Accessibilità per tutti

L'intelligenza artificiale (AI) in sanità
innovazioni tecnologiche per
l'assistenza socio-sanitaria
senza barriere e senza confini

venerdì 22 novembre 2019

Aula Magna Rita Levi Montalcini
Ospedale di Cattinara- Strada di Fiume, 447 - Trieste

Le possibilità dell'uso dell'Intelligenza Artificiale in Sanità oggi: facilitare i servizi

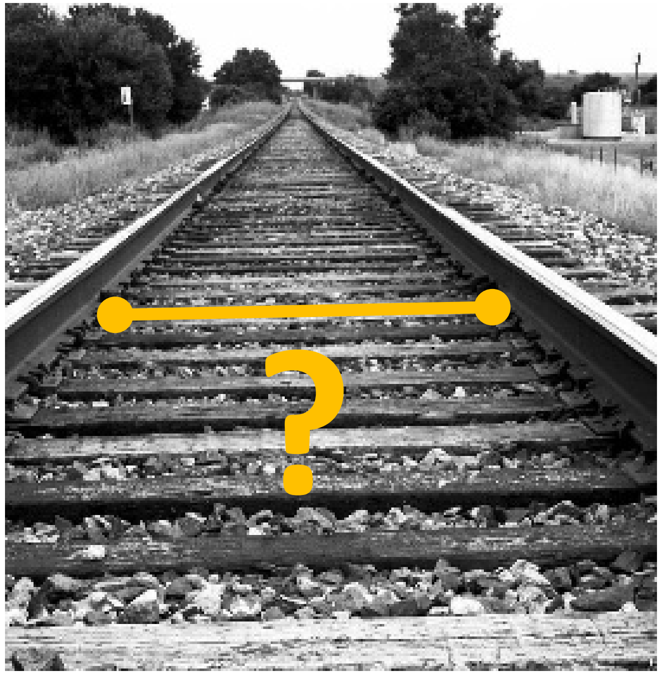
Francesco Gabbrielli

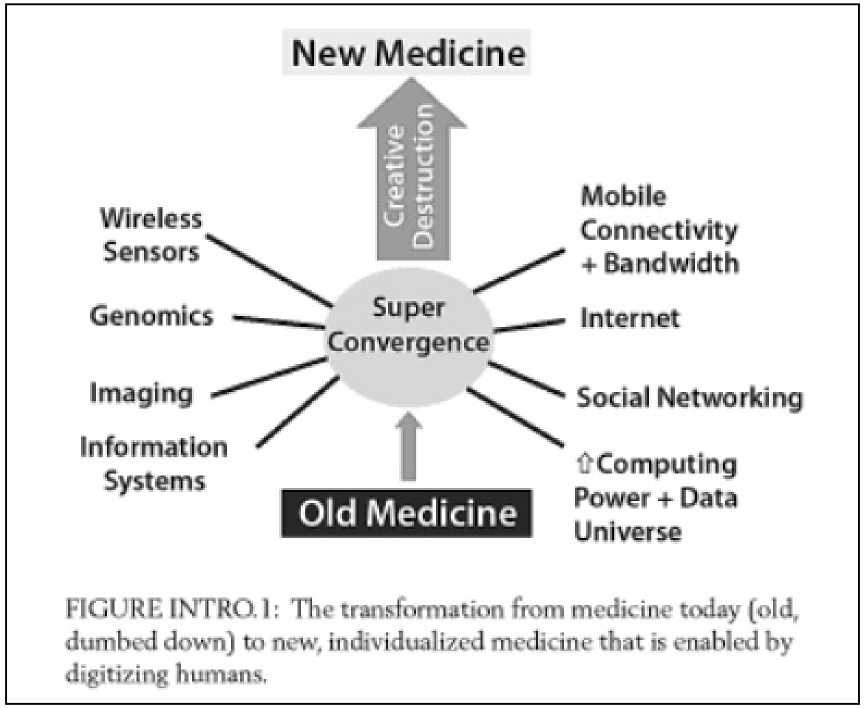
CONSEQUENCES OF DIGITAL INNOVATION WORLDWIDE WHICH ARE RELEVANT IN HEALTHCARE

- GLOBAL DIGITAL COMMUNITY = GLOBAL CONSEQUENCES
- DIGITAL EVOLUTION OF PEOPLE DAILY LIFE = WE SPENT A RATE OF OUR LIFE IN CYBERSPACE
- QUICK DIFFUSION OF DIGITAL PRODUCTS = RAPID TURN-OVER
- IPER-PRODUCTION OF DATA = WE NEED URGENT STRATEGIES TO ARCHIVE AND PROTECT DATA
- SUPER-CONVERGENCE OF TECHNOLOGIES = NEW POSSIBILITIES FOR MEDICINE (NEW ISSUES)

INTEROPERABILITY IS THE MOST USED INNOVATION

WHAT DOES IT MEAN INTEROPERABILITY ?





Eric Topol

LETTER

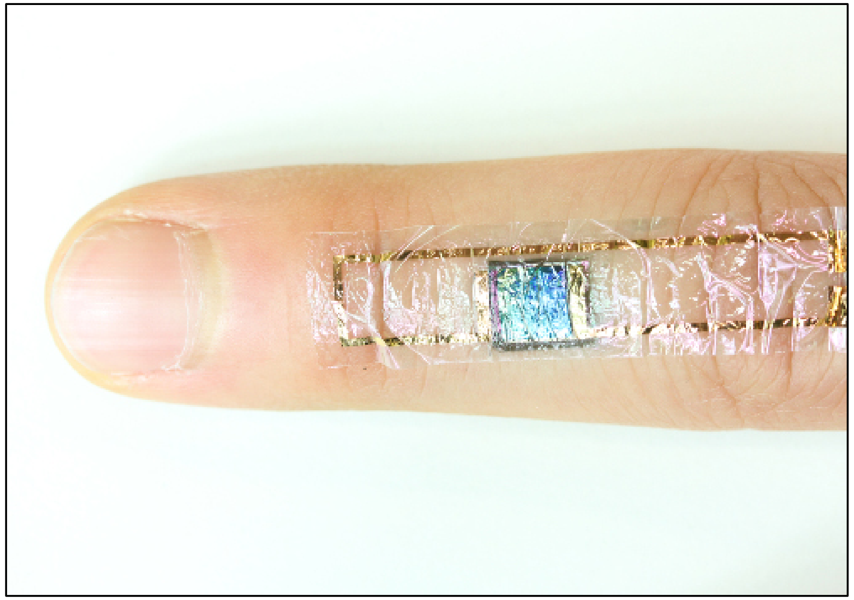
https://doi.org/10.1038/s41586-018-0536-x

Self-powered ultra-flexible electronics via nano-grating-patterned organic photovoltaics

