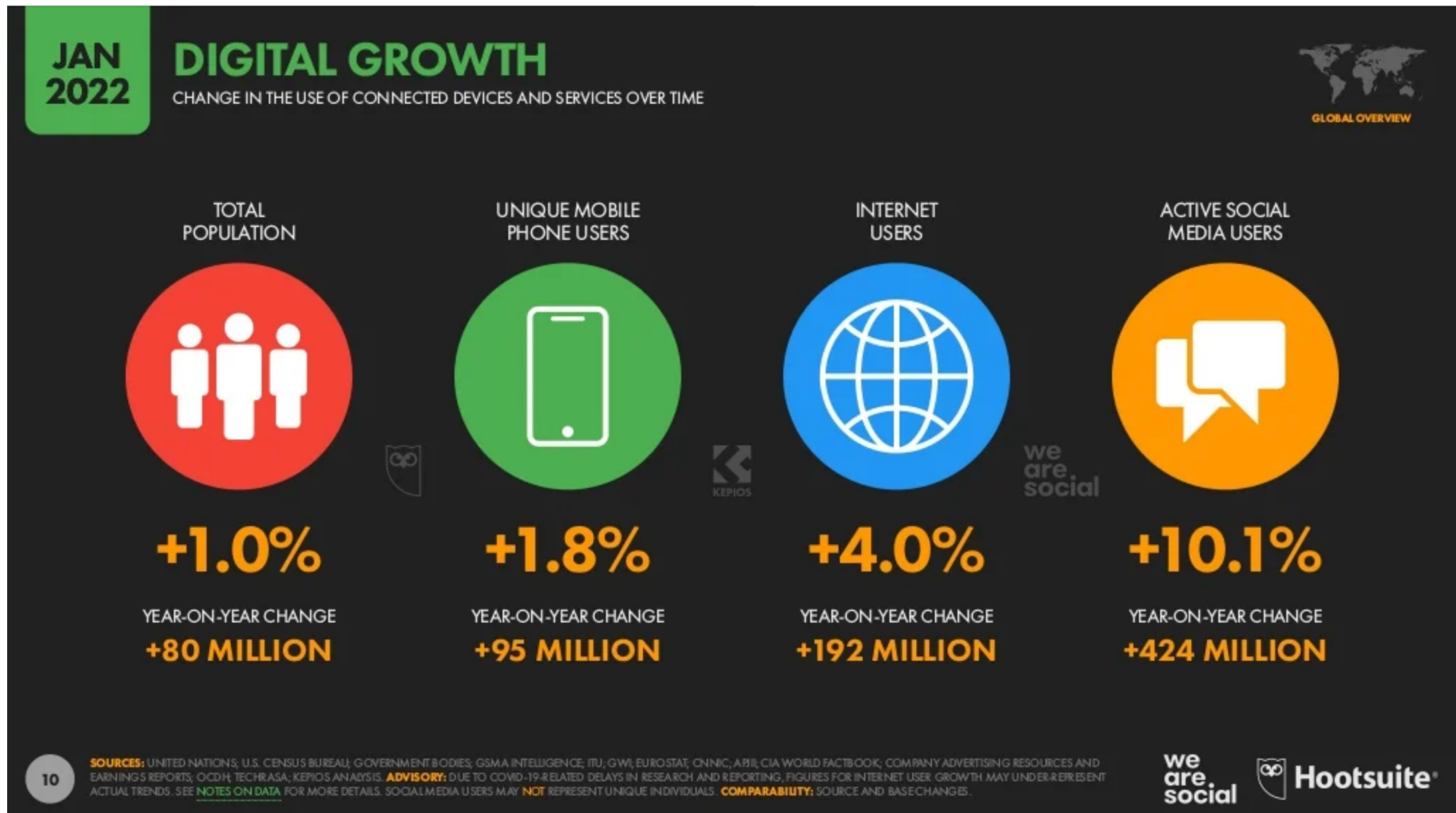
mHealth, Internet of Things, and telemedicine systems

Sara Marceglia

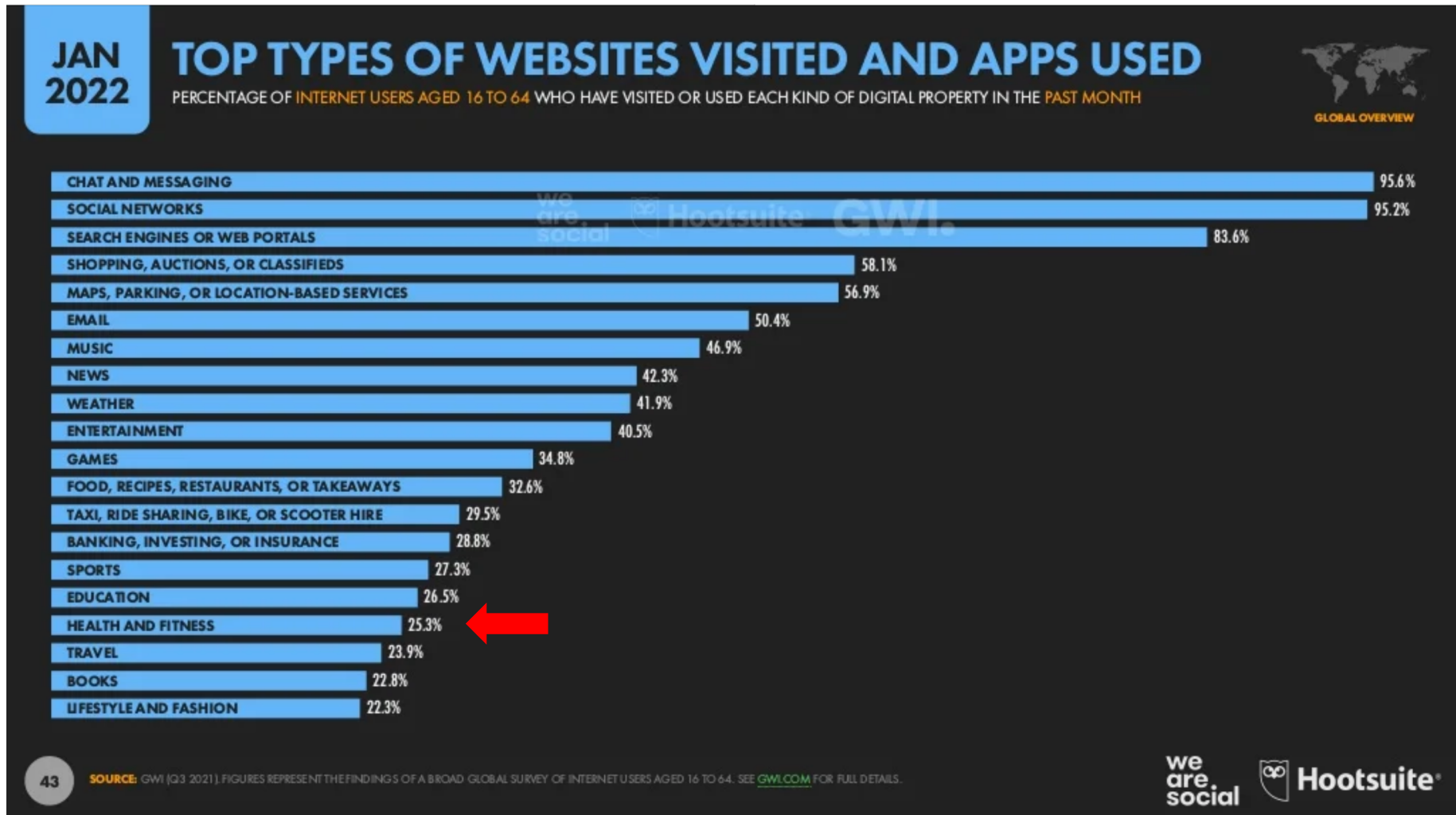
The app world



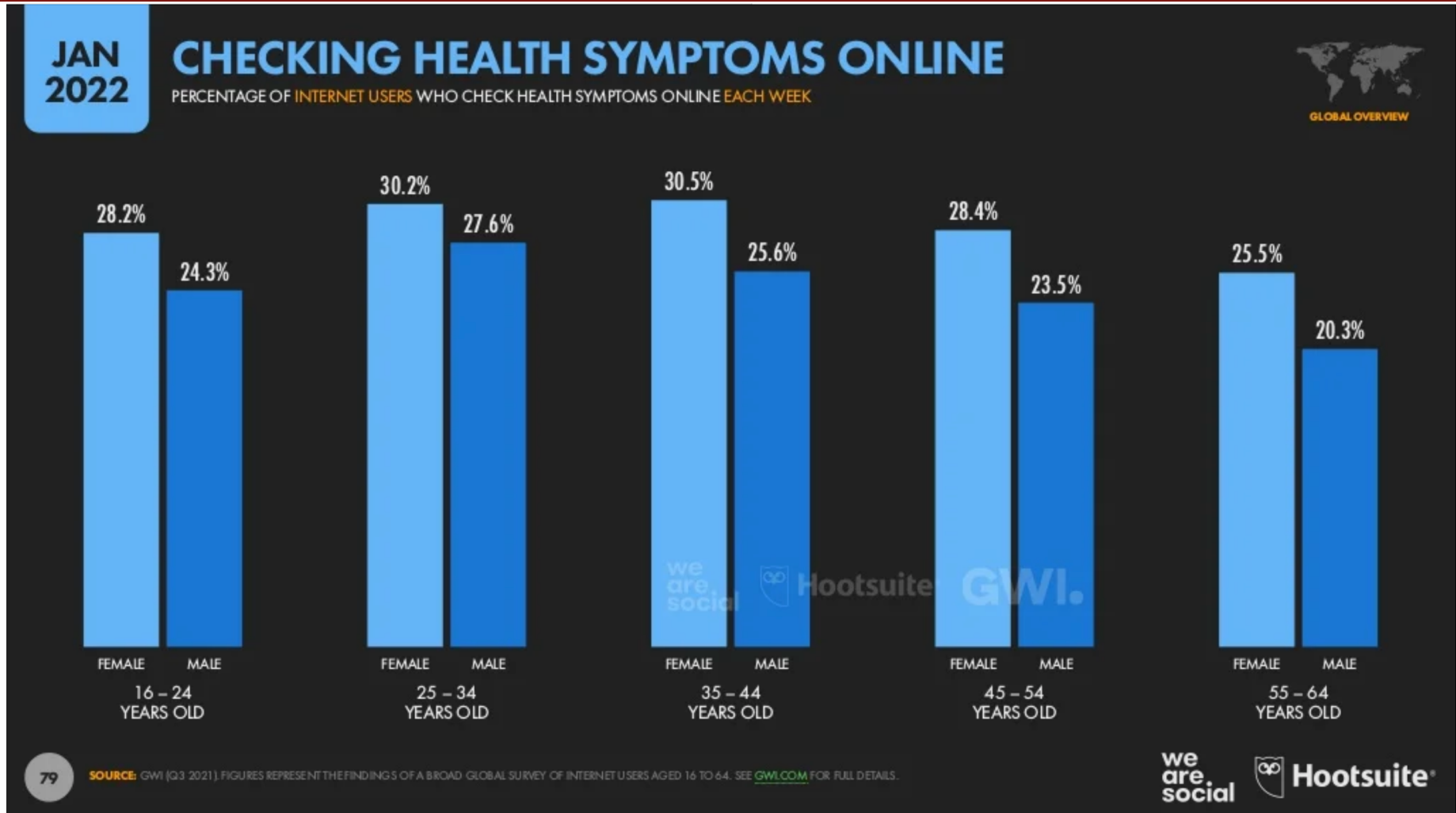
The app world



The app world



App and Health



HEALTH AND SOCIAL MEDIA

CORONAVIRUS
Fake news

RAFFREDDORE
ARIA TACHIPIRINA
ANTIBIOTICI IGIENE
CANDEGINA
PANE
LIMONI
FEBBRE
CALDO
CORONAVIRUS
ZANZARE
DISTANZA
MANI
BARBA
ANTIVIRALI
5G
CASA
TOSSE
AGLIO
SINTOMI
PROTEINE
TBC

