

# Digital Therapeutics & Cardiovascular Health

A new generation of evidence-based prescription interventions



Giuseppe Recchia



# Agenda

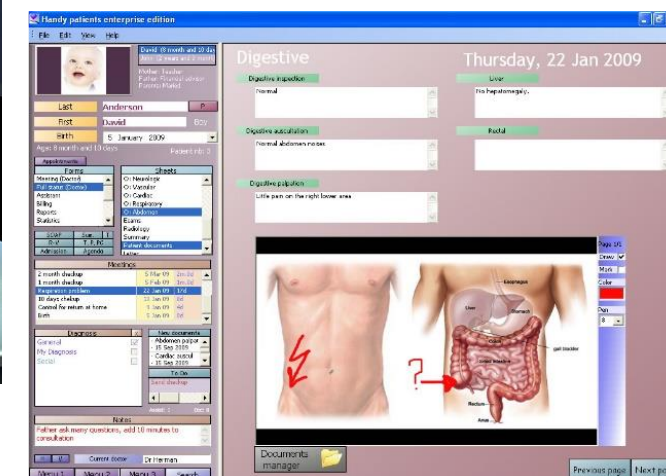
- 1. Digital Therapeutics - che cosa sono**
- 2. Digital Therapeutics e salute cardiovascolare**
- 3. Digital Therapeutics - quando nella pratica medica italiana?**

# Comprende tecnologie, sistemi e piattaforme che

1. coinvolgono la persona su finalità connesse a salute, stile di vita, benessere;
2. catturano, archiviano o trasmettono dati sanitari;
3. erogano o supportano servizi sanitari ed operazioni cliniche;



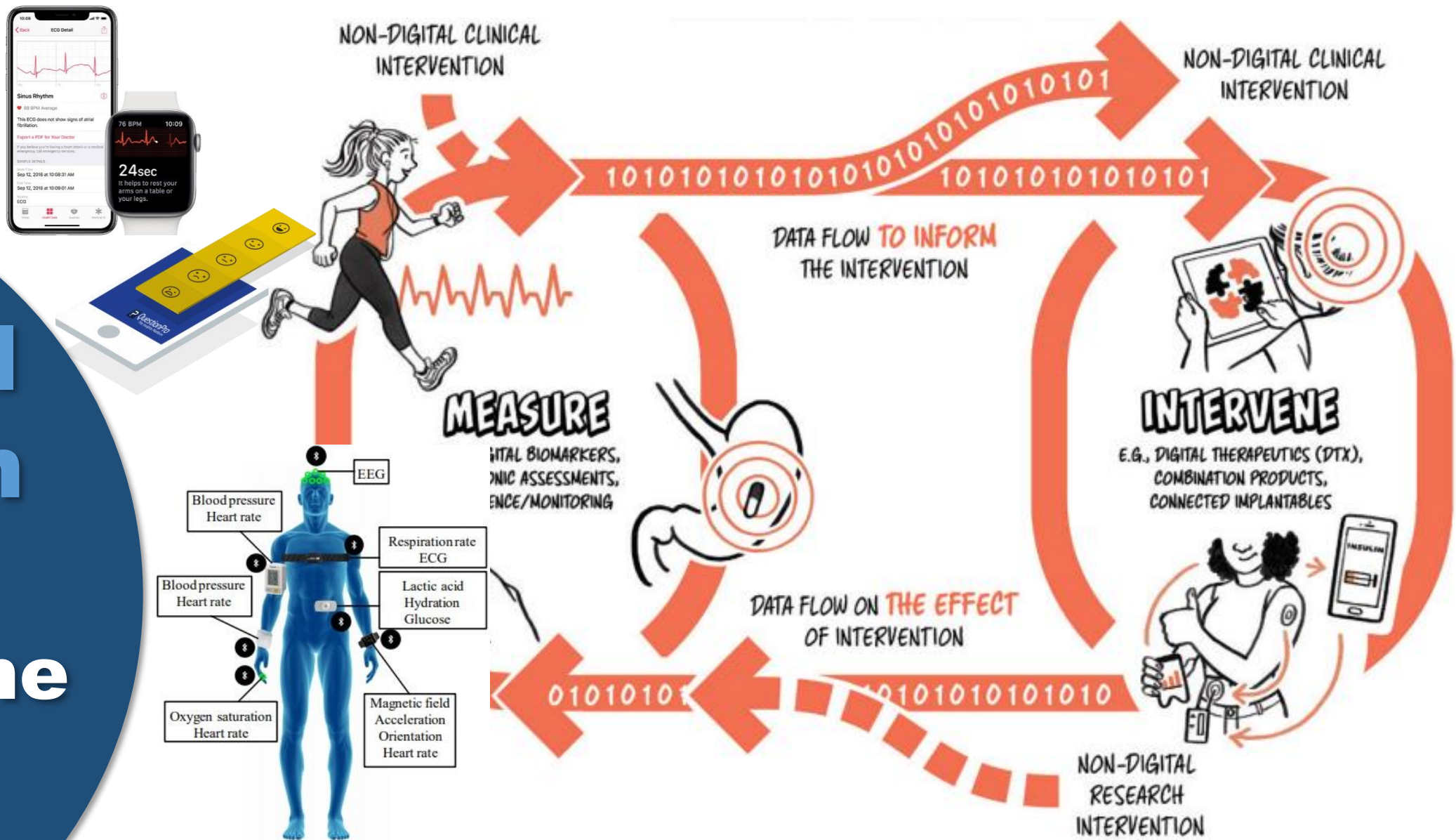
# Digital Health



**In generale, non richiedono prove di efficacia clinica**

Comprende prodotti software e/o hardware (1) misurano (2) intervengono per migliorare la malattia