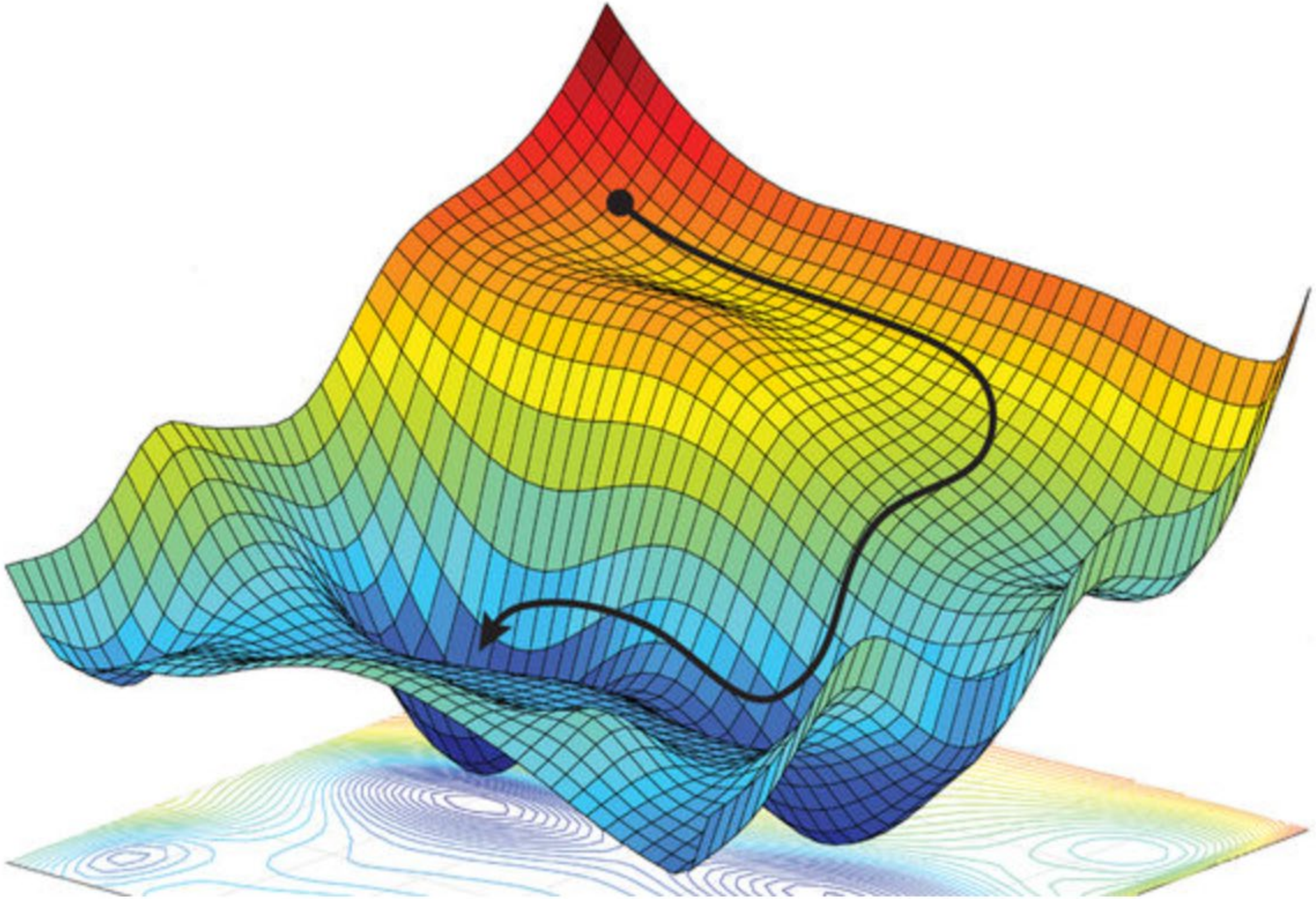
Sungjun Park[1,4,5], Soo Won Heo[1,5], Wonryung Lee[2,5], Daishi Inoue[1], Zhi Jiang[2,3], Kilho Yu[1], Hiroaki Jinno[1,2], Daisuke Hashizume[1], Masaki Sekino[2], Tomoyuki Yokota[2], Kenjiro Fukuda[1,3]*, Keisuke Tajima[1]* & Takao Someya[1,2,3]*

NATURE | Vol. 561, 27 Sept. 2 0 1 8

"…a human-friendly, ultra-flexible organic sensor powered by sunlight, which acts as a self-powered heart monitor… "



WHAT IS THE QI INDEX OF ARTIFICIAL INTELLIGENCE ?



Gradient descent relies on trial and error to optimize an algorithm, aiming for minima in a 3D landscape.

ALEXANDER AMINI, DANIELA RUS. MASSACHUSETTS INSTITUTE OF TECHNOLOGY, ADAPTED BY M. ATAROD/*SCIENCE*

Research

JAMA Oncology | Original Investigation

Development of Genome-Derived Tumor Type Prediction to Inform Clinical Cancer Care