IMN ISTITUTO DI RICERCHE
FARMACOLOGICHE
MARIO NEGRI · IRCCS

Istituto Ricerca Forma:

**ISTITUTO
AUXOLOGICO
ITALIANO**
Istituto di ricovero e cura a carattere scientifico

VIDEO OPINION: IL MEDICO È ONLINE ▶

CORI
Leggi
REFERTO
ONLINE

CHI SIAMO DIAGNOSI E CURA EQUIPE RICERCA E FORMAZIONE SEDI CONVENZIONI GALLERY CONTATTI EVENTI



April 17, 2020

Coronavirus: attenzione
alle bufale su social e chat

NEWS

Example: Health apps for neurology



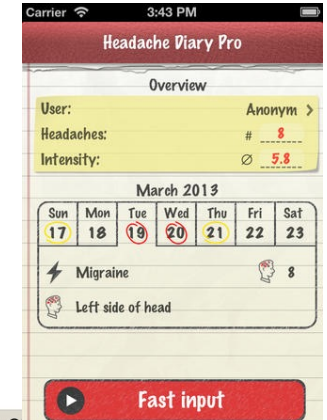
Epilepsy information



Seizure detection



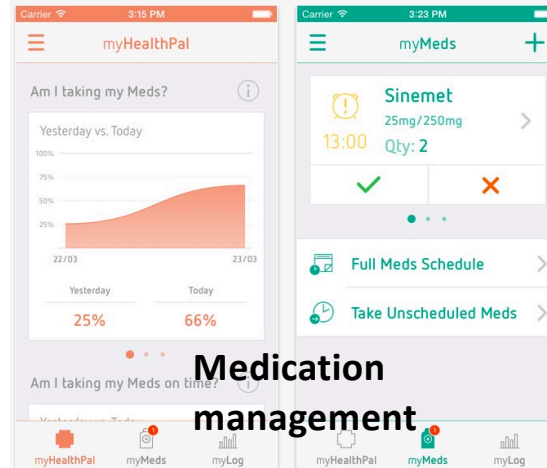
Post-stroke recovery



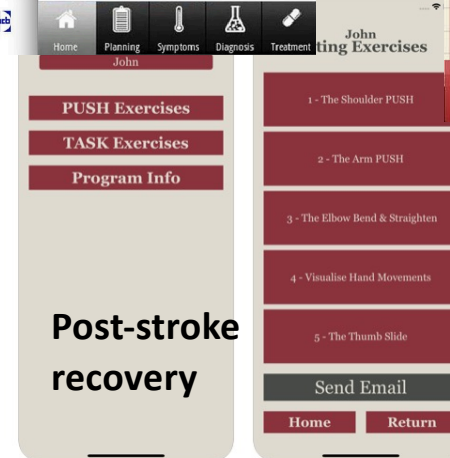
Headache diary



Cognitive Behavioural Therapy



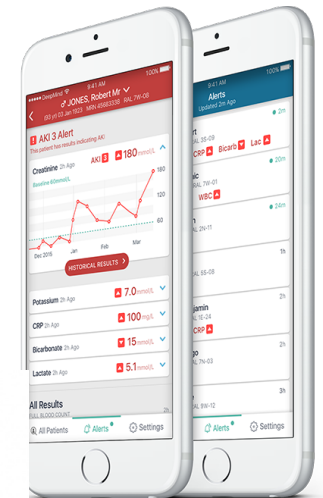
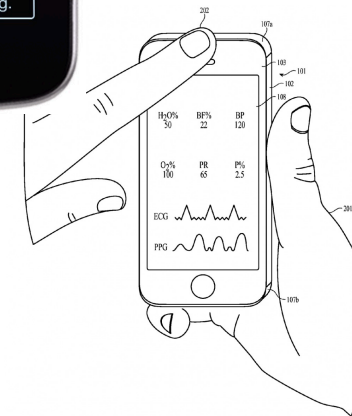
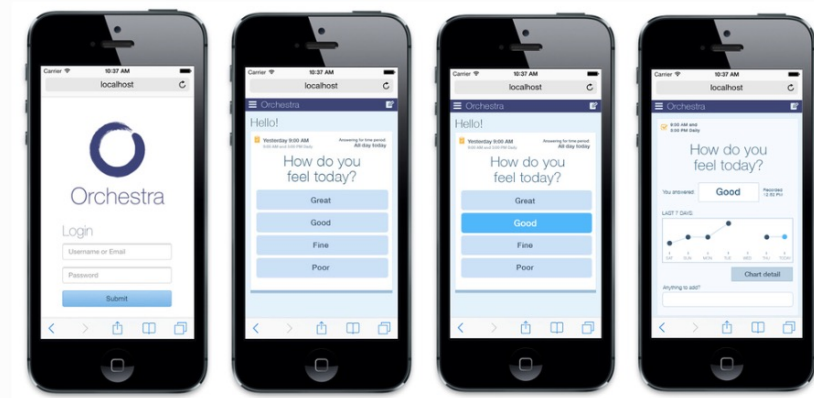
Medication management



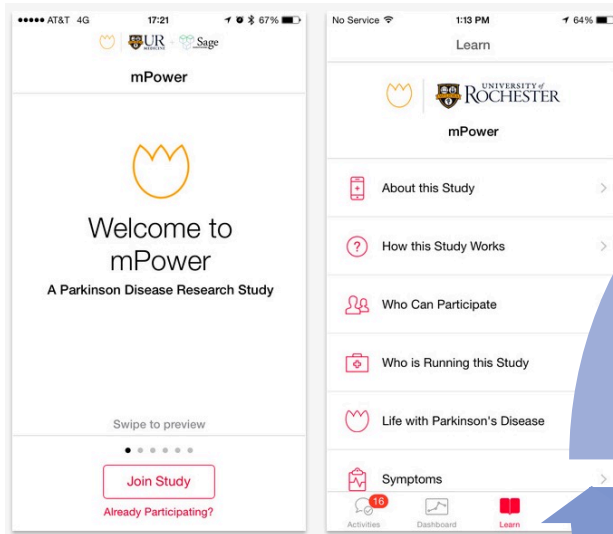
mHealth

m-Health → the use of mobile technologies to deliver e-Health

The mobile app Orchestra connects patients with their doctors for more continuous care, while researchers have access to useful data



Expectations



Data collection for research

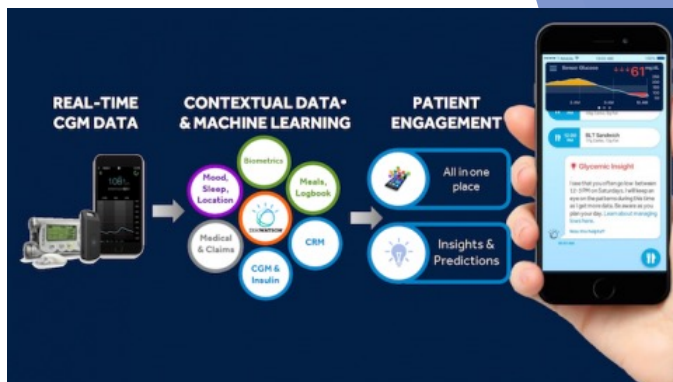
Healthcare inclusion



Personalized care

Real-time communication

The mobile app Orchestra connects patients with their doctors for more continuous care, while researchers have access to useful data



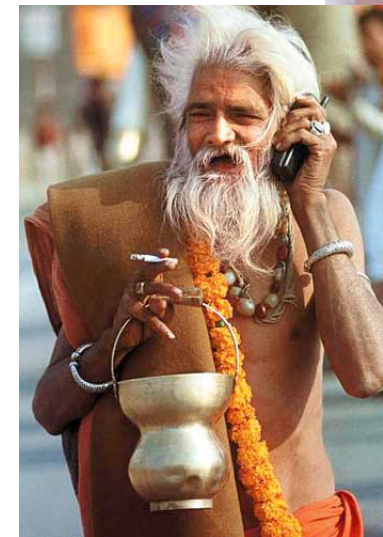
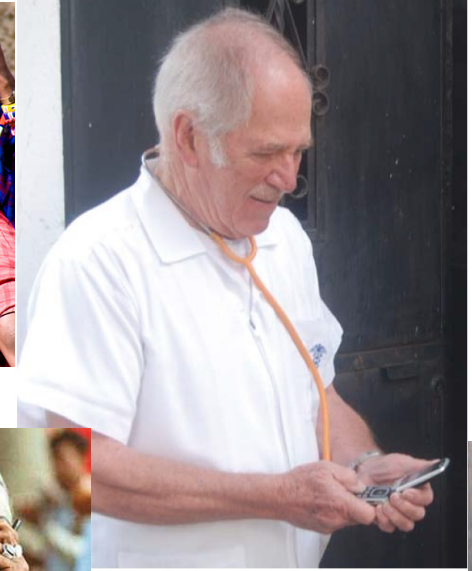
INTERACTIVE JOURNAL OF MEDICAL RE

Original Paper

WhatsApp Messenger as an Adjunctive Tool for Telemedicine: An Overview

WHY MOBILE: HEALTHCARE INCLUSION

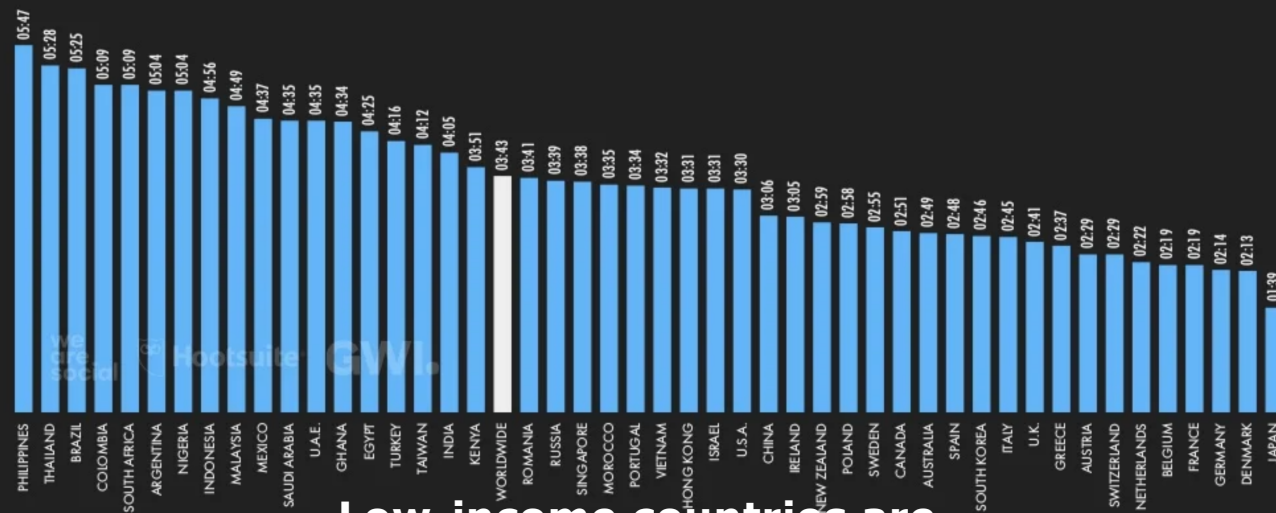
- Digital inclusion also of developing countries
- Distributing healthcare benefits across society (equity)