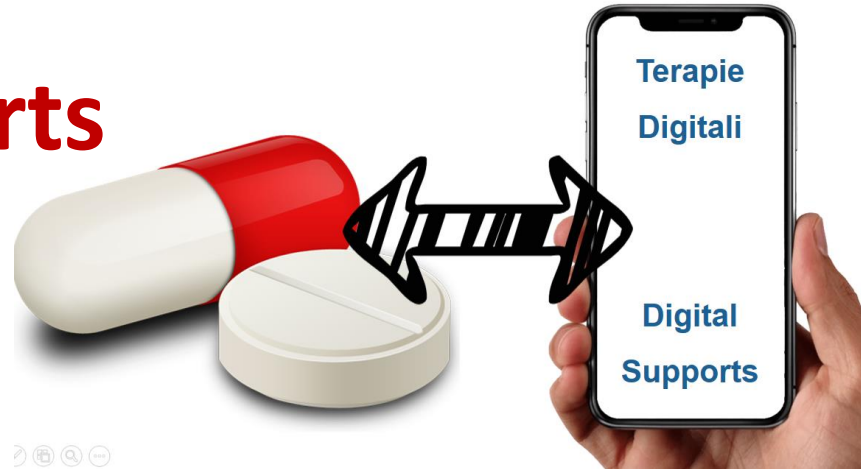
# Digital Health Digital Medicine



Richiedono prove di efficacia clinica

Comprende prodotti software e/o hardware (1) misurano (2) intervengono per migliorare la malattia

# 1. Digital Supports



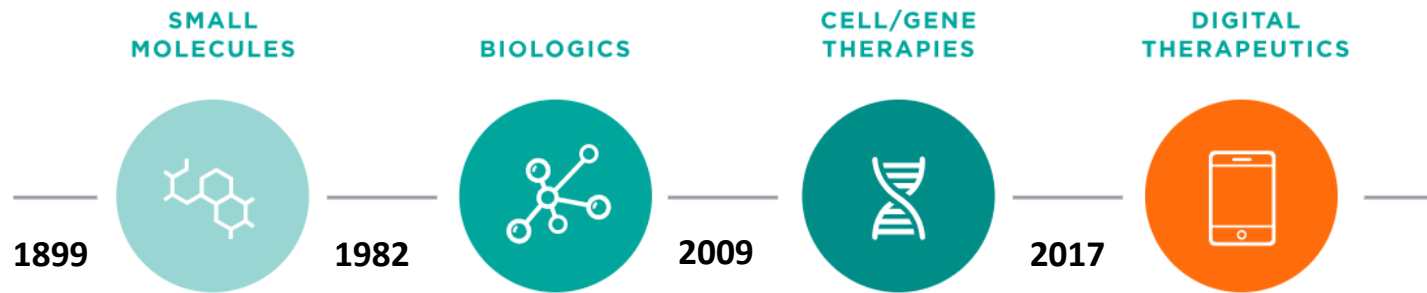
# 2. Digital Rehabilitation



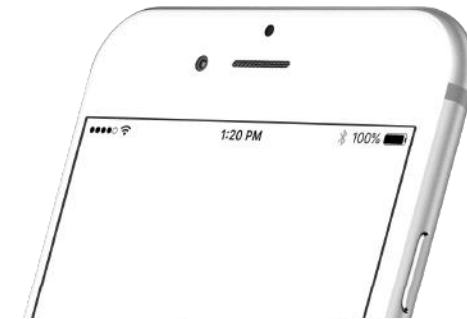
**Digital Health**  
**Digital Medicine**

Richiedono prove di efficacia clinica

# Digital Health Digital Medicine Digital Therapeutics

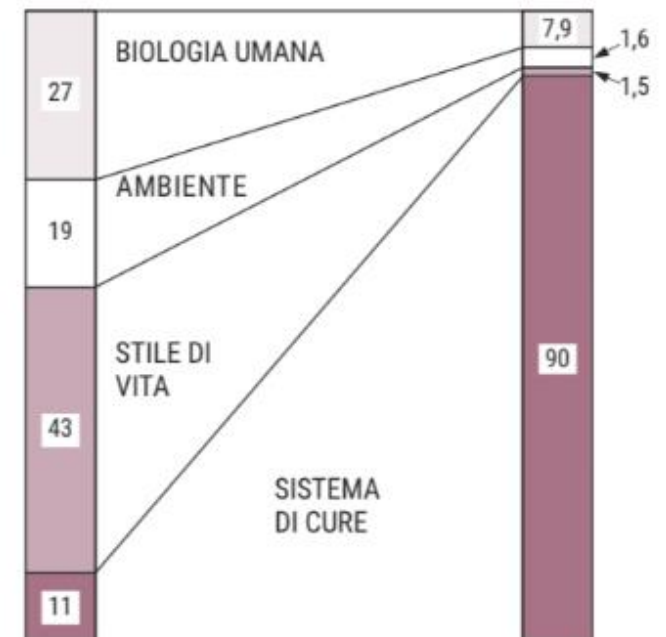


- Tecnologie Sanitarie a finalità terapeutica
- Modifica dei comportamenti disfunzionali
- Sviluppate attraverso RCTs
- Autorizzate da enti regolatori
- Rimborsabili dai servizi sanitari
- Prescritte dal medico
- Principio Attivo è un **algoritmo**