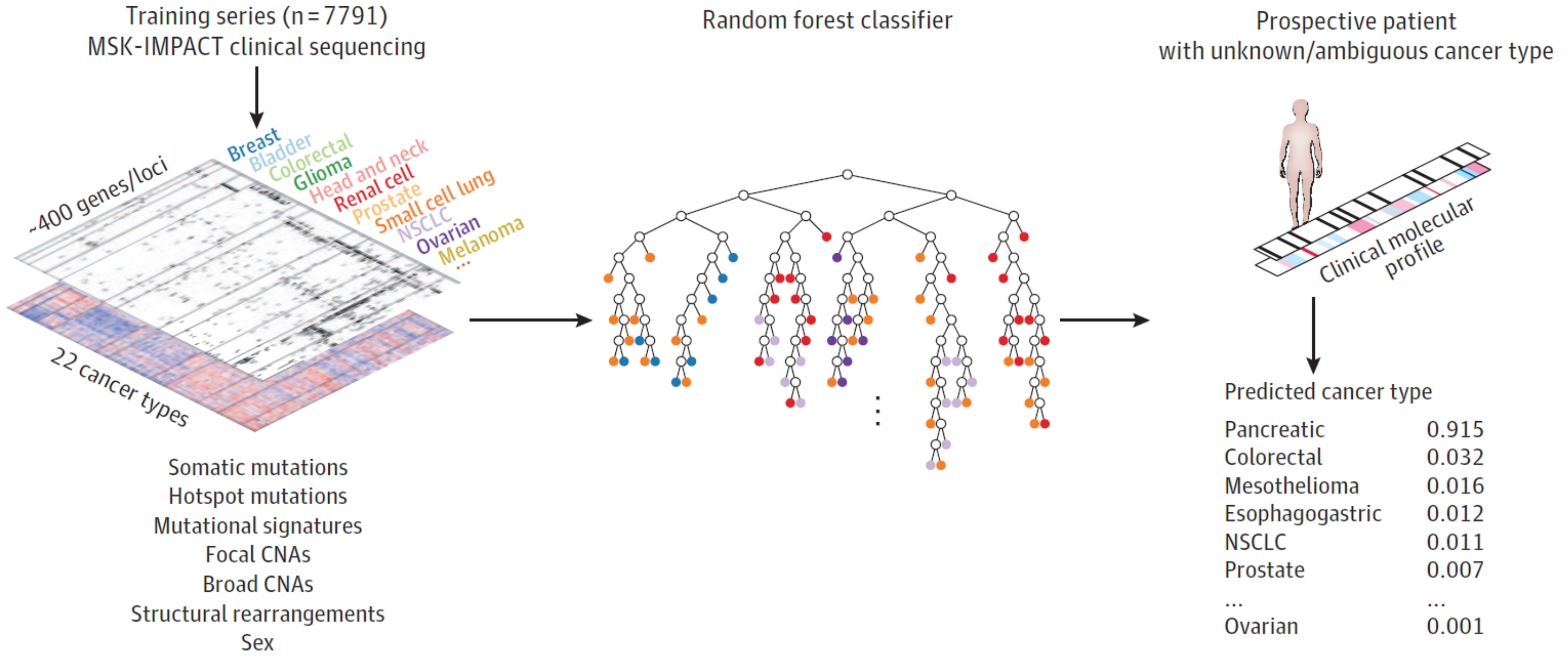
Alexander Penson, PhD; Niedzica Camacho, PhD; Youyun Zheng, BS; Anna M. Varghese, MD; Hikmat Al-Ahmadie, MD; Pedram Razavi, MD, PhD; Sarat Chandarlapaty, MD, PhD; Christina E. Vallejo, MD; Efsevia Vakiani, MD, PhD; Teresa Gilewski, MD; Jonathan E. Rosenberg, MD; Maha Shady, BS; Dana W. Y. Tsui, PhD; Dalicia N. Reales, MPH; Adam Abeshouse, BS; Aijazuddin Syed, MS; Ahmet Zehir, PhD; Nikolaus Schultz, PhD; Marc Ladanyi, MD; David B. Solit, MD; David S. Klimstra, MD; David M. Hyman, MD; Barry S. Taylor, PhD; Michael F. Berger, PhD

JAMA Oncol. doi:10.1001/jamaoncol.2019.3985
Published online November 14, 2019.

Molecular alterations from Memorial Sloan Kettering–Integrated Mutation Profiling ofActionable Cancer Targets (MSK-IMPACT)

Figure 1. Classifier Performance Across Cancers

A Random forest classifier schematic



Radiology

REVIEWS AND COMMENTARY • REVIEW

Artificial Intelligence for Mammography and Digital Breast Tomosynthesis: Current Concepts and Future Perspectives

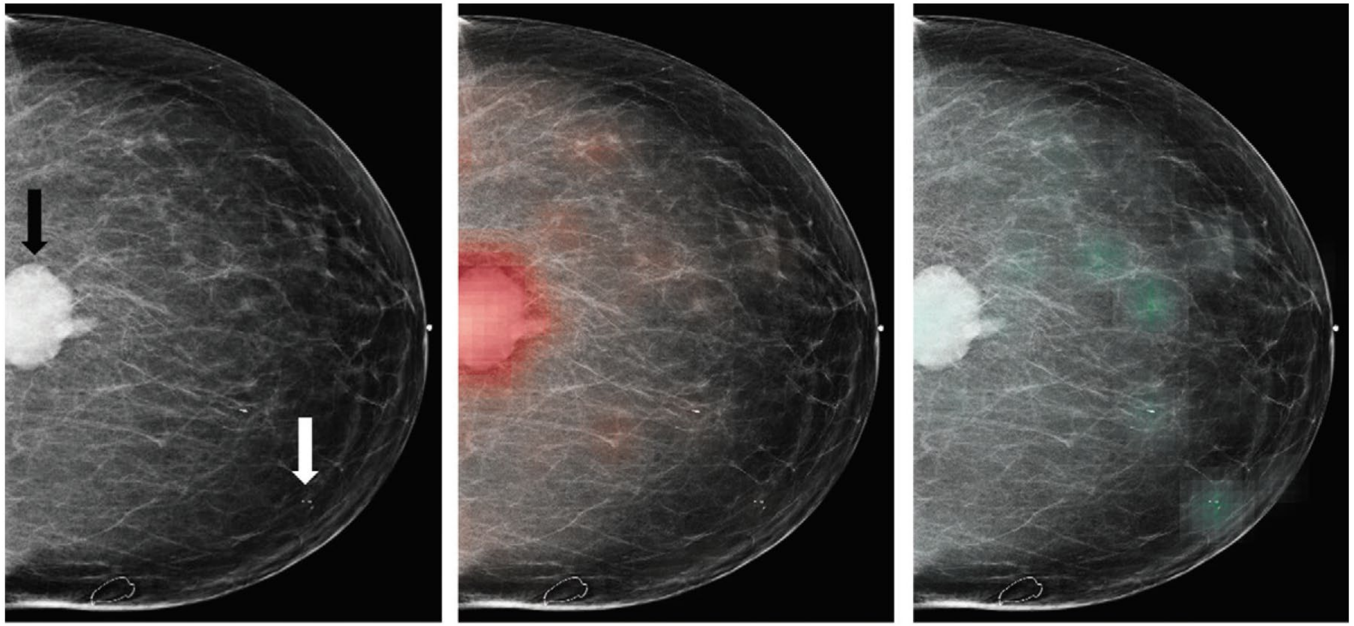
Krzysztof J. Geras, PhD • Ritse M. Mann, MD, PhD • Linda Moy, MD

From the Center for Biomedical Imaging (K.J.G., L.M.), Center for Data Science (K.J.G.), Center for Advanced Imaging Innovation and Research (L.M.), and Laura and Isaac Perlmutter Cancer Center (L.M.), New York University School of Medicine, 160 E 34th St, 3rd Floor, New York, NY 10016; Department of Radiology and Nuclear Medicine, Radboud University Medical Centre, Nijmegen, the Netherlands (R.M.M.); and Department of Radiology, the Netherlands Cancer Institute-Antoni van Leeuwenhoek Hospital, Amsterdam, the Netherlands (R.M.M.). Received November 15, 2018; revision requested January 11, 2019; final revision received April 11; accepted May 13. **Address correspondence to** L.M. (e-mail: *linda.moy@nyulangone.org*).

Supported by the National Institute of Biomedical Imaging and Bioengineering (R21CA225175).

Conflicts of interest are listed at the end of this article.

Radiology 2019; 00:1–14 • https://doi.org/10.1148/radiol.2019182627 • Content codes: BR IN



a. b. c.