JAN 2022

TIME SPENT USING THE INTERNET ON MOBILES

AVERAGE AMOUNT OF TIME PER DAY THAT INTERNET USERS AGED 16 TO 64 SPEND USING THE INTERNET ON MOBILE PHONES



Low-income countries are above the world global average

WHY MOBILE: REAL-TIME COMMUNICATION

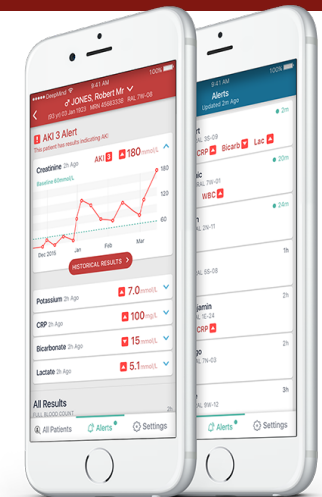
INTERACTIVE JOURNAL OF MEDICAL RESEARCH

Giordano et al

Original Paper

WhatsApp Messenger as an Adjunctive Tool for Telemedicine: An Overview

The mobile app Orchestra connects patients with their doctors for more continuous care, while researchers have access to useful data

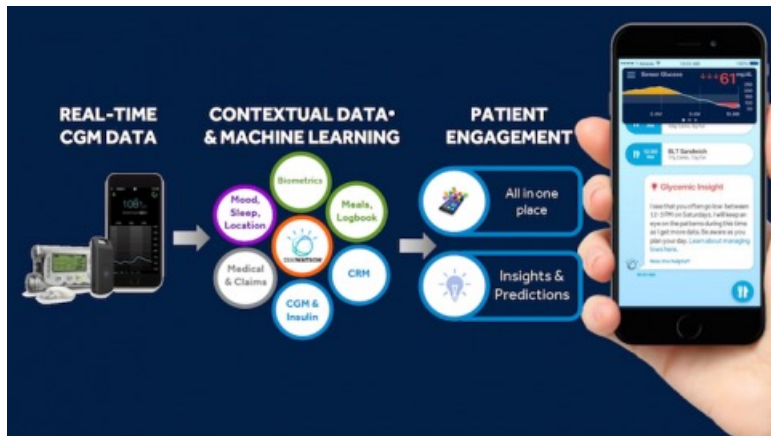


The app helps doctors get information about their acute kidney failure patients to enable faster diagnostics in situations where time is of the essence.

The app uses 'breaking news' alerts to make sure doctors' attention is directed to the patients who need it the most in the moment.

WHY MOBILE: PATIENT-CENTERED MEDICINE

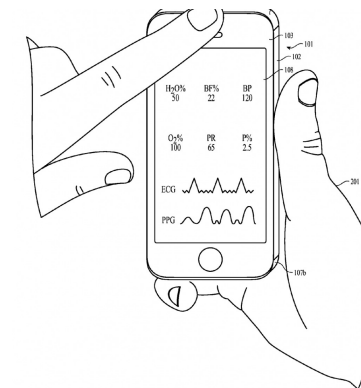
- Patient inclusion in healthcare delivery
- Increased education capability
- Services for non-patients (wellness, healthy lifestyle)
- Moving some health responsibilities to patients



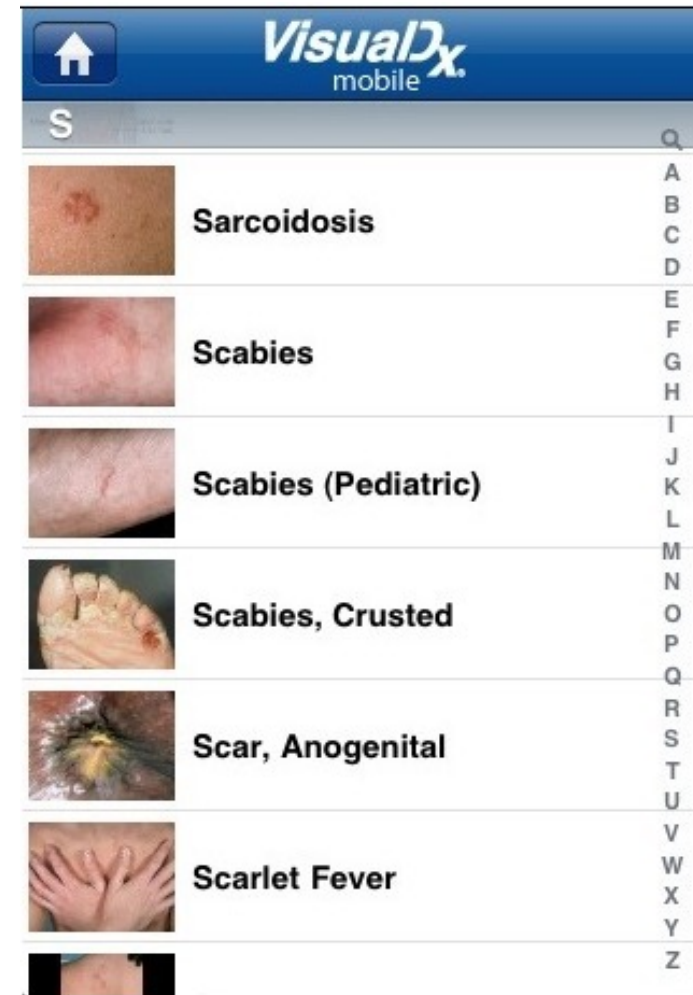
Cochlear Limited launches FDA-cleared, Apple-compatible cochlear implant
By Jeff Lagasse



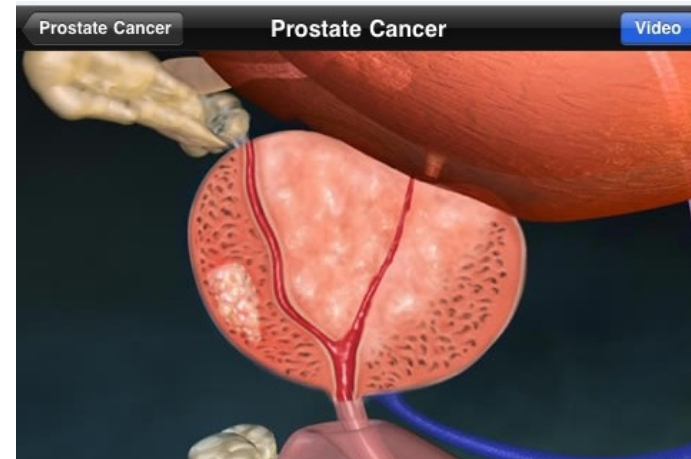
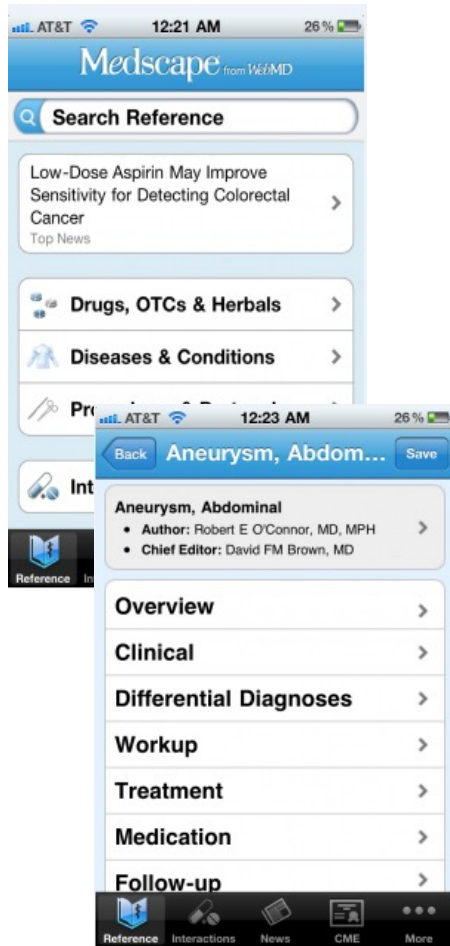
Newly granted Apple patent shows ways to turn an iPhone into a health sensor



WHY MOBILE: MEDICAL PRACTICE



WHY MOBILE: MEDICAL EDUCATION



WHY MOBILE: COLLECTING DATA FOR RESEARCH

Crowdsourcing for research

A Wandering Mind Is an Unhappy Mind



Matthew A. Killingsworth* and Daniel T. Gilbert

We solved this problem by developing a Web application for the iPhone (Apple Incorporated, Cupertino, California), which we used to create an unusually large database of real-time reports of thoughts, feelings, and actions of a broad range of people as they went about their daily activities. The application contacts participants through

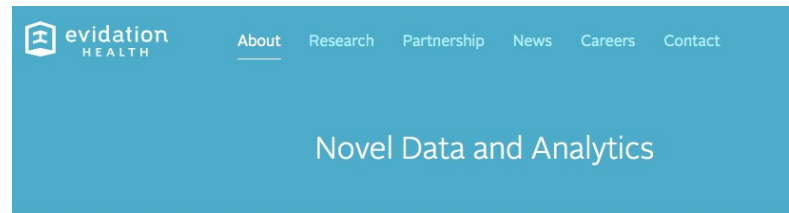
Large DNA study using 23andMe data finds 15 sites linked to depression

Collecting data for epidemics

Boston research company collecting COVID-19 data in new app

Coronavirus: NHS contact tracing app to target 80% of smartphone users

By Leo Kelion



Collect digital data for advanced analytics

Evidation Health's technology platform and services enable healthcare companies to partner with patients and consumers who are engaged in understanding and improving health outcomes.



Sanofi and Evidation Health to work together to understand, treat disease

By Jeff Lagasse | August 1, 2017

Medicines aren't the only tools that biopharma companies like Sanofi are using to help patients. Information technology has become a key tool in every part of Sanofi's business, and among the most important digital tools are data and analytics; they enable the company to apply insights gained from real world evidence to the discovery, development and delivery of new medicines. To advance that...



Brigham and Women's partners with Evidation Health to research impact of digital tools in clinical trials

By Heather Mack | October 21, 2016

The innovation arm of Brigham and Women's Hospital has partnered with efficacy-focused digital health company Evidation Health to collaborate on a project measuring the real life impact of digital health solutions on clinical and financial outcomes. The idea is to combine forces to develop methods of creating direct-to-patient trials of digital health solutions, leveraging the research...

CAVEATS (1): Content reliability

Medical apps for smartphones: lack of evidence undermines quality and safety

Arthur Willem Gerard Buijink,¹ Benjamin Jelle Louise Marshall³

BMJ

BMJ 2013;346:f1811 doi: 10.1136/bmj.f1811 (Published 20 March 2013)

Page 1 of 2

How do we know whether medical apps work?