Contributo potenziale per la riduzione della mortalità (in percentuale)

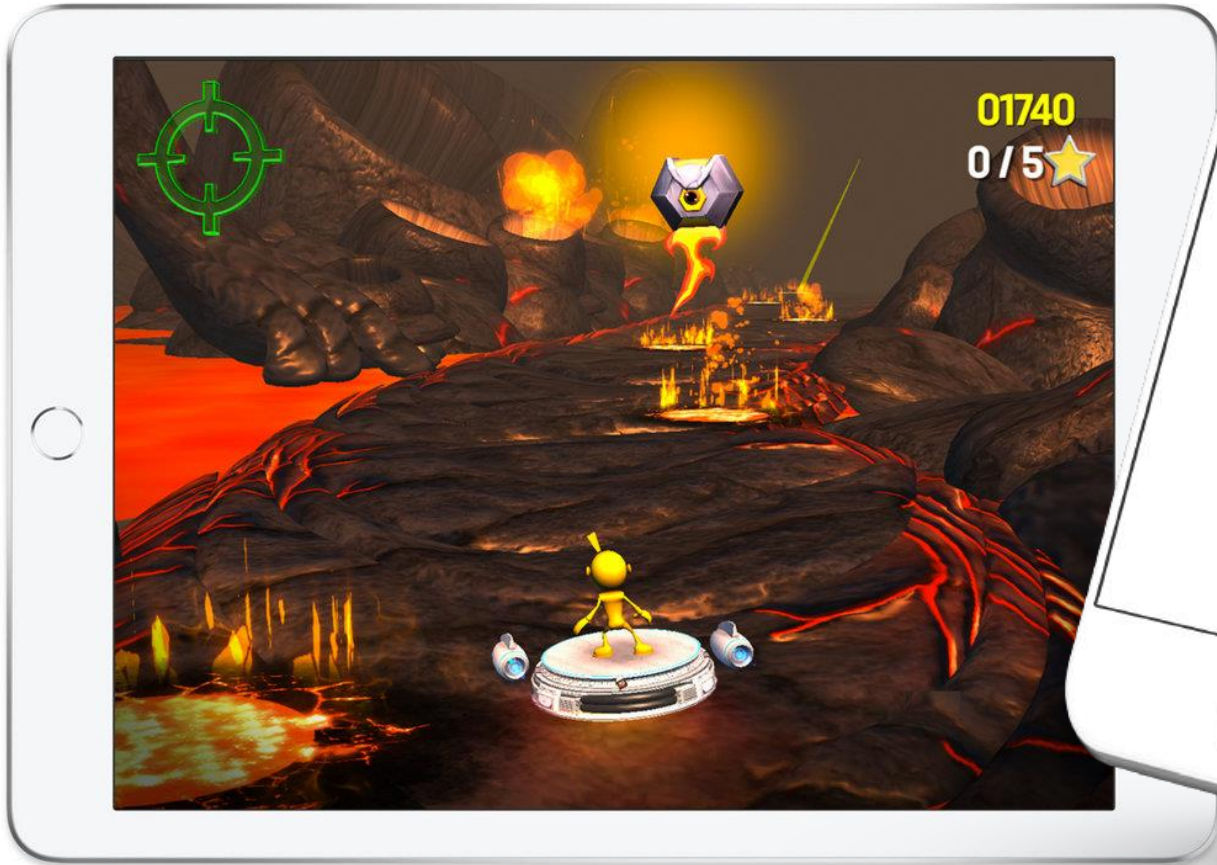
Impiego attuale delle spese sanitarie negli Stati Uniti (in percentuale)



# Quante Terapie Digitali sono oggi disponibili?

Digital Therapeutic	Company	Phase	Therapeutic Indication
Deprexis	GAIA AG	Approved 2009	Depression
Sleepio	Big Health	Approved 2013	Insomnia
Reset	Pear Therapeutics	Approved 2017	Substance Use Disorder
Reset-O	Pear Therapeutics	Approved 2018	Opioid Use Disorder
Oleena	Voluntis	Approved 2019	Oncology
Somryst	Pear Therapeutics	Approved 2020	Chronic Insomnia
Endeavor	Akili Laboratories	Approved 2020	ADHD
Smoking Cessation	CureApp	Approved 2020	Smoking
Parallel	Mahana	Approved 2020	Irritable Bowel System
Hypertension	Cure App	Late Development	Hypertension
AKL-T02	Akili Laboratories	Late Development	Autism

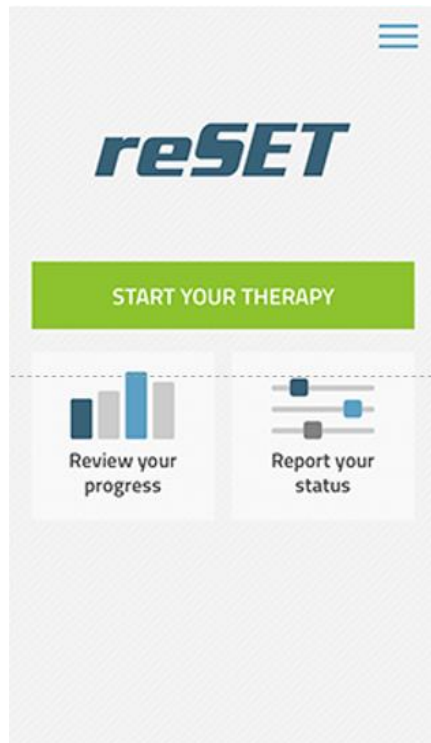
# Quali forme digitali per le Terapie Digitali?