Figure 4: Examples of saliency maps for screening mammography examination classification in 67-year-old asymptomatic woman. Images are left craniocaudal mammograms without **(a)** and with **(b, c)** overlying heat maps. There is a 3.6-cm irregular round dense mass (black arrow in **a**) in upper central left breast and a 5-mm cluster of calcifications (white arrow in **a**) in medial inferior left breast. From a probability of malignancy score of 0–1, the maximum value of the benign green heat map is 0.71. The maximum value of the malignant red heat map is 0.881. Both values indicate that the classifier predicts with high certainly that the mass is malignant and the calcifications are benign. At pathologic examination, the mass was an invasive ductal carcinoma and the calcifications were benign fat necrosis. (Image courtesy of Nan Wu, PhD.)

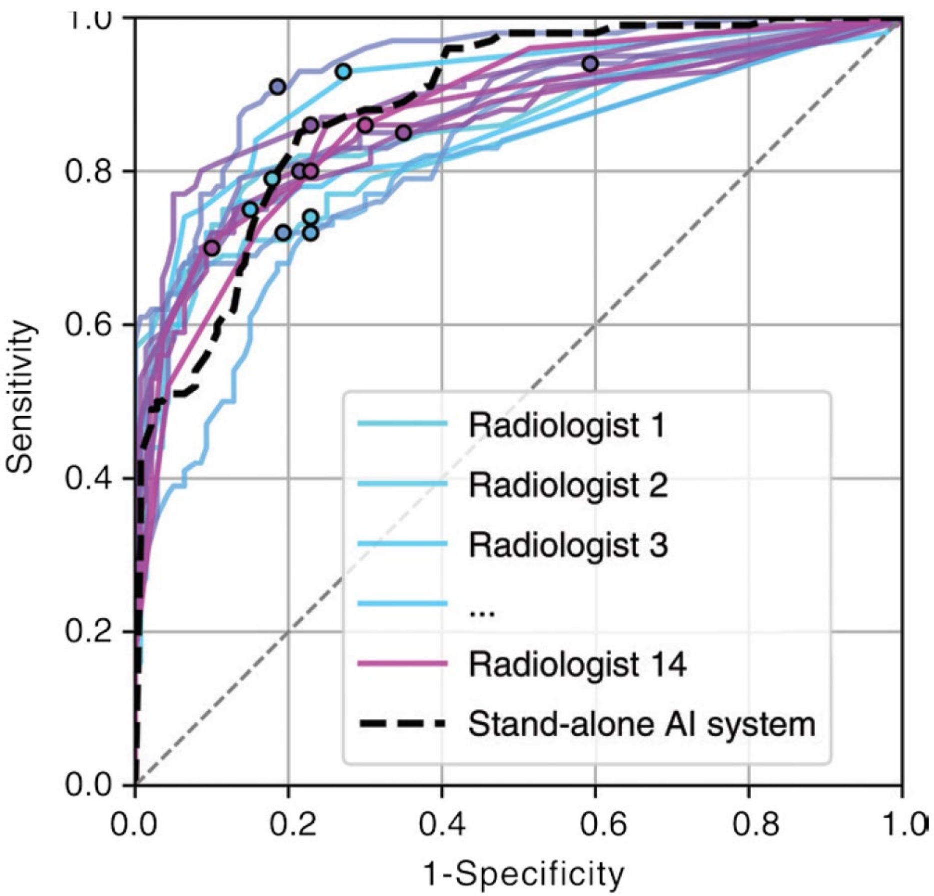


Figure 5: Receiver operating characteristic curves for radiologists reading mammograms unaided and stand-alone artificial intelligence (AI) computer system (Transpara; Screenpoint, Nijmegen, the Netherlands). Circles indicate the radiologists' operating points at Breast Imaging Reporting and Data System category 3 thresholds. (Reprinted, with permission, from reference 82.)

JAMA. 2018 Sep 18;320(11):1103-1104. doi: 10.1001/jama.2018.8211.

Informatics, Data Science, and Artificial Intelligence.

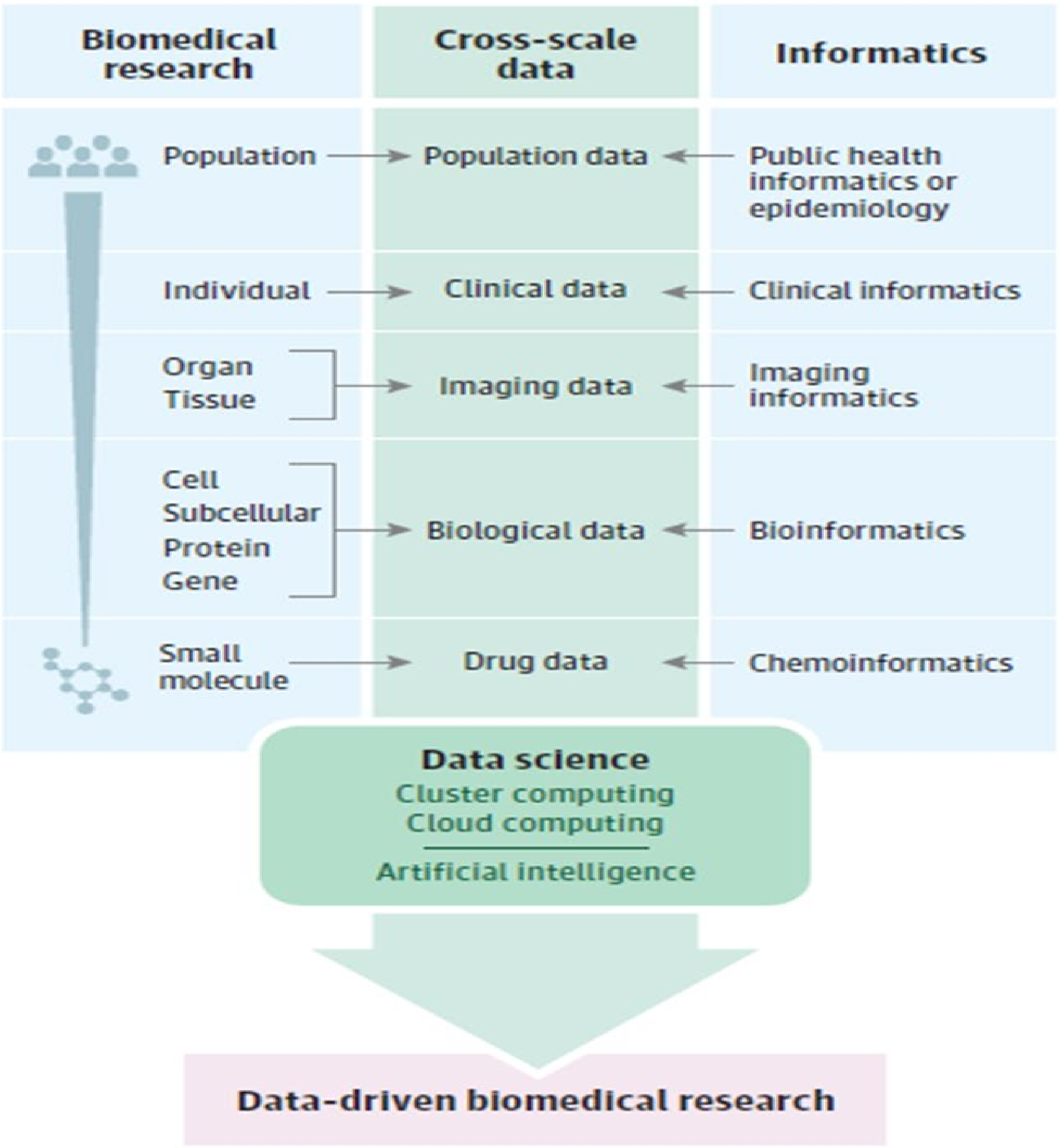
Zhu L[1], Zheng WJ[1].