Smartphone apps have the potential to transform the way the public manage their health and interact with health services, says **Margaret McCartney**, but regulation of medical apps has only just started

STUDY

Margaret McCartney *general practitioner, Glasgow*

Diagnostic Inaccuracy of Smartphone Applications for Melanoma Detection

Joel A. Wolf, BA; Jacqueline F. Mor Joseph C. English III, MD; Jonhan F

OPEN ACCESS Freely available online

PLOS ONE

mHealth: A Strategic Field without a Solid Scientific Soul. A Systematic Review of Pain-Related Apps

Rocio de la Vega, Jordi Miró*

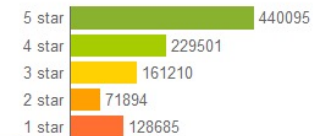
Unit for the Study and Treatment of Pain - ALGOS, Research Center for Behavior Assessment, Department of Psychology and Institut d'Investigació Sanitària Pere Virgili, Universitat Rovira i Virgili, Tarragona, Spain



Literature shows that **apps** provided for patients can be **inaccurate** or **uncontrolled** and that **apps reviewed in the scientific literature are not those available in stores**

- Internet search engines like **Google** are the **3rd source of information** (51,4%), **Facebook** is the **fifth** (43,7%).
- Among younger people:
 - **First: Facebook (71,1%)**
 - **Second: Google (68,7%)**
 - **Fourth: YouTube (53,6%)**

User Reviews



Average rating:

3.8



1,028,105



Apps are chosen based on the review of other users but **there are no recognized systems for app review**

CAVEATS (2): Privacy and security

- Individuals may have a **limited or incorrect understanding of when data about their health is protected by law, and when it is not** → some health-related information are stored in places that usually treat non-health information (e.g., Twitter, Facebook, etc) → HIPAA rule does not apply
- Health information collected in **different places without consistent security standards** may pose a cybersecurity threat (of which individuals may be unaware)
- Medical device manufacturers may not be covered entities or business associates under HIPAA. This leaves a **health care provider using a medical device with potentially greater responsibility for assuring privacy and security protections** for health information created and shared by the device



CAVEATS (3): Risks for the users

Cyberpsychology, Behavior, and Social Networking, VOL. 19, NO. 11 | Original Articles

🔒 normal

The Facebook Experiment: Quitting Facebook Leads to Higher Levels of Well-Being

Tromholt Morten ✉

Published Online: 1 Nov 2016 | <https://doi.org/10.1089/cyber.2016.0259>

SLEEP

Getting worked up with anxiety or envy from what we see on social media keeps the brain on high alert, preventing us from falling asleep

DISOTERTED MEMORIES

“If we direct all of our attention toward capturing the best shots for our social media followers to admire, less will be available to enjoy other aspects of the experience in real time,”

Gen Z is quitting social media in droves because it makes them unhappy, study finds

March 09, 2018 by Oliver McAteer, Campaign

It's the most socially savvy generation, but many are leaving multiple platforms and marketers need to know why.

American Academy
of Pediatrics



DEDICATED TO THE HEALTH OF ALL CHILDREN™

Guidance for the Clinician in
Rendering Pediatric Care

Clinical Report—The Impact of Social Media on
Children, Adolescents, and Families

RESPONSES TO CAVEATS (1): regulatory bodies



Contains Nonbinding Recommendations

Mobile Medical Applications

Guidance for Industry and Food and Drug Administration Staff

Document issued on February 9, 2015.

This document supersedes "Mobile Medical Applications: Guidance for Food and Drug Administration Staff" issued on September 25, 2013.

This document was updated to be consistent with the guidance document "Medical Devices Data Systems, Medical Image Storage Devices, and Medical Image Communication Devices" issued on February 9, 2015.

For questions about this document regarding CDRL-regulated devices, contact Bahad Patel at 301-796-5528 or by electronic mail at Bahad.Patel@fda.hhs.gov or contact the Office of the Center Director at 301-796-5900.

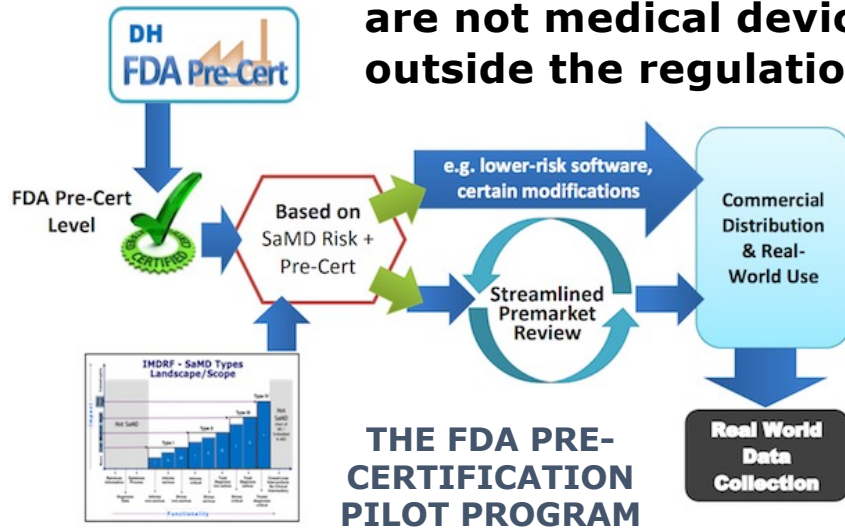
For questions about this document regarding CBDR-regulated devices, contact the Office of Communication, Outreach and Development (OCOD), by calling 1-800-835-4709 or 240-402-

Software e app mediche sono "dispositivi medici" e dovranno avere il marchio CE. La sentenza della Corte di Giustizia Europea

La Corte ha stabilito che "un software è di per sé un dispositivo medico quando è specificamente destinato dal fabbricante ad essere impiegato per una o più delle finalità mediche stabilite nella definizione di dispositivo medico" e partendo da tale assunto hanno dichiarato che il software può essere dispositivi medico anche senza impiego "sull'uomo". [LA SENTENZA](#)



There is a grey zone of Apps that are not medical devices and fall outside the regulation



Reclassification of mobile medical apps for smartphones and other mobile devices → generally risk class IIa, but under certain conditions can be risk class IIb or III. (Rule 11 in Annex VIII MDR)

May 2017

RESPONSES TO CAVEATS (1): regulatory bodies

Healthcare IT News

TOPICS

[Global Edition](#) [Medical Devices](#)

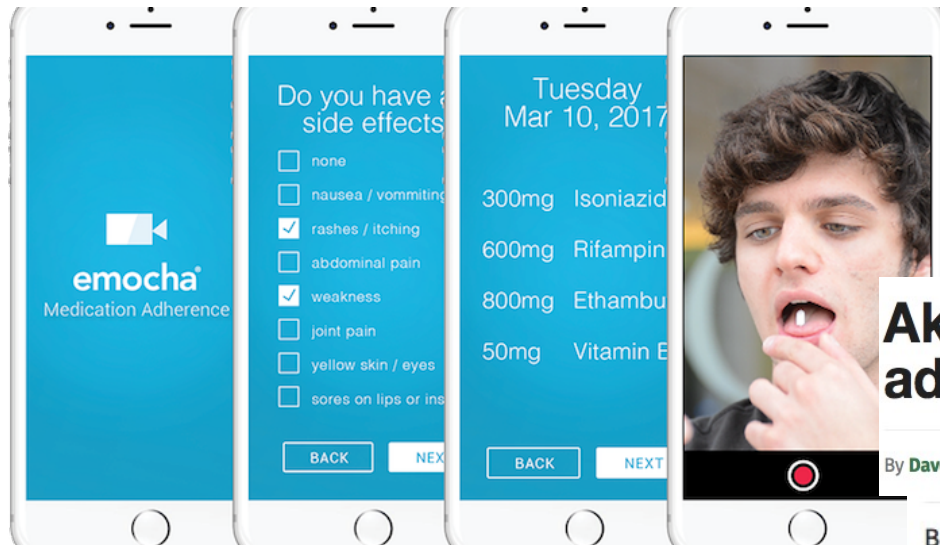
FDA hopes draft guidance on device software will offer 'clarity, simplicity'

The new document, published this past week, takes stock of a fast-changing technology environment – and would replace the agency's previous medical device guidance, first issued more than 16 years ago.

<https://www.healthcareitnews.com/news/fda-hopes-draft-guidance-device-software-will-offer-clarity-simplicity>

RESPONSES TO CAVEATS (2): companies moving forward

With \$1.7M NIDA grant, emocha will evaluate its app for treating opioid addiction



Mount Sinai launches RxUniverse, a system-wide platform to prescribe medical apps

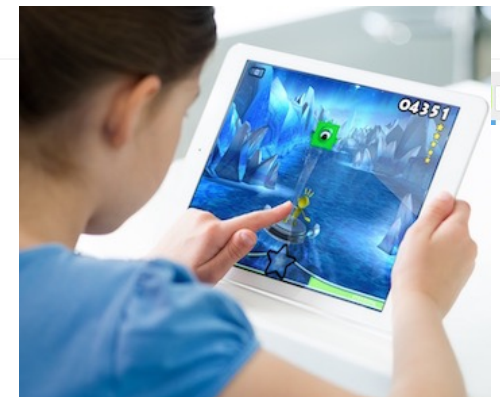
By Heather Mack (/content/heather-mack) | November 03, 2016

A screenshot of the RxUniverse login page. At the top, it says 'Mount Sinai RxUniverse RxU'. Below that is the question 'Have you prescribed an app today?'. There is a dropdown menu for 'Please choose your organization' with 'Mount Sinai' selected. Below are input fields for 'Work Email' and 'Password'. A 'Forgot Password?' link is next to the password field. A purple 'Log in' button is at the bottom. At the very bottom, there is a link for 'New User? Register Here'.

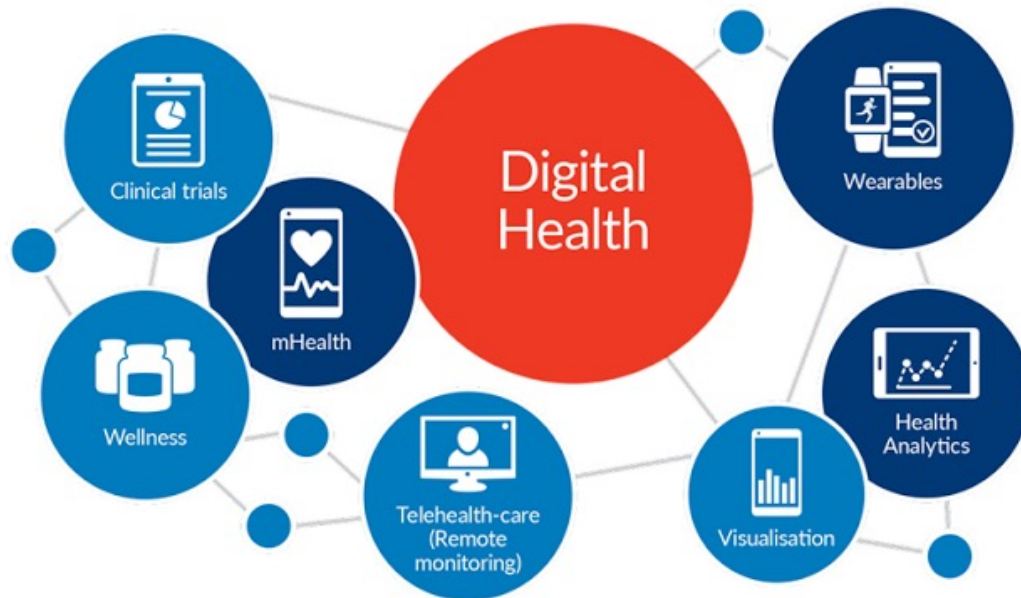
Akili preparing FDA bid following strong results of adolescent ADHD trial

By Dave Muoio | December 04, 2017

Boston-based **Akili Interactive Labs** has announced positive results from the largest clinical trial of its video game-based pediatric ADHD treatment yet. In light of these data, the company announced that it now plans to file AKL-T01, also known as Project: Evo ADHD Treatment, for FDA clearance as a novel treatment for children and adolescents with ADHD



Internet of Things



*"Interconnection of sensing and actuating **devices** providing the ability to **share information** across platforms through a unified framework, developing a common operating picture for **enabling innovative applications**. This is achieved by seamless **ubiquitous sensing, data analytics and information representation with Cloud computing** as the unifying framework."*

Apps, wereable & implantable devices

Hollywog launches smartphone-controlled pain management wearable

By Dave Maolo | October 09, 2017



The number of devices connected to the Internet was 12.5 billion in 2010, making the number of connected devices per person >1 (1.84) for the first time in history. Now they are 25 billions



Medtronic implantable device for treating chronic pain by delivering neurostimulation at the spinal cord is connected to a Samsung Galaxy Tab S2, to allow data capturing and IPG controlling



GIZWEAR.net

SOWATCH: lo smartwatch che previene l'ictus

Digital Health, Ultime Notizie | 26/09/2016 | Gianluca Parrigiani



THIM, il primo wearable al mondo "migliora-sonno" | Video



Hodei Technology helps hospitals use Google Glass for surgical collaboration; rural telemedicine

Apple Watch adds gym equipment integration, built-in Bluetooth



"Apple Watch is designed to help you live a healthier life," CEO Tim Cook said, "and people are absolutely loving the fitness capabilities, the health capabilities, the quick access to information, and even the ability to swim with it."