# Come funzionano le Terapie Digitali?

informazione



interazione

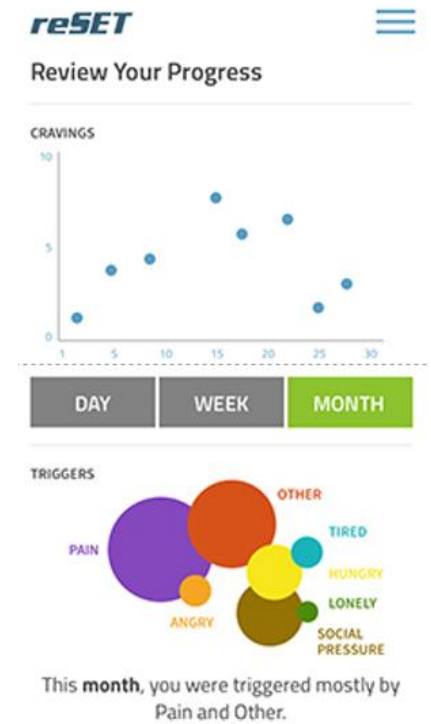
The screenshot shows the 'Report Your Status' form in the reSET app. It includes the following questions and inputs:

- Have you used today?  Yes  No
- How strong is your craving right now? 6 (slider)
- What triggers are affecting this craving?
- HUNGRY  n/a 4 (slider)
- ANGRY  n/a 2 (slider)
- LONELY  n/a 7 (slider)
- TIRED  n/a 0 (slider)
- SOCIAL PRESSURE  n/a 3 (slider)
- PAIN  n/a 10 (slider)
- OTHER  n/a 6 (slider)

A green 'SUBMIT' button is at the bottom.

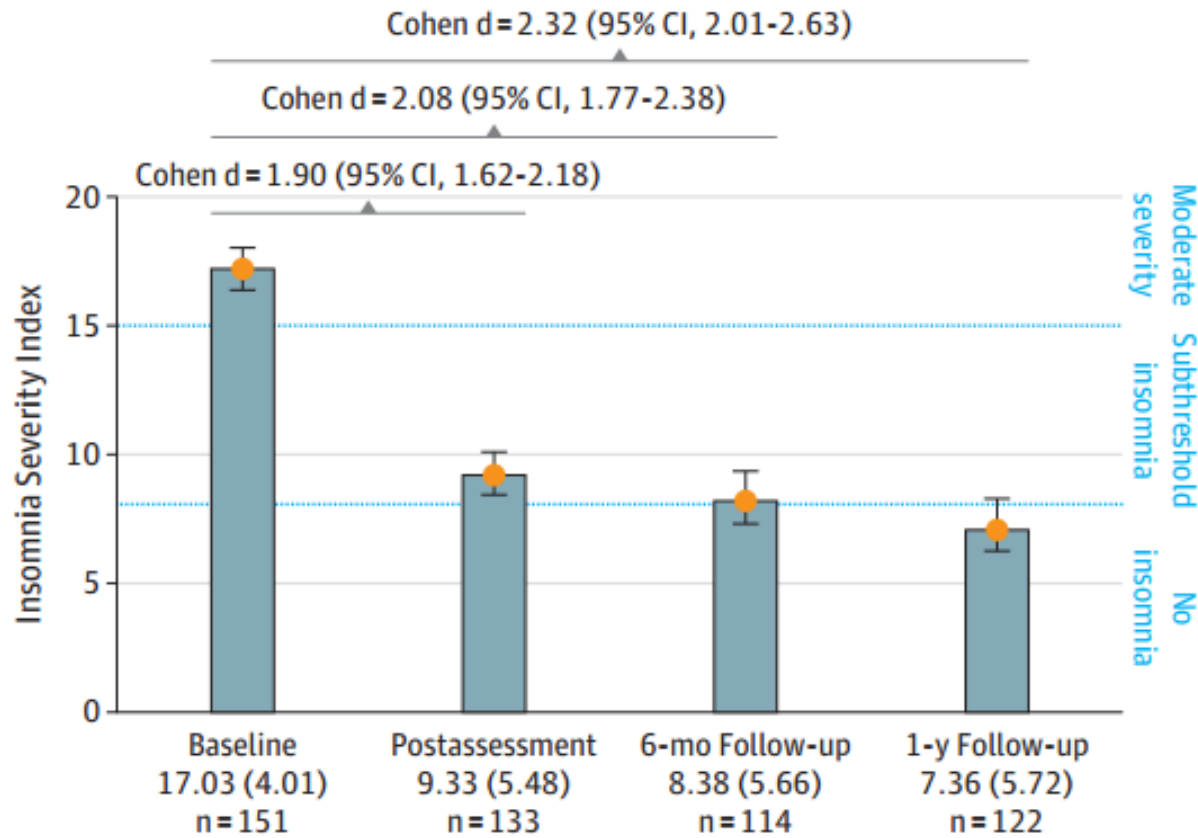
Let the  
virtual  
therapist  
guide you  
through  
18 sessions