Author information

1 School of Biomedical Informatics, University of Texas Health Science Center, Houston.

E. Topol:
" from hypothesis-driven to data-driven biomedical research"

Figure 1. Biomedical Research and Informatics Approaches in Artificial Intelligence



Celler et al. BMC Public Health 2014, 14:1270
http://www.biomedcentral.com/1471-2458/14/1270

BMC Public Health

STUDY PROTOCOL Open Access

Design of a multi-site multi-state clinical trial of home monitoring of chronic disease in the community in Australia

Branko G Celler[1,2*], Ross Sparks[2], Surya Nepal[2], Leila Alem[2], Marlien Varnfield[2], Jane Li[2], Julian Jang-Jaccard[2], Simon J McBride[2] and Rajiv Jayasena[2]

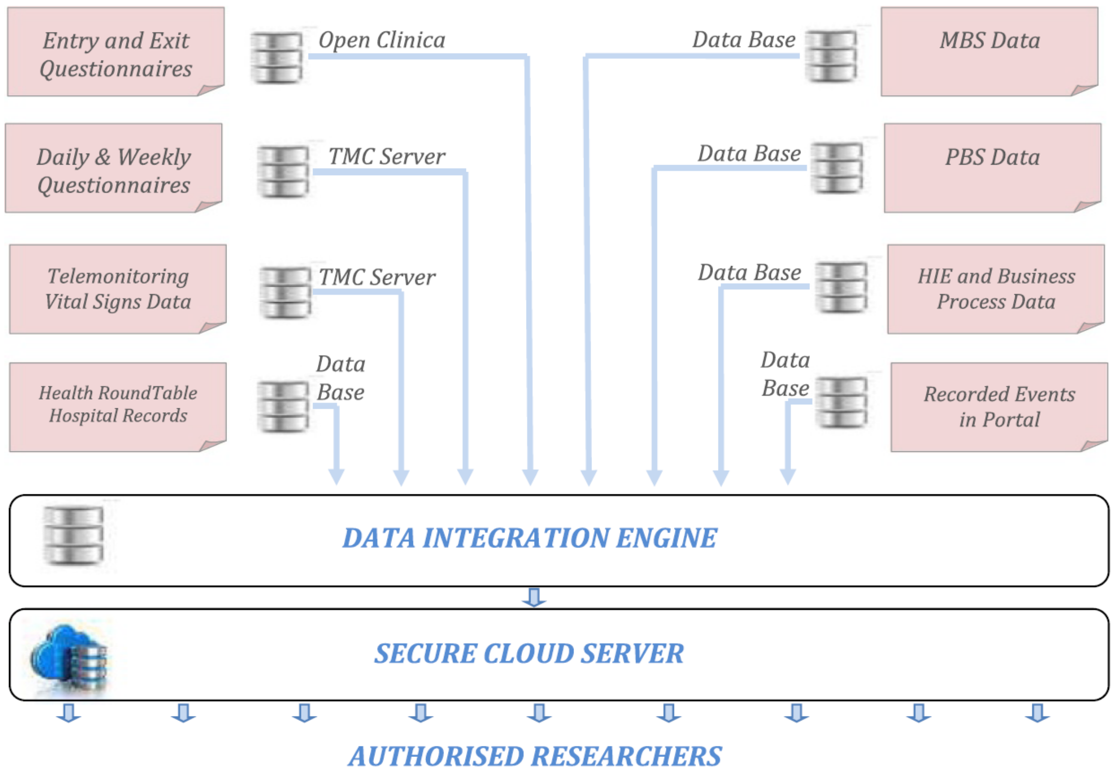


Figure 4 Schematic diagram of different data sources and their secure integration.

Celler et al. BMC Public Health 2014, 14:1270
http://www.biomedcentral.com/1471-2458/14/1270

BMC Public Health

STUDY PROTOCOL Open Access

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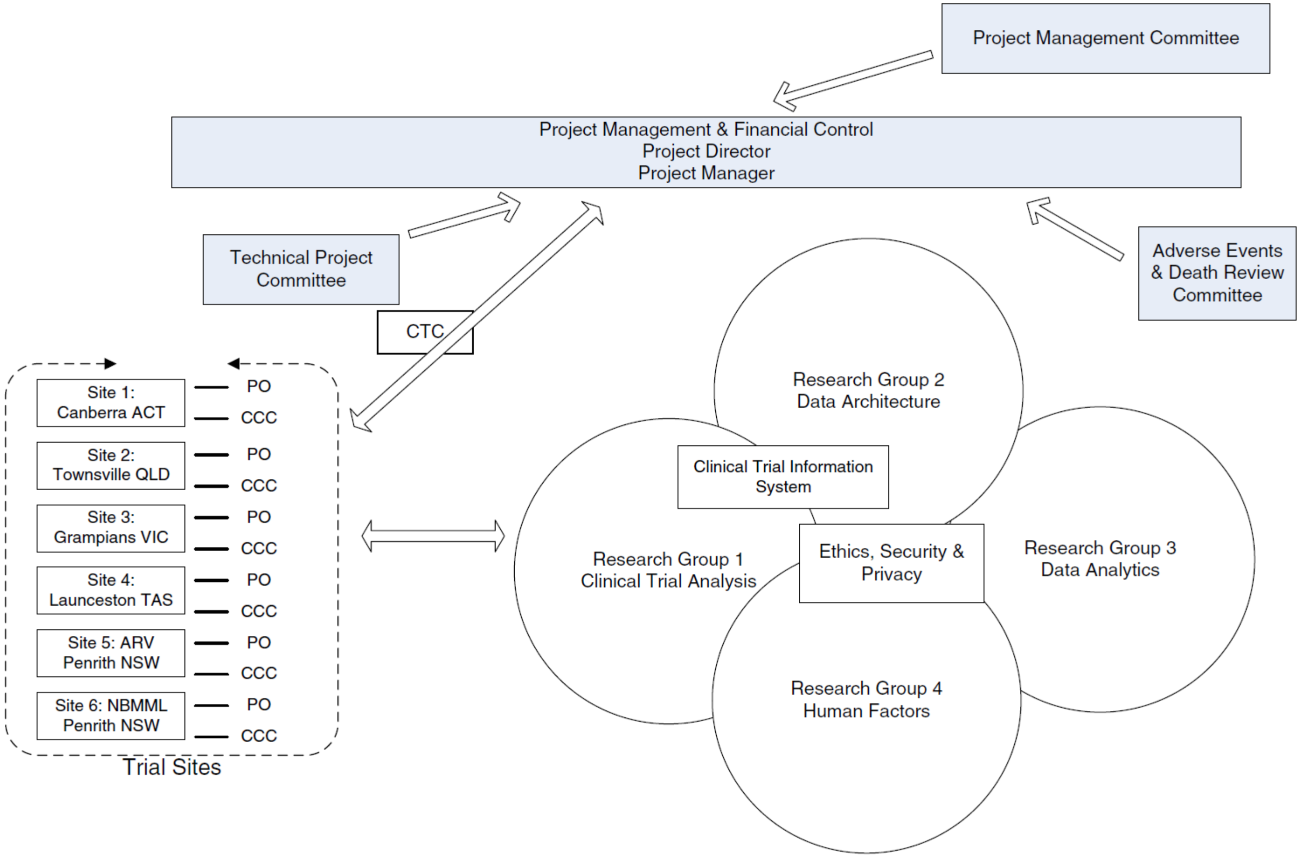