The biggest update to the Apple Watch health and fitness suite was an integration between the watch and fitness equipment at the gym. Brands like LifeFitness, Matrix, TechnoGym, Star Trac, Cybex, Schwinn, and StairMaster, which sell 80 percent of the country's fitness equipment, will start to roll out Apple Watch-integrated equipment this fall.

In-Depth: How digital sensors could change the face of pharma

By **Jonah Comstock** | November 17, 2017

Earlier this week, Proteus Digital Health and Otsuka Pharmaceuticals announced that Abilify MyCite, a new, sensor-enabled version of Otsuka's drug for schizophrenia, **had received FDA approval** for mental health conditions including schizophrenia and bipolar disorder.

The Proteus digital medicine platform is a medication management and adherence system that includes sensor-enabled pills, a peel-and-stick biometric sensor patch worn on the body, and a companion smartphone app. The patch records when a pill is ingested and can also track other things like sleep patterns and physical activity levels.

A historic clearance

For those who have been aware of Proteus for a long time, the importance of this latest regulatory win might not be obvious. It's far from the first FDA nod for the startup, which saw its patch first cleared in 2010 and its pill first cleared in 2012. Proteus has also been using its technology in small hospital deployments for some time.



Nonetheless, this is something new and potentially game changing. For one thing, previous clearances went through the FDA's medical device pathway and didn't allow the system to be prescribed the way the Abilify's clearance eventually will.

Telemedicine and Telehealth

TELEMEDICINE

- Integration, monitoring and management of patients, as well as education of patients and healthcare professionals using systems and technologies allowing a prompt communication with experts and an effective access to patient's information, independent from where the patient is or the information are stored" (*EC commission, 1990*)

TELEHEALTH

- Delivery of health care services, where patients and providers are separated by distance. Telehealth uses ICT for the exchange of information for the diagnosis and treatment of diseases and injuries, research and evaluation, and for the continuing education of health professionals. Telehealth can contribute to achieving universal health coverage by improving access for patients to quality, cost-effective, health services wherever they may be. It is particularly valuable for those in remote areas, vulnerable groups and ageing populations (*WHO*)

Telemedicine

Synchronous telemedicine

Real-Time

Provider and patient communicate via live video-conferencing. Used often in telepsychiatry, telehomecare, telecardiology and remote consults (teleconsults) with specialists, primary care physicians, counselors, social workers and other health care professionals.

Asynchronous telemedicine

Store & Forward

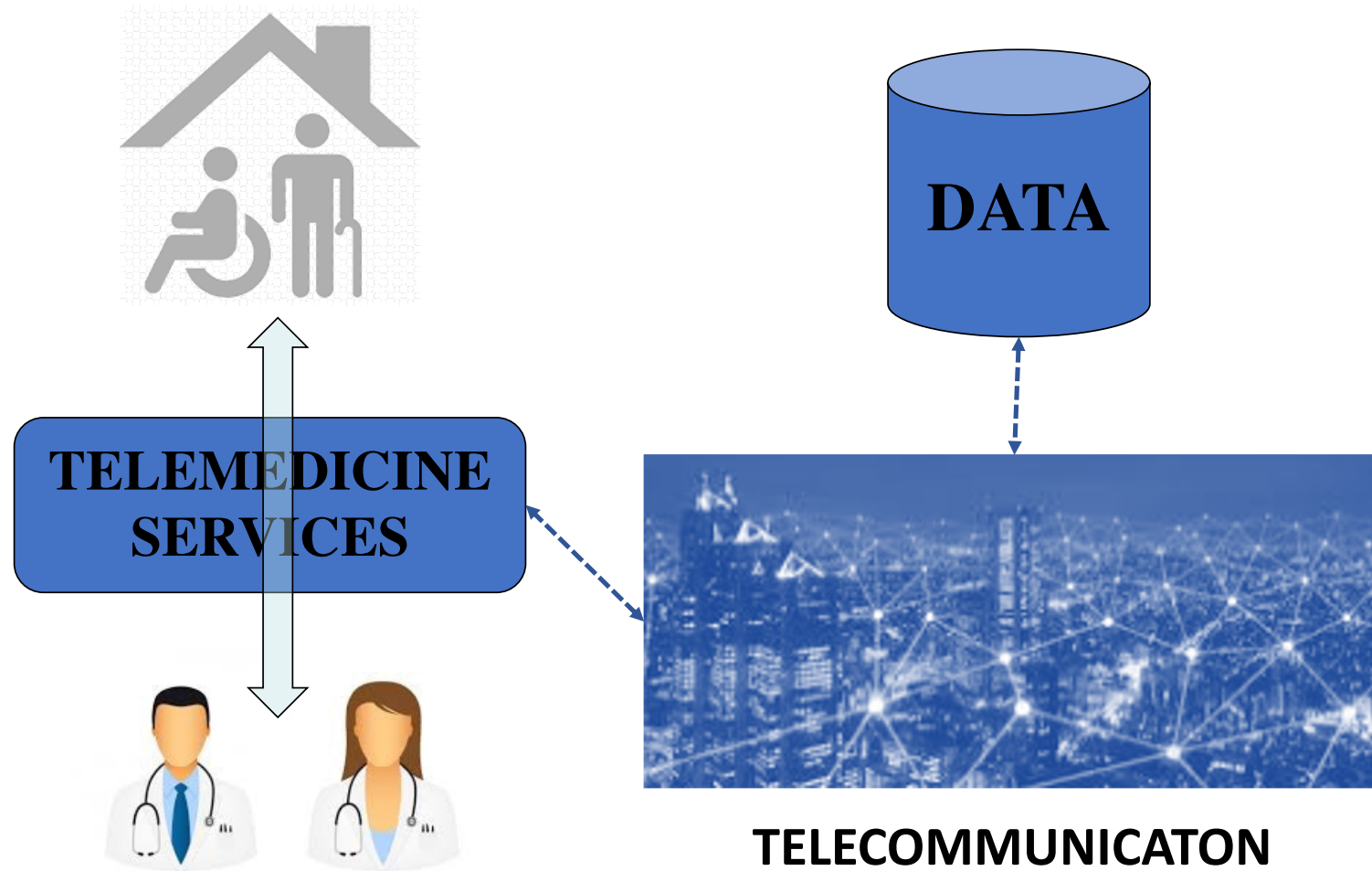
Digital images, video, audio, clinical data are captured and stored on a patient's computer or mobile device and then transmitted securely to a provider for later study or analysis. Used often in teledermatology and telepathology.

Telemonitoring

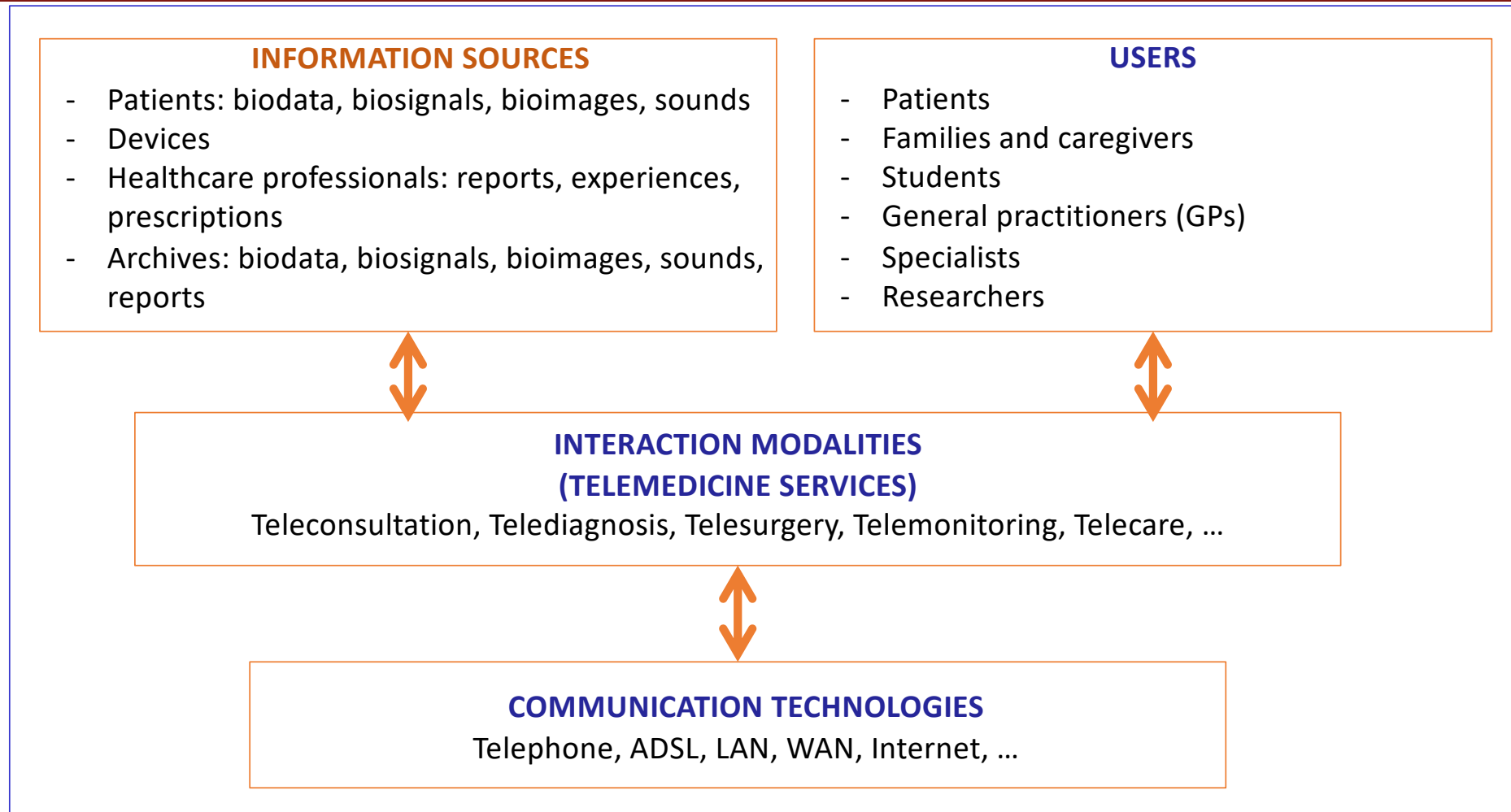
Remote Monitoring

Patient uses a system that feeds data from sensors and monitoring equipment to an external monitoring center so that health care professionals can monitor a patient remotely. Used to monitor chronic conditions such as heart disease, diabetes and asthma.