motivazione

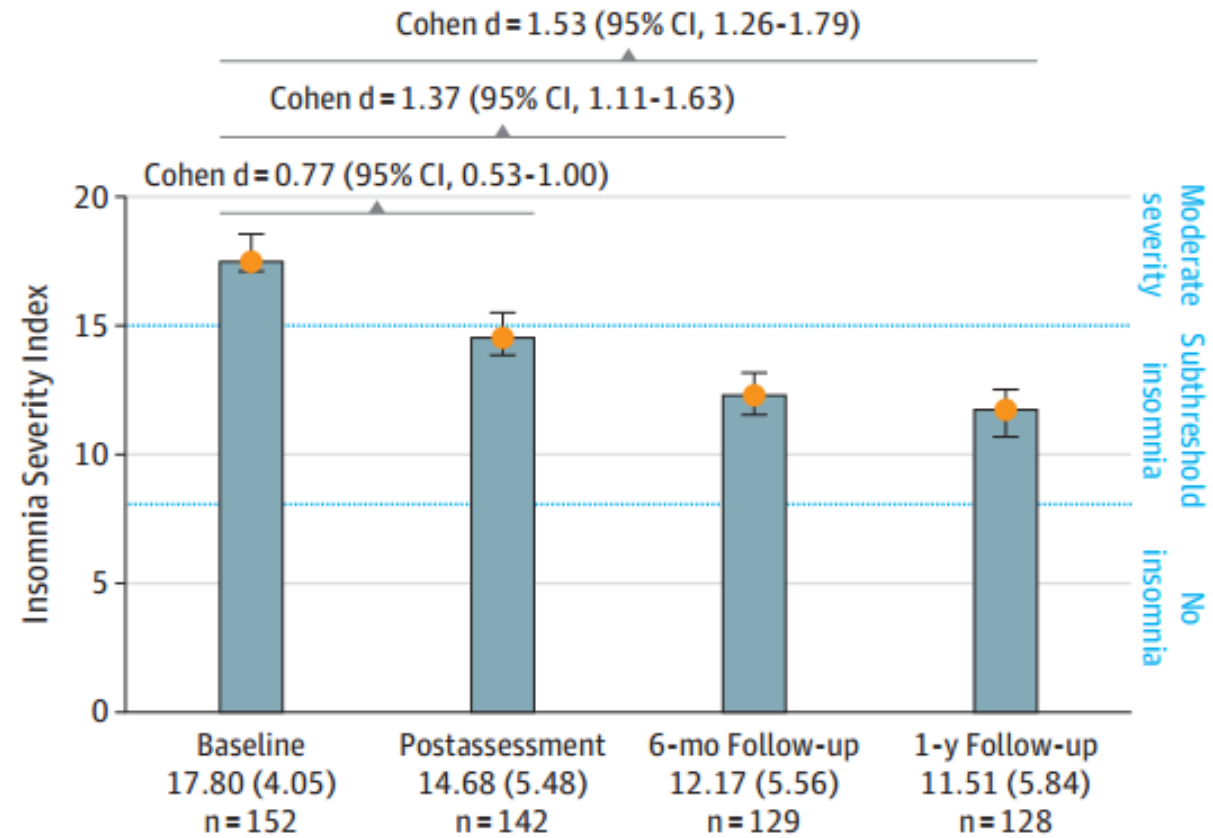


# Sono efficaci?

## A SHUTi

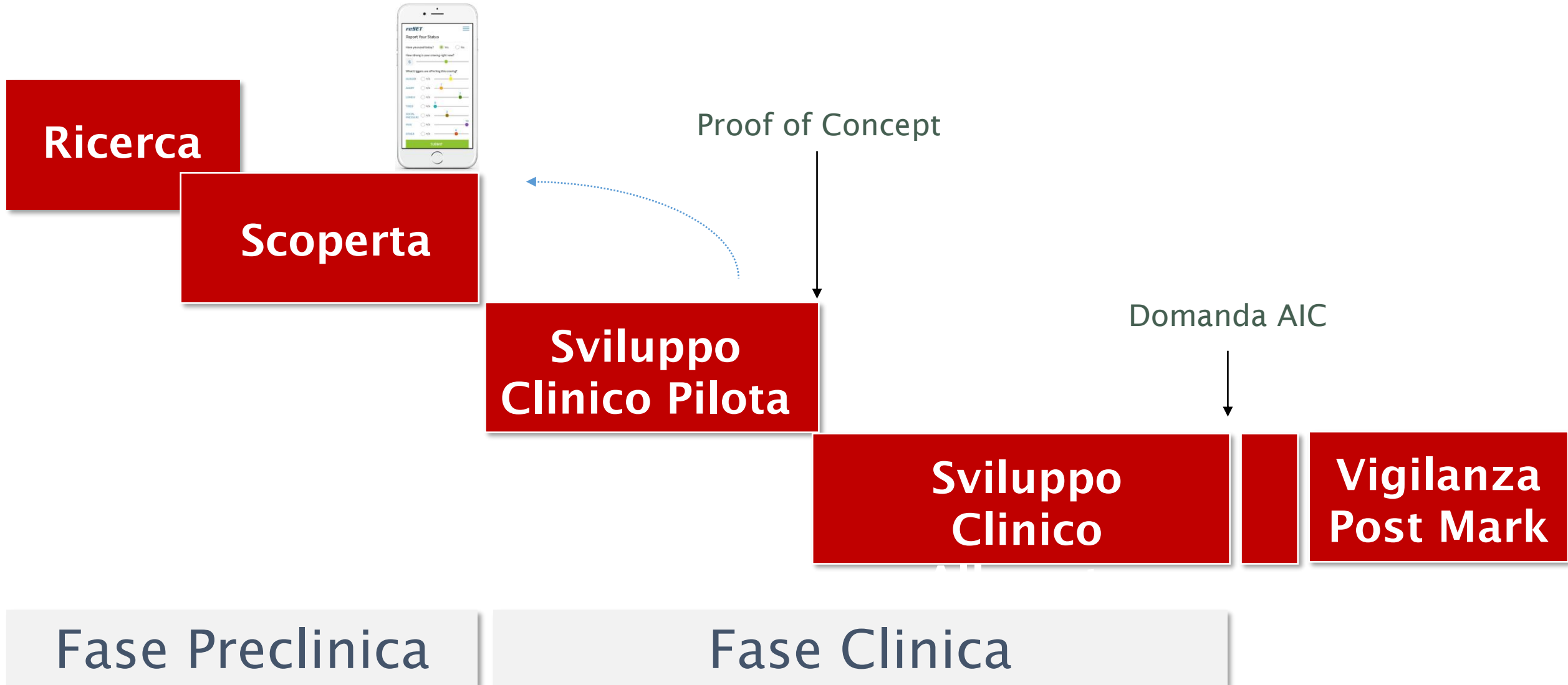


## B Patient education



Effect of a Web-Based Cognitive Behavior Therapy for Insomnia Intervention With 1-Year Follow-up - A Randomized Clinical Trial

# Come si ricercano e sviluppano?




# Quali Terapie Digitali per le Malattie cardiologiche?



Perspective

*Sensors* **2021**, *21*, 12. <https://dx.doi.org/10.3390/s21010012>

## Digital Health in Cardiac Rehabilitation and Secondary Prevention: A Search for the Ideal Tool

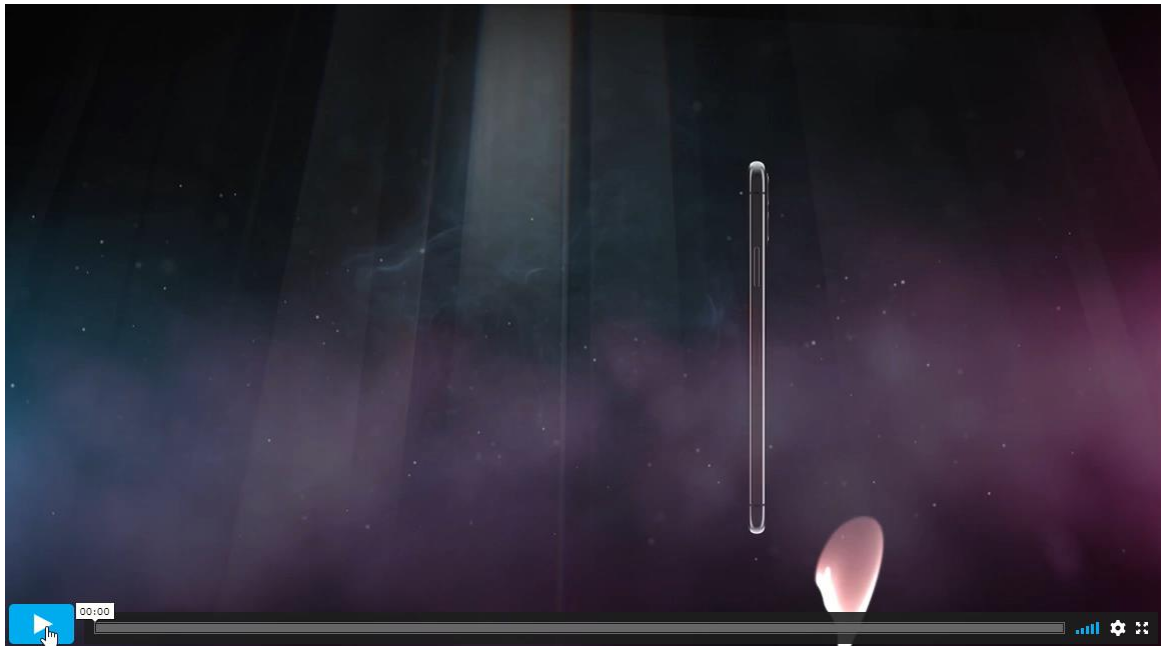
Maarten Falter <sup>1,2,3,\*</sup> , Martijn Scherrenberg <sup>1,2</sup> and Paul Dendale <sup>1,2</sup>

Digital health is becoming more integrated in daily medical practice. In cardiology, patient care is already moving from the hospital to the patients' homes, with large trials showing positive results in the field of tele-monitoring via cardiac implantable electronic devices (CIEDs), monitoring of pulmonary artery pressure via implantable devices, tele-monitoring via home-based non-invasive sensors, and screening for atrial fibrillation via smartphone and smartwatch technology.

Cardiac rehabilitation and secondary prevention are modalities that could greatly benefit from digital health integration, as current compliance and cardiac rehabilitation participation rates are low and optimization is urgently required. This viewpoint offers a perspective on current use of digital health technologies in cardiac rehabilitation, heart failure and secondary prevention. Important barriers which need to be addressed for implementation in medical practice are discussed. To conclude, a future ideal digital tool and integrated healthcare system are envisioned. To overcome personal, technological, and legal barriers, technological development should happen in dialog with patients and caregivers. Aided by digital technology, a future could be realized in which we are able to offer high-quality, affordable, personalized healthcare in a patient-centred way