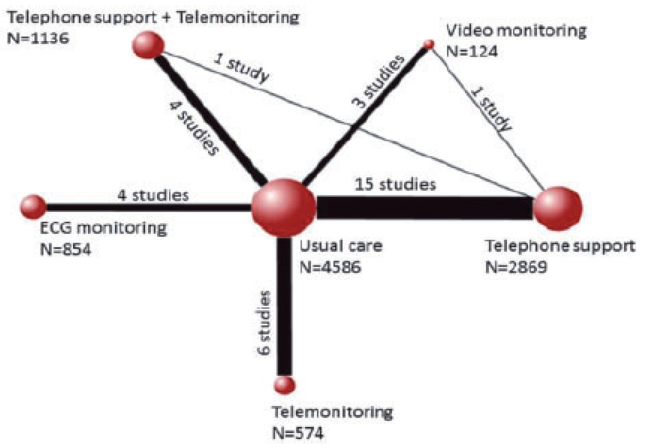
Figure 2 Project organisation and management structure. CTC – Clinical Trial Coordinator. PO –Project Officer and CCC – Clinical Care Coordinator at each trial site.

European Heart Journal Supplements (2017) **19** (Supplement D), D113–D129
The Heart of the Matter
doi:10.1093/eurheartj/sux024

EUROPEAN SOCIETY OF CARDIOLOGY®

The future of telemedicine for the management of heart failure patients: a Consensus Document of the Italian Association of Hospital Cardiologists (A.N.M.C.O), the Italian Society of Cardiology (S.I.C.) and the Italian Society for Telemedicine and eHealth (Digital S.I.T.)

Andrea Di Lenarda, FACC, FESC (Coordinator)[1]*, Giancarlo Casolo, FACC, FESC (Coordinator)[2], Michele Massimo Gulizia, FACC, FESC (Coordinator)[3], Nadia Aspromonte, FACC, FESC (Coordinator)[4], Simonetta Scalvini[5], Andrea Mortara[6], Gianfranco Alunni[7], Renato Pietro Ricci[4], Roberto Mantovan[8], Giancarmine Russo[9], Gian Franco Gensini[10], and Francesco Romeo[11]



Structured Telephone support					
1.50 (0.96, 2.30)	Telemonitoring				
1.04 (0.67, 1.60)	0.70 (0.39, 1.23)	Telemonitoring & Telephone support			
0.68 (0.34, 1.39)	0.45 (0.20, 1.01)	0.65 (0.29, 1.46)	Video monitoring		
1.02 (0.72, 1.45)	0.68 (0.42, 1.15)	0.98 (0.59, 1.65)	1.50 (0.70, 3.18)	ECG monitoring	
0.80 (0.66, 0.96)	**0.53 (0.36, 0.80)**	0.77 (0.51, 1.15)	1.18 (0.58, 2.35)	0.78 (0.57, 1.06)	Usual Care

Figure 1 Left: Comparisons among interventions included in the analyses of all-cause mortality (30 studies, $n = 10\,193$). Each node represents an intervention and the size of each node indicates the number of included patients. The solid lines connecting the nodes together indicate the existence of this comparison in the literature and the thickness of the lines represents the number of studies that included a particular comparison. Right: The effect of different forms of telemedicine on all-cause mortality. The effect of structured telephone support and telemonitoring was significant in comparison with usual care (bottom line, in bold). Adapted from Kotb *et al.*[15]

"There is an absolute need for a close collaboration between institutions and scientific societies to manage this development, to define and apply certified standards of quality and process, and to evaluate common solutions both at national and regional levels to be applied to elderly and chronic patients."

Coronary artery disease

ORIGINAL RESEARCH ARTICLE

Impact of telemedicine interventions on mortality in patients with acute myocardial infarction: a systematic review and meta-analysis

Milena Soriano Marcolino,[1] Luciana Marques Maia,[1] João Antonio Queiroz Oliveira,[1] Laura Defensor Ribeiro Melo,[1] Bruno Leonardo Duarte Pereira,[1] Diomildo Ferreira Andrade-Junior,[1] Eric Boersma,[2] Antonio Luiz Ribeiro[1]

Heart 2019;105:1479–1486.

In 31 studies, the intervention was prehospital ECG transmission.

Telemedicine was associated with reduced in-hospital mortality compared with usual care (relative risk (RR) 0.63(95% confidence interval[CI] 0.55 to 0.72); I2 <0.001%).

DTB time was consistently reduced (mean difference −28 (95% CI −35 to –20) min), but showed large heterogeneity (I2=94%).

Thirty-day mortality (RR 0.62;95% CI 0.43 to 0.85) and long-term mortality (RR 0.61(95% CI 0.40 to 0.92)) were also reduced, with moderate heterogeneity (I2=52%).

HHS Public Access
Author manuscript
J Ment Health. Author manuscript; available in PMC 2016 June 28.

Published in final edited form as:
J Ment Health. 2015 ; 24(5): 321–332. doi:10.3109/09638237.2015.1019054.