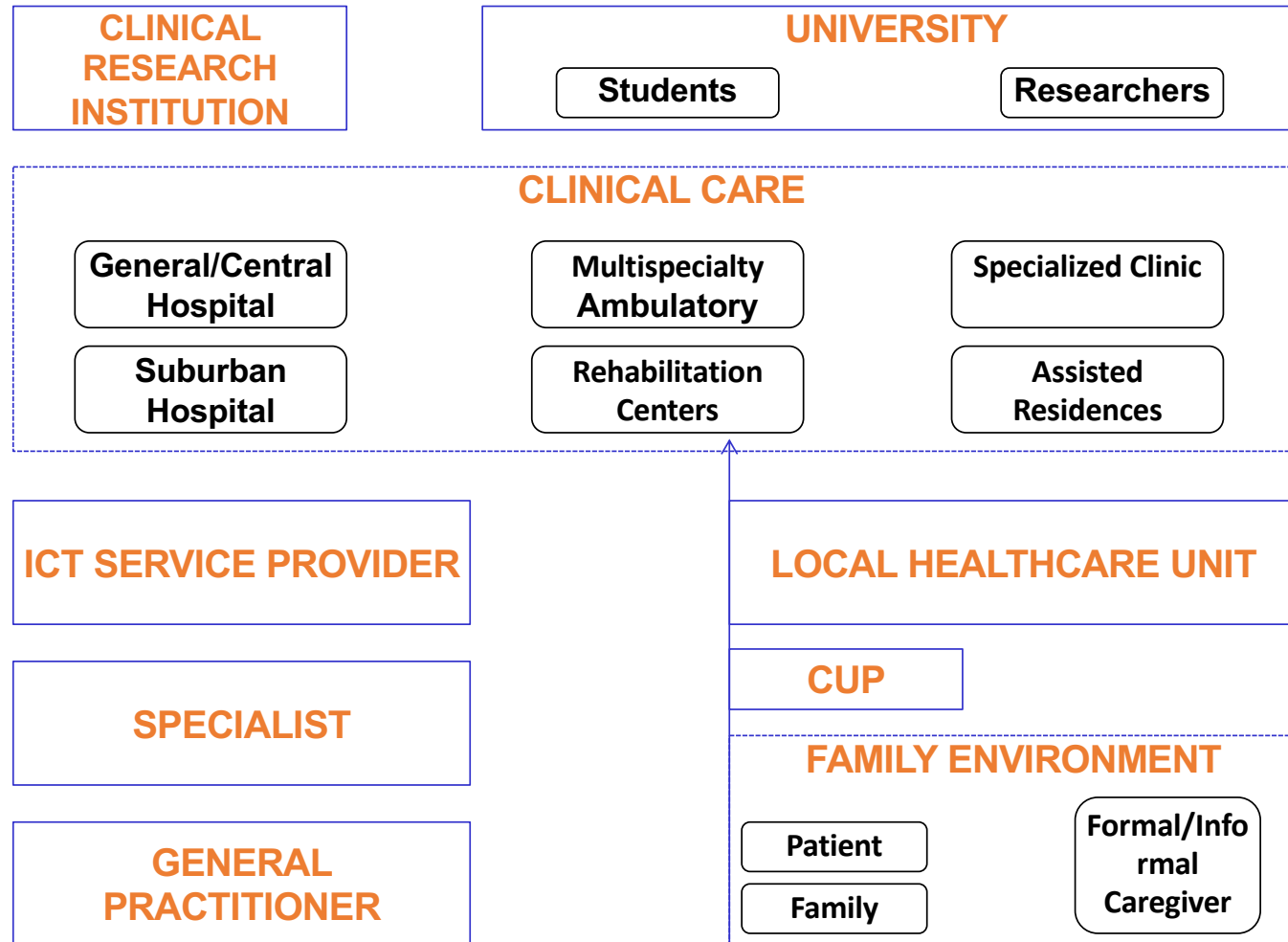
Application scenario



A general model for telemedicine



Actors involved



Telemedicine classification by service

Tele-reporting

- the reports are created and visualized remotely

Tele-consultation

- a second opinion is asked remotely

Tele-explanation

- from a specialized to a non-specialized physician

Tele-psychology

- to provide comfort to the patient/family

Tele-monitoring

- remote monitoring of patient's clinical condition

Tele-prescription

- remote prescribing (drug, therapies, rehabilitation, activities, exercises,..)

Tele-control

- possibility to remotely change what is monitored

Tele-booking

- remote booking of visits, exams, ...

Tele-administration

- remote control of administrative procedures

Tele-education

- training, support, and even examination in a remote fashion

Examples

Televisits

The image shows a screenshot of the DaVinci website. At the top left is the logo, which consists of a heart shape with a white caduceus symbol inside, followed by the word "davinci" in a lowercase, sans-serif font. To the right of the logo is a horizontal navigation menu with the following items: "HOME", "COME FUNZIONA", "COSA TRATTIAMO" (with a downward arrow), "CHI SIAMO", and "NOVITÀ MAMME". Below this menu is the text "TELEMONITORAGGIO". On the far right of the top navigation area is a dark blue button with the white text "ACCEDI". Below the navigation is a dark blue banner with white text. It features a small logo at the top center that says "VICINI VINCIAMO" with a heart icon, followed by "EMERGENZA COVID" and "Consulti Online Gratuiti" in a larger font. At the bottom of the banner is the hashtag "#ViciniVinciamo". On the left and right sides of the banner are white icons of a coronavirus particle. Below the banner is a large advertisement. The background is a blurred image of a person's hands holding a tablet. On the tablet screen, a video call is in progress. The main part of the screen shows a female doctor in a white lab coat with a stethoscope around her neck, sitting at a desk. A smaller inset window in the bottom left corner of the tablet shows a female patient. To the left of the tablet, the text "Il tuo dottore" is written in a large, white, sans-serif font, with "ONLINE" below it in a much larger, bold, white, sans-serif font. Below this text is a paragraph: "Con DaVinci puoi consultare facilmente un dottore o uno psicologo tramite videochiamata dove e quando è più comodo per te". At the bottom left of the advertisement is a dark blue button with the white text "PARLA CON UN DOTTORE".

davinci

HOME COME FUNZIONA COSA TRATTIAMO ▾ CHI SIAMO NOVITÀ MAMME

TELEMONITORAGGIO

ACCEDI

VICINI VINCIAMO
EMERGENZA COVID
Consulti Online Gratuiti
#ViciniVinciamo

Il tuo dottore
ONLINE

Con DaVinci puoi consultare facilmente un dottore o uno psicologo tramite videochiamata dove e quando è più comodo per te

PARLA CON UN DOTTORE

Examples

Telerehabilitation



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[Servizi](#)

[Esperti](#)

[Come Funziona](#)

[Chi siamo](#)

[Contatti](#)



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COVID boost of telemedicine and telehealth systems

JAMA Neurology August 2020 Volume 77, Number 8

VIEWPOINT

The Coronavirus Disease 2019 Crisis as Catalyst for Telemedicine for Chronic Neurological Disorders

Vol. ■ No. ■ 2020

Journal of Pain and Symptom Management 1

COVID-19 for Fast Track Publication

Telemedicine in the Time of Coronavirus

Brook Calton, MD, MHS, Naulzey Abedini, MD, MSc, and Michael Fratkin, MD
Division of Palliative Medicine (B.C., N.A.), Department of Medicine, University of California, San Francisco (UCSF), San Francisco, California; and ResolutionCare (M.F.), Eureka, California, USA

Tele-Neuro-Ophthalmology During the Age of COVID-1

Kevin E. Lai, MD, Melissa W. Ko, MD, Janet C. Rucker, MD, Jeffrey G. Odel, MD, Linus D. Sun, MD, PhD, Kimberly M. Wings, MD, Arko Ghosh, BS, Shruthi Harish Bindiganavile, MD, Nita Bhat, MD, Sydney P. Wendt, BS, Jackson M. Scharf, BS, Marc J. Dinkin, MD, Nailyn Rasool, MD, Steven L. Galetta, MD, Andrew G. Lee, MD

PERSPECTIVES IN HOSPITAL MEDICINE

Keep Calm and Log On: Telemedicine for COVID-19 Pandemic Response

Ameet Doshi, MD, MBA*, Yonatan Platt, MD, John R Dressen, MHA, Benji K Mathews, MD, FACP, SFHM, Jerome C Siy, MD, MHA, SFHM

Department of Hospital Medicine, HealthPartners, Bloomington, Minnesota.

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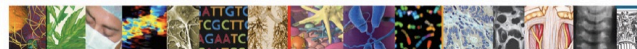
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From Isolation to Coordination: How Can Telemedicine Help Combat the COVID-19 Outbreak?

Yunkai Zhai, Yichuan Wang, Minhao Zhang, Jody Hoffer Gittel, Shuai Jiang, Baozhan Chen, Fangfang Cui, Xianying He, Jie Zhao, Xiaojun Wang
doi: <https://doi.org/10.1101/2020.02.20.20025957>

This article is a preprint and has not been peer-reviewed [what does this mean?]. It reports new medical research that has yet to be evaluated and so should not be used to guide clinical practice.

Ruggero Capra¹ - Flavia Mattioli²



The NEW ENGLAND JOURNAL of MEDICINE

Virtually Perfect? Telemedicine for Covid-19

Judd E. Hollander, M.D., and Brendan G. Carr, M.D.

Review

Telehealth in pediatric epilepsy care: A rapid transition during the COVID-19 pandemic

Shifteh Sattar^a, Rachel Kuperman^{b,*}

Epilepsy & Behavior 111 (2020) 107282

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Epilepsy & Behavior

journal homepage: www.elsevier.com/locate/yebeh



Accelerating Telemedicine for Cerebral Palsy During the COVID-19 Pandemic and Beyond

Hilla Ben-Pazj^{1,2,3*}, Liana Beni-Adani^{1,4} and Ron Lamdan¹

Telemedicine use

Rapporto ISS COVID-19 • n. 12/2020

**Indicazioni *ad interim* per servizi
assistenziali di telemedicina durante
l'emergenza sanitaria COVID-19**

versione 13 aprile 2020

Ministero della Salute

TELEMEDICINA
Linee di indirizzo nazionali

2014

Services

CLASSIFICAZIONE		AMBITO	PAZIENTI	RELAZIONE	
TELEMEDICINA SPECIALISTICA	TELE VISITA	sanitario	Può essere rivolta a patologie acute, croniche, a situazioni di post-acuzie	Presenza attiva del Paziente	B2C B2B2C
	TELE CONSULTO			Assenza del Paziente	B2B
	TELE COOPERAZIONE SANITARIA			Presenza del Paziente, <i>in tempo reale</i>	B2B2C
TELE SALUTE		sanitario	E' prevalentemente rivolta a patologie croniche	Presenza attiva del Paziente	B2C B2B2C
TELE ASSISTENZA		socio-assistenziale	Può essere rivolta ad anziani e fragili e diversamente abili		

* B2B: individua la relazione tra medici

B2B2C: individua la relazione tra un medico e un paziente mediata attraverso un operatore sanitario

B2C: individua la relazione tra medico e paziente

Telemedicina specialistica

Dipendentemente dal tipo di relazione tra gli attori coinvolti, le prestazioni della Telemedicina Specialistica si possono realizzare secondo le seguenti modalità:

Televisita

La Televisita è un atto sanitario in cui il medico interagisce a distanza con il paziente. L'atto sanitario di diagnosi che scaturisce dalla visita può dar luogo alla prescrizione di farmaci o di cure. Durante la Televisita un operatore sanitario che si trovi vicino al paziente, può assistere il medico. Il collegamento deve consentire di vedere e interagire con il paziente e deve avvenire in tempo reale o differito.

Teleconsulto

Il Teleconsulto è un'indicazione di diagnosi e/o di scelta di una terapia senza la presenza fisica del paziente. Si tratta di un'attività di consulenza a distanza fra medici che permette a un medico di chiedere il consiglio di uno o più medici, in ragione di specifica formazione e competenza, sulla base di informazioni mediche legate alla presa in carico del paziente.