# Quali Terapie Digitali per le Malattie cardiologiche?

## Digital Supports



Digital Therapeutics

## Misurazioni



# Hypertensione Arteriosa - CureApp

Received: 5 May 2020

Revised: 26 June 2020

Accepted: 27 June 2020

- Digital therapeutics is a new approach to treat hypertension via using software programs such as smartphone apps and/or device algorithms.
- We develop a HERB system—new interactive smartphone app (HERB Mobile) with web-based patient management console (HERB Console)—to lower blood pressure (BP) based on an algorithm that helps users to promote lifestyle modifications in conjunction with medically validated non-pharmacological interventions.
- The app can assess the personalities, behavior characteristics, and hypertension determinants of each patient with hypertension to provide adequate guidance.
- To demonstrate the efficacy of the system, we designed a randomized, controlled, multicenter, open-label trial “HERB-DH1 (HERB digital hypertension 1)” to assess the efficacy of HERB system in patients with essential hypertension.
- The authors allocate patients to the intervention group (HERB system + standard lifestyle modification) or to the control group (standard lifestyle modification alone).
- In the intervention group, we provide the HERB Mobile for patients and the HERB Console for their primary physicians for 24 weeks.
- Both groups are instructed for standard lifestyle modifications based on the current recommendations in the Japanese Society of Hypertension 2019 guideline.
- The primary outcome is the mean change from baseline to 12 weeks in 24- hour systolic BP measured by ambulatory BP monitoring.
- We started this study in December of 2019, and the trial results will be expected in early 2021.
- We believe that this trial enables us to verify the efficacy of the HERB system in patients with essential hypertension.

# Hypertensione Arteriosa - BT003

JMIR Cardio 2019 | vol. 3 | iss. 1 | e13030 | p. 1

## Achieving Rapid Blood Pressure Control With Digital Therapeutics: Retrospective Cohort and Machine Learning Study

Nicole L Guthrie<sup>1\*</sup>, MS; Mark A Berman<sup>1\*</sup>, MD; Katherine L Edwards<sup>1\*</sup>, MSN; Kevin J Appelbaum<sup>1\*</sup>, BSE; Sourav Dey<sup>2\*</sup>, PhD; Jason Carpenter<sup>2\*</sup>, MS; David M Eisenberg<sup>3\*</sup>, MD; David L Katz<sup>1,4\*</sup>, MD, MPH

**Background:** Behavioral therapies, such as electronic counseling and self-monitoring dispensed through mobile apps, have been shown to improve blood pressure, but the results vary and long-term engagement is a challenge. Machine learning is a rapidly advancing discipline that can be used to generate predictive and responsive models for the management and treatment of chronic conditions and shows potential for meaningfully improving outcomes.

**Objective:** To examine the effect of a novel digital therapeutic on blood pressure in adults with hypertension and to explore the ability of machine learning to predict participant completion of the intervention.

**Methods:** Participants with hypertension, who engaged with the digital intervention for at least 2 weeks and had paired blood pressure values, were identified from the intervention database. Participants were required to be  $\geq 18$  years old, reside in the United States, and own a smartphone. The digital intervention offers personalized behavior therapy, including goal setting, skill building, and self-monitoring. Participants reported blood pressure values at will, and changes were calculated using averages of baseline and final values for each participant.

**Results:** The primary cohort comprised 172 participants with hypertension, having paired blood pressure values, who were engaged with the intervention. Mean change was  $-11.5$  mmHg for systolic blood pressure and  $-5.9$  mmHg for diastolic blood pressure over a mean of 62.6 days ( $P < .001$ )

**Conclusions:** Reductions in blood pressure were observed in adults with hypertension who used the digital therapeutic. The degree of blood pressure reduction was clinically meaningful and achieved rapidly by a majority of the studied participants

# Ipertensione Arteriosa - Amicommed



## CHI C'E' DIETRO IL PROGRAMMA

Dietro AMICOMED ci sono molte competenze che quotidianamente lavorano.

Il programma è stato realizzato da un team di cardiologi, nutrizionisti, personal trainer e ingegneri biomedici che hanno elaborato un sofisticato algoritmo innovativo a livello mondiale in grado di generare il programma più adatto alle abitudini, preferenze ed esigenze specifiche di ognuno. Gli utenti scopriranno che l'ipertensione può essere gestita in maniera semplice.



## AMICOMED E' MOLTO DI PIU'

**L'App offre molte funzionalità, anche indipendentemente dal programma. Tutte dedicate alla pressione.**

Sarà sempre possibile inserire misure ricevendo in tempo reale le nostre risposte (sezione track e progress) e capire così come interpretare le continue variabilità della pressione. Questo grazie ad un ulteriore algoritmo rivoluzionario, certificato dispositivo medico CE classe IIa, in grado di interpretare la variabilità della pressione arteriosa.



## IL VALORE SCIENTIFICO DEL PROGRAMMA AMICOMED

I risultati del programma AMICOMED sono stati presentati ai principali congressi scientifici internazionali.

Chi ha seguito i nostri consigli ha abbassato la pressione in media di 5 mmHg (in alcuni casi anche fino a 20). I nostri risultati sono stati presentati all'American College of Cardiology, all'American Society for Hypertension, all'European Society of Hypertension e all'Associazione Nazionale Medici Cardiologi Ospedalieri. La validità della nostra iniziativa ha ottenuto il patrocinio della Società Italiana di Prevenzione Cardiovascolare.



AMICOMED



# Cardiac Rehabilitation - Kardia

## Outcome Measures

Go to

### Primary Outcome Measures ⓘ :

1. Compliance and adherence to the "Kardia" program [ Time Frame: 9 months ]

Compliance to smart phone based cardiac rehabilitation program - Uploading of completed data (BP, activity) to web portal. Compliance is defined as taking at least 1 BP per day and wearing the Biovotion for >10 hours per day.