Emerging mHealth and eHealth Interventions for Serious Mental Illness: A Review of the Literature

John A. Naslund, MPH[a], **Lisa A. Marsch, PhD**[b,c,d], **Gregory J. McHugo, PhD**[c,d], and **Stephen J. Bartels, MD, MS**[a,d,e]

[a]The Dartmouth Institute for Health Policy and Clinical Practice, Dartmouth College, Lebanon, NH

[b]The Center for Technology and Behavioral Health, Dartmouth College, Lebanon, NH

[c]Psychiatric Research Center, Dartmouth College, Lebanon, NH

[d]Department of Psychiatry, Geisel School of Medicine at Dartmouth, Lebanon, NH

[e]Department of Community and Family Medicine, Geisel School of Medicine at Dartmouth, Lebanon, NH

Interventions were grouped into four categories:

1) illness self-management and relapse prevention;

2) promoting adherence to medications and/or treatment;

3) psychoeducation, supporting recovery, and promoting health and wellness;

4) symptom monitoring.

Published in final edited form as:
J Ment Health. 2015 ; 24(5): 321–332. doi:10.3109/09638237.2015.1019054.

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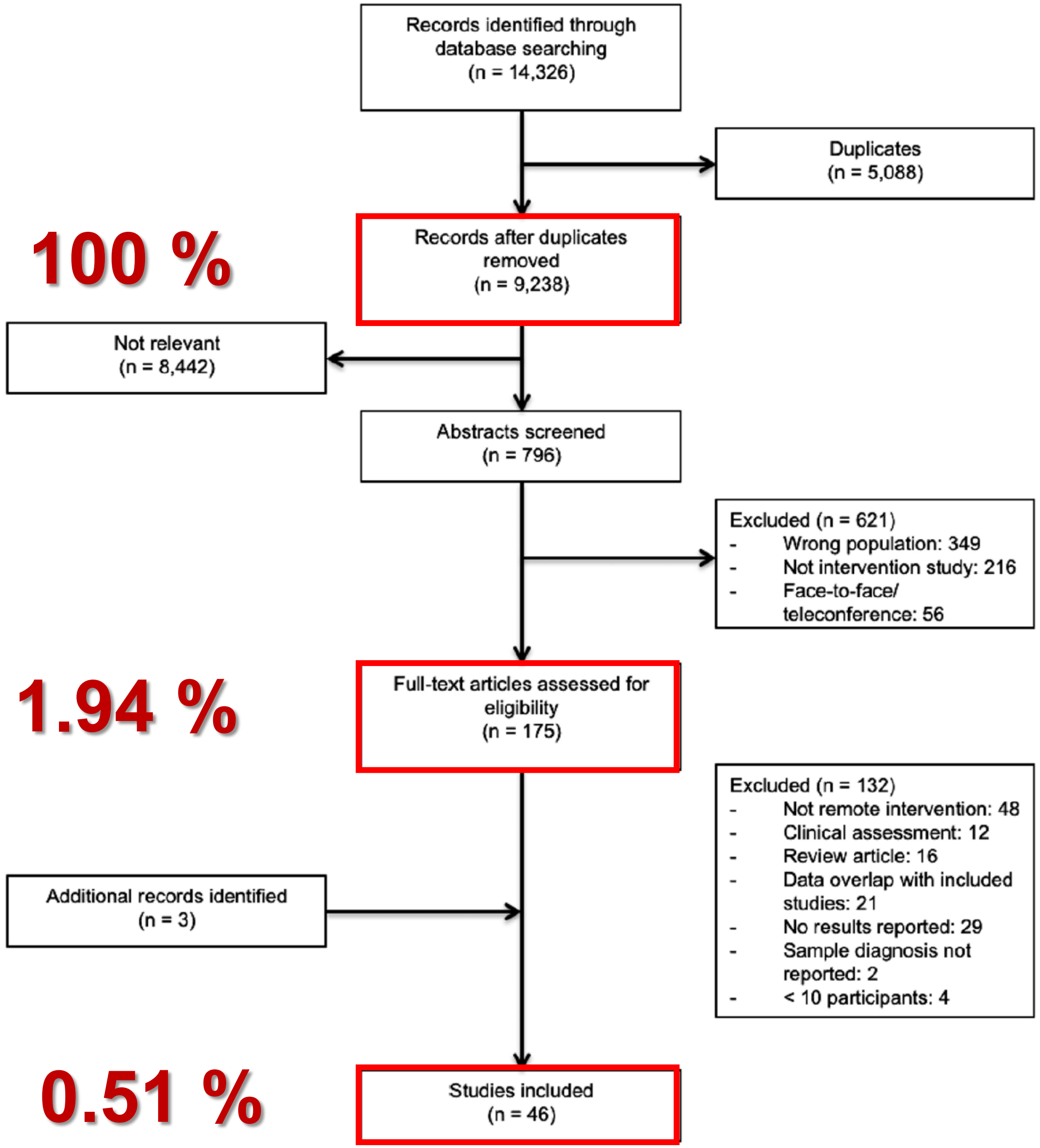


Centro Nazionale per la Telemedicina e le Nuove Tecnologie Assistenziali

I servizi di Telemedicina si cuciono addosso ai pazienti nei loro territori, ma con metodi validati e modelli coerenti.

TO VERIFY ORGANIZATIONAL PROCESSES AS WELL AS MEDICAL PROCEDURES IS NECESSARY TO PROJECT EFFECTIVE DIGITAL SYSTEMS IN HEALTHCARE