Telecooperazione sanitaria

La Telecooperazione sanitaria è un atto consistente nell'assistenza fornita da un medico o altro operatore sanitario ad un altro medico o altro operatore sanitario impegnato in un atto sanitario. Il termine viene anche utilizzato per la consulenza fornita a quanti prestano un soccorso d'urgenza.

Telesalute

La registrazione e trasmissione dei dati può essere automatizzata o realizzata da parte del paziente stesso o di un operatore sanitario.

La Telesalute prevede un ruolo attivo del medico (presa in carico del paziente) e un ruolo attivo del paziente (autocura), prevalentemente pazienti affetti da patologie croniche, e in questo si differenzia dal Telemonitoraggio. La Telesalute comprende il Telemonitoraggio, ma lo scambio di dati (parametri vitali) tra il paziente (a casa, in farmacia, in strutture assistenziali dedicate,...) e una postazione di monitoraggio non avviene solo per l'interpretazione dei dati, ma anche per supportare i programmi di gestione della terapia e per migliorare la informazione e formazione (knowledge and behaviour) del paziente.

Telemonitoraggio

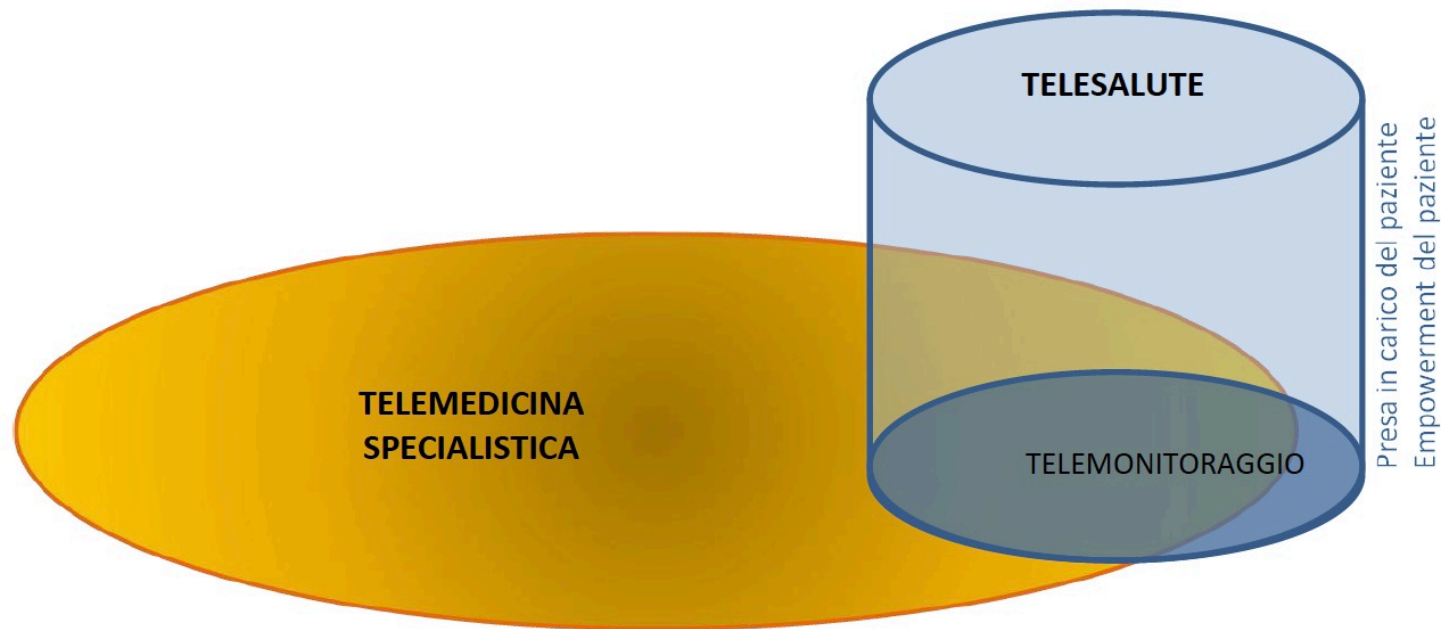


Figura 2.1 Rappresentazione schematica dei rapporti tra Telemonitoraggio, Telemedicina Specialistica e Telesalute. Si evidenzia il ruolo attivo del Paziente (Empowerment) e del Medico (presa in carico) nel caso della Telesalute, che espande il concetto del curare nella direzione del prendersi cura (medicina di iniziativa).

Teleassistenza

Per Teleassistenza, si intende un sistema socio-assistenziale per la presa in carico della persona anziana o fragile a domicilio, tramite la gestione di allarmi, di attivazione dei servizi di emergenza, di chiamate di “supporto” da parte di un centro servizi. La Teleassistenza ha un contenuto prevalentemente sociale, con confini sfumati verso quello sanitario, con il quale dovrebbe connettersi al fine di garantire la continuità assistenziale. Non rivolgendosi all’ambito sanitario, ma a quello socio-assistenziale, non sarà oggetto di queste Linee di Indirizzo.

Internet of health things ecosystems

Applications used to deliver telemedicine services

Telemedicine

mHealth

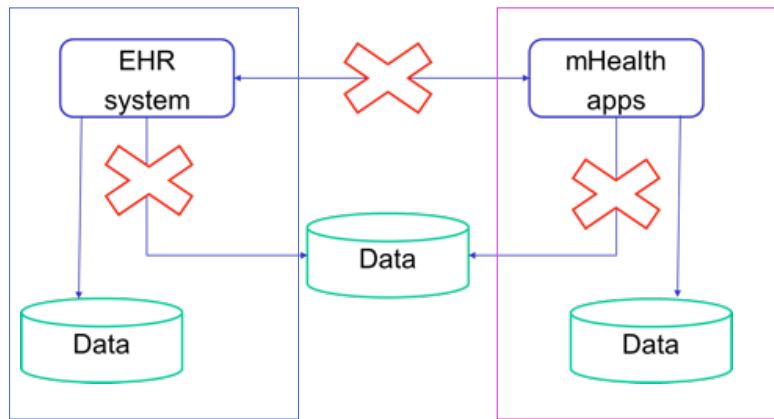
IoT

Personal Apps

Personal Devices



Connecting apps to telemedicine services: HL7-FHIR standards

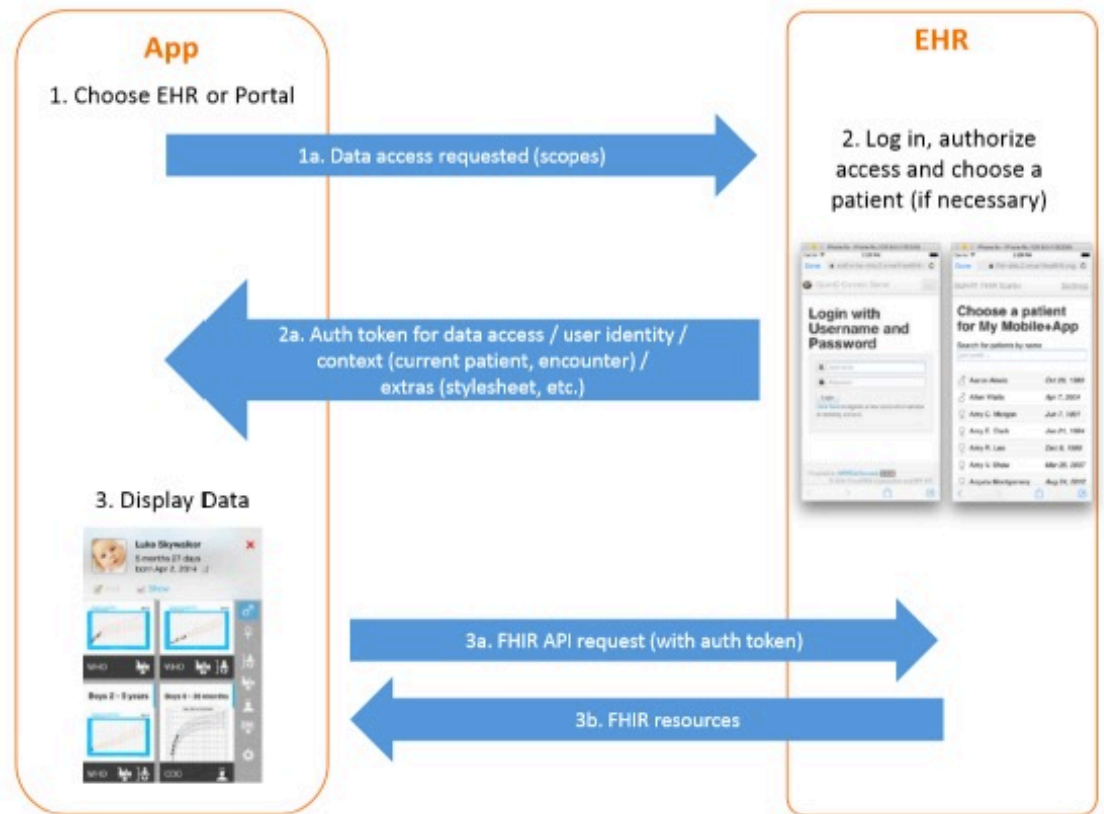


Healthcare professional
in Hospital

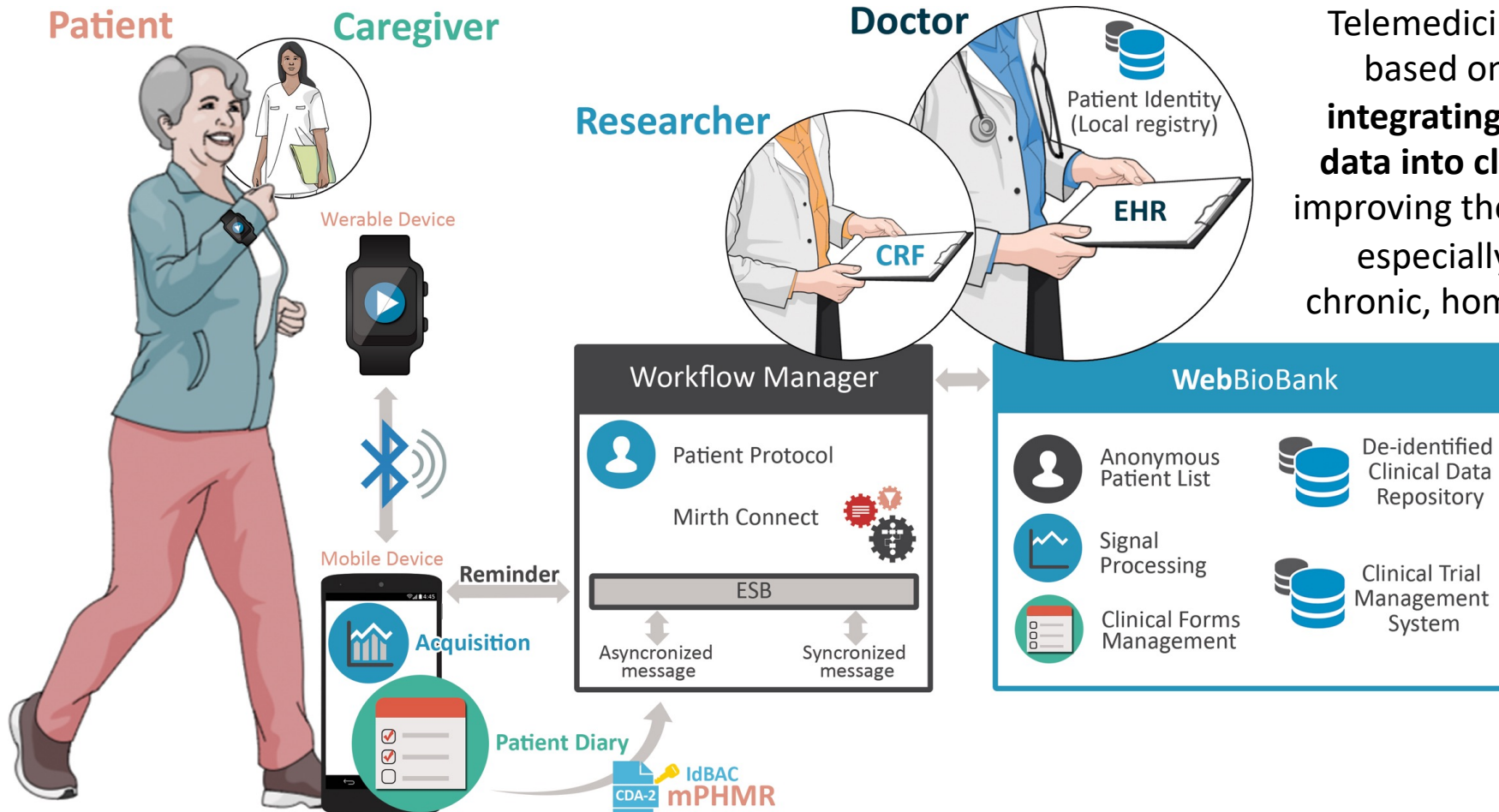
Patient at
Home



Fast Healthcare Interoperability Resources



mHealth-IoT-telemedicine ecosystem for clinical trials: an example



Telemedicine/app ecosystems based on standards allow **integrating patient-generated data into clinical research** thus improving the reliability of results, especially for longitudinal, chronic, home-based monitoring