(90% compliance in intervention group would be considered acceptable)

### Secondary Outcome Measures ⓘ :

1. Improvement in 6MWT [ Time Frame: 9 Months ]

6MWT at baseline (within 2 weeks upon discharge) months 3 (+/- 2 months) and 9 (+/- 3 months) will be analysed and compared

2. Major Adverse Cardiovascular Events (MACE) and Hospitalizations [ Time Frame: 12 months ]

Reduction in MACE and Hospitalization

3. Improvement in quality of life [ Time Frame: 9 months ]

EQ5D questionnaire

# Post Infarto – MI CBT

Trial record **41 of 95** for: Digital Therapeutics | Heart Diseases

[◀ Previous Study](#) | [Return to List](#) | [Next Study ▶](#)

## Cognitive Behavioral Therapy Following Myocardial Infarction (MI-CBT)

### Outcome Measures

Go to

#### Primary Outcome Measures ⓘ :

1. Cardiac anxiety questionnaire [ Time Frame: baseline ]

Measure of cardiac anxiety, fear, avoidance and attention. The score ranges between 0 and 72, with a greater score indicating elevated cardiac anxiety.

2. Cardiac anxiety questionnaire [ Time Frame: 2 months from baseline ]

Measure of cardiac anxiety, fear, avoidance and attention. The score ranges between 0 and 72, with a greater score indicating elevated cardiac anxiety.

3. Cardiac anxiety questionnaire [ Time Frame: 8 months from baseline ]

Measure of cardiac anxiety, fear, avoidance and attention. The score ranges between 0 and 72, with a greater score indicating elevated cardiac anxiety.

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**Outcome Measures**Go to Primary Outcome Measures ⓘ :

## 1. Improvement in quality of life [ Time Frame: Day 90 after enrollment ]

Assessed by KCCQ survey. This survey is a 23 item instrument used to quantify physical function, symptoms (frequency, severity and recent change), social function, self-efficacy and knowledge, and quality of life. An overall summary scored is derived for each domain and transformed to a score range of 1-100. Higher scores reflect better health status and quality of life.

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## 2. Number of hospital admissions since enrollment [ Time Frame: 90 days post enrollment ]

Via medical record review

## 3. Number of hospital admissions since enrollment [ Time Frame: 180 days post enrollment ]

Via medical record review

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Via medical record review

# CHF - Datos

*April 13, 2021*

## **Datos Health Announces New Partnership For Study Measuring Impact Of Digital Solutions On Heart Failure Treatment**

- Datos Health announced its collaboration with **Amgen** on a new study to evaluate the potential impact of digital health data to improve therapy in heart failure.
- The initiative has been successfully launched in seven leading U.S. teaching hospitals and continues to enroll new patients. Leveraging Datos' remote care automation platform to remotely collect health data, it will serve as a basis for comparing guideline-directed heart failure therapy utilizing digital health data with traditional practices that do not employ digital resources.
- This breakthrough study will test the hypothesis that remotely collected patient data – such as heart rate and blood pressure indicators – measured asynchronously through digital technologies can facilitate better, personalized titration of guideline-recommended heart failure medications
- Utilization of digital health data for investigators can lead to earlier initiation, up-titration, or determination of end-of-dose adjustments for guideline-based heart failure therapies and achieve optimal tolerated doses for individual therapies. Datos' speed of implementation and ease of protocol configuration to integrate clinically relevant real-time health information makes it an ideal partner for this research.  
Datos is committed to supporting pharmaceutical companies in accessing and validating the data essential to enable timely interventions and increase patient adherence to treatment guidelines, freeing them up to devote greater energies to furthering development and testing.

Materiali di lavoro  
su sanità e salute  
della Fondazione  
Smith Kline

## TERAPIE DIGITALI, UNA OPPORTUNITÀ PER L'ITALIA

Editor  
Gualberto Gussoni

# Atto I

# Digital Medicine

Giuseppe Recchia

*da Vinci Digital Therapeutics, Milano - Fondazione Smith Kline, Verona*

*Terapie Digitali, una Opportunità per l'Italia*  
**Una Call to Action per l'adozione  
nella pratica medica**

# Atto II

- Informazione

Nello Martini<sup>1</sup>, Silvia Calabria<sup>1</sup>, Giuseppe Recchia<sup>2,3</sup>  
Gualberto Gussoni<sup>4</sup>, Oriana Ciani<sup>5</sup>

### Pian pare

## Terapie digitali, HTA e rimborso in Italia

- prev
- ecce
- pote
- per l
- disp

Il presente documento fornisce informazioni e proposte per promuovere in Italia una conoscenza e una cultura sulle Terapie Digitali (DTx) e per attivare le procedure di valutazione scientifica, di accesso e di rimborsabilità delle DTx.

In alcuni Paesi europei, come descritto in un'altra sezione di questo Documento, sono state attivate differenti procedure per l'accesso e la rimborsabilità delle DTx. Si tratta tuttavia di iniziative singole e non coordinate tra di loro, in assenza completa di un quadro di riferimento legislativo, regolatorio, di valutazione tecnologica (HTA), di accesso e rimborso che possa uniformare le procedure nei diversi Paesi europei.

la quel-  
io socioeconomico, dasi pensare alle ricadute nel sistema economico-fi-  
nanziario e nel mondo del lavoro a seguito dell'adozione di misure ecce-  
zionali per il contenimento e la gestione dell'emergenza epidemiologica.