mHealth-IoT-telemedicine ecosystem for clinical trials: an example

The screenshot shows a web browser window with the URL `localhost:82/PatientPrivacy/Pages/WorkbenchDefault.aspx#`. The user is logged in as Pierluigi. The page title is "List Management". Below the title, there is a section for uploading an XML file for filling in patient details. This section contains a file selection button, a "Clear sensitive data" button, a "New Patient" button, and a "Download XML Patient Data" button. Below this is a "Patient List" table for "Ospedale Maggiore Policlinico - U.O. di Neurofisiopatologia Clinica, Neurochirurgia". The table has columns for IdEHR, IdBAC, Data, Protocols, Code, Surname, Name, Sex, DateOfBirth, and TaxCode. The table displays 10 entries, with the first 9 rows showing patient data and the 10th row showing a summary row. The table is paginated, showing "Showing 1 to 10 of 257 entries" and a navigation bar with "Previous", "1", "2", "3", "4", "5", "...", "26", and "Next".

List Management

Upload an XML file for filling in the Patient's personal details

Select a XML File Clear sensitive data New Patient Download XML Patient Data

Patient List - Ospedale Maggiore Policlinico - U.O. di Neurofisiopatologia Clinica, Neurochirurgia

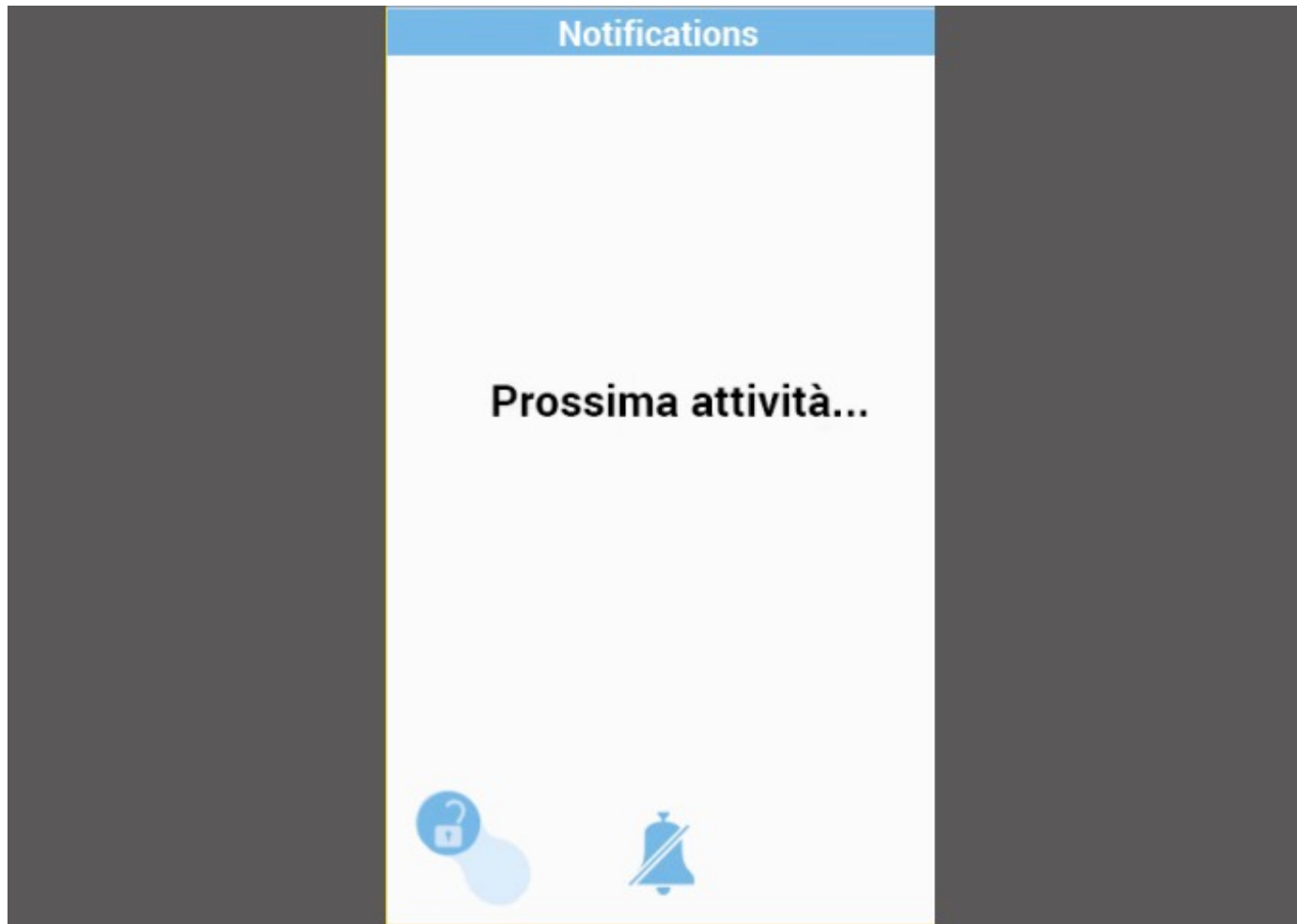
Show 10 entries Search:

IdEHR	IdBAC	Data	Protocols	Code	Surname	Name	Sex	DateOfBirth	TaxCode
3317	11461	10/07/2017 23:02:48		722					
3321	11465	18/10/2017 17:41:39		P004					
3316	11460	10/07/2017 23:01:40		122					
3320	11464	13/07/2017 16:57:25		123					
3318	11462	11/07/2017 11:39:04		812					
3319	11463	11/07/2017 17:30:14		890					
3323	11467	19/10/2017 15:36:11		P001					
3322	11466	19/10/2017 15:23:06		P002					
3324	11468	21/10/2017 16:48:32		P003					
98	42	22/10/2011 17:49:37							

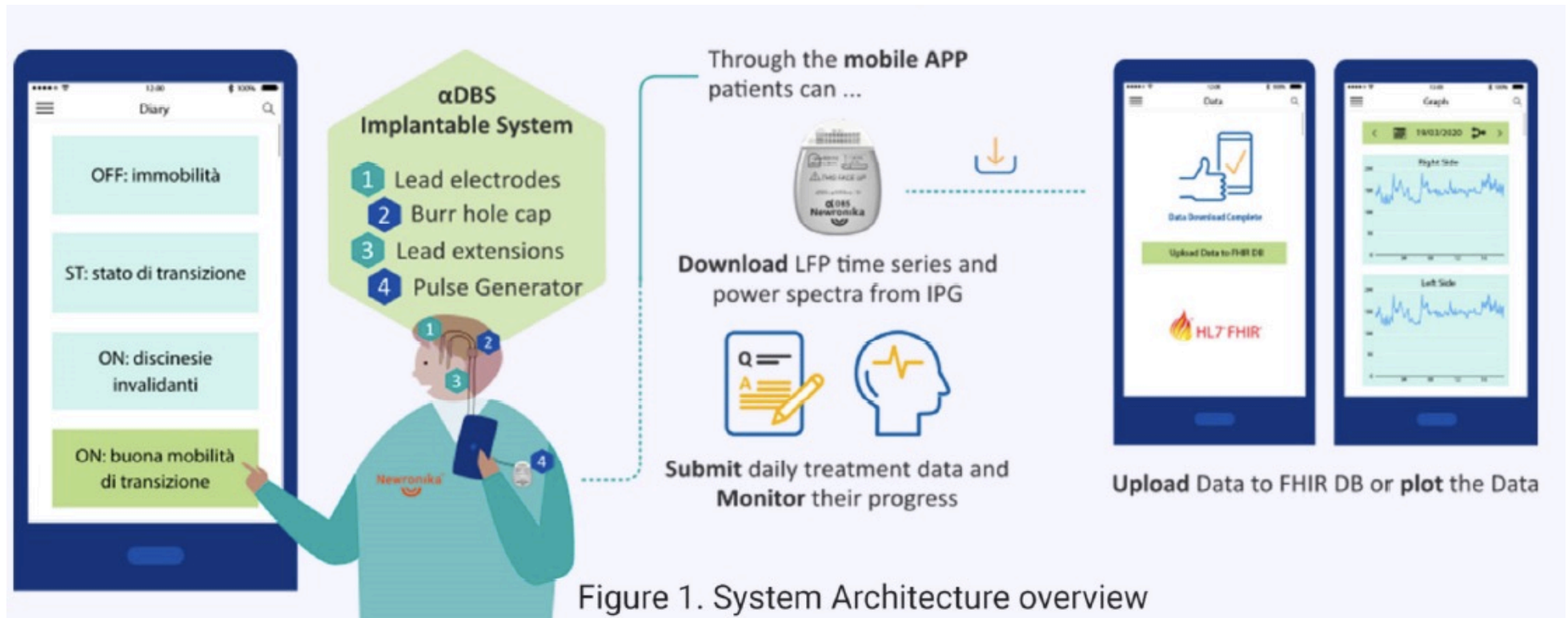
Showing 1 to 10 of 257 entries

Previous 1 2 3 4 5 ... 26 Next

mHealth-IoT-telemedicine ecosystem for clinical trials: an example



Apps and bi-directional computer interfaces: adaptive DBS



- Adaptive Deep Brain Stimulation (aDBS) devices can record neural signals and adapt the neuromodulation therapy accordingly, thus being fully bi-directional computer interfaces
- It is now necessary to study brain dynamics 24/7, and to define optimized algorithms for providing personalized stimulation
- A data management ecosystem

Take-home messages

- mHealth apps are increasingly adopted, together with wearable and IoT devices
- There are no recognized review systems for health-related apps that are not certified as medical devices
- A full Internet of Health System including telemedicine (communication technologies), apps, and devices could be an effective way to exploit the full potentials of apps
- There are medical informatics standards (HL7-FHIR) that enable the connection of apps to electronic health records and hospital systems
- The use of apps can boost medical research thanks to the possibility to collect data in ecologic environments and to include patient's generated data
- The COVID-19 pandemic boosted the adoption of apps and telemedicine opening the way for its adoption also in non-emergency situations