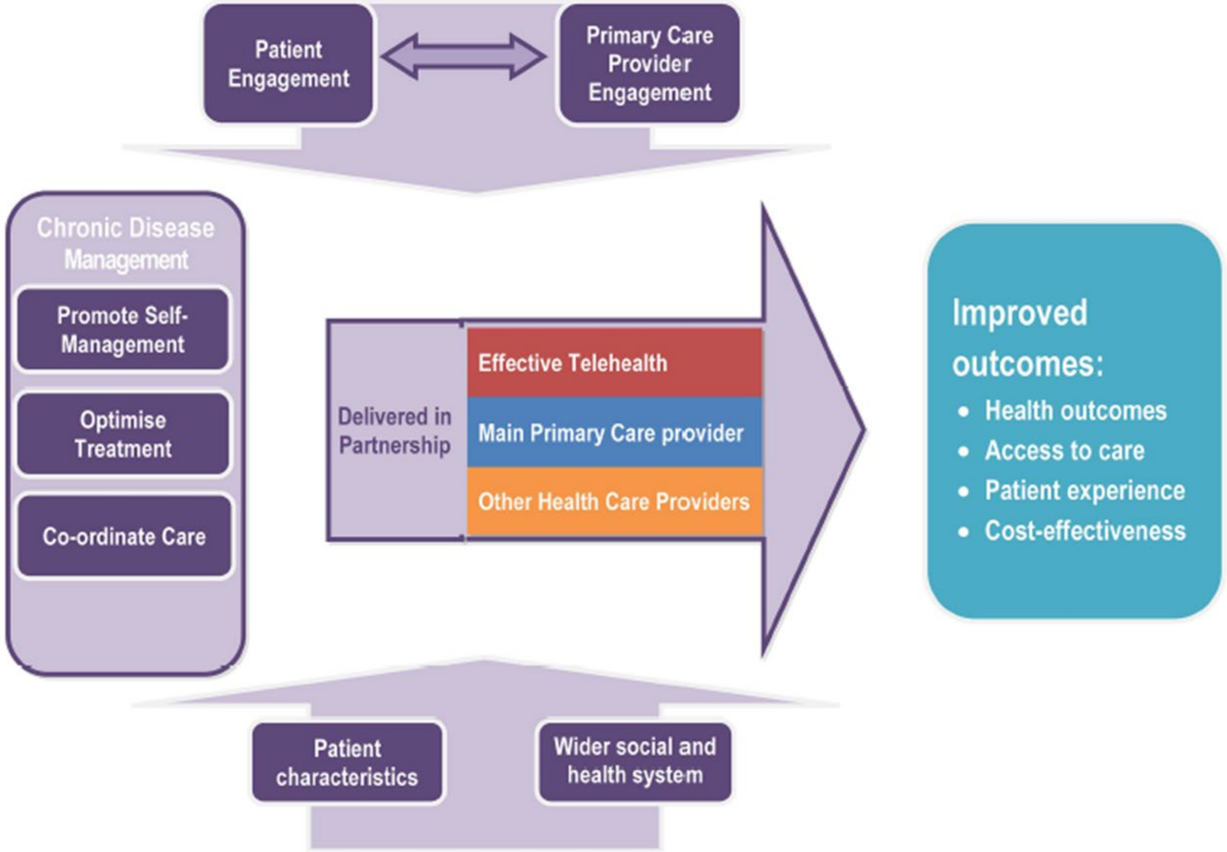
Open Access Research

BMJ Open

TElehealth in CHronic disease: mixed-methods study to develop the TECH conceptual model for intervention design and evaluation

Chris Salisbury,[1] Clare Thomas,[1] Alicia O'Cathain,[2] Anne Rogers,[3] Catherine Pope,[3] Lucy Yardley,[4] Sandra Hollinghurst,[1] Tom Fahey,[5] Glyn Lewis,[6] Shirley Large,[7] Louisa Edwards,[1] Alison Rowsell,[4] Julia Segar,[8] Simon Brownsell,[2] Alan A Montgomery[9]

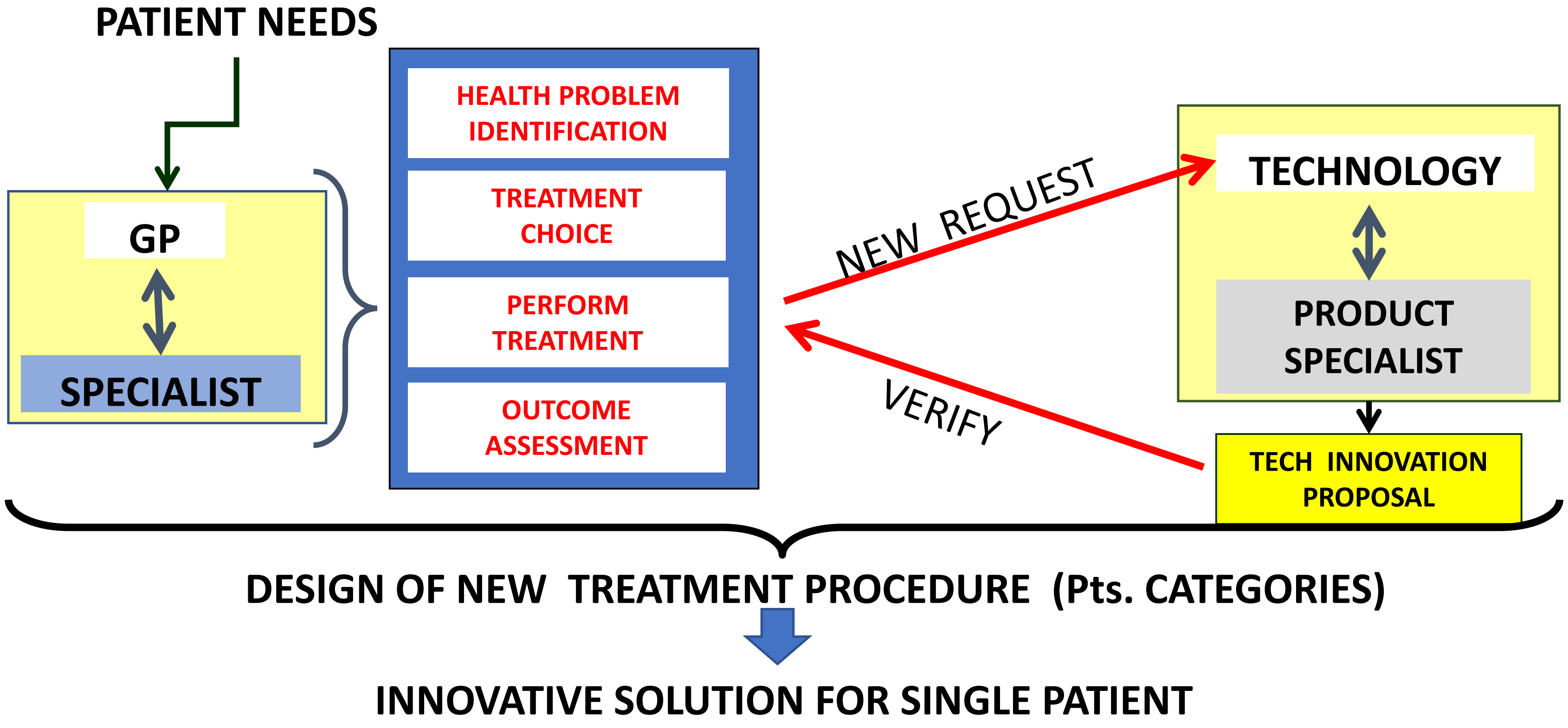
BMJ Open 2015;5:e006448. doi:10.1136/bmjopen-2014-006448



An exemple? TECH Model

ITALIAN TELEMEDICINE SYSTEM DESIGN METHOD:

- Epidemiological study (area)
- People needs analysis (health & social)
- Professional needs analysis
- Feasibility study
- Project Design
- Project sustainability
- Start-up service (PCM)
- Service stabilisation



Centro Nazionale per la Telemedicina e le Nuove Tecnologie Assistenziali

«**MISSION**: condurre, promuovere e coordinare la ricerca e la governance di sistema per le applicazioni sociali e sanitarie nell'ambito delle nuove tecnologie informatiche e della telemedicina.»

LINEE DI SVILUPPO

1. **AFFIANCAMENTO ASL/AO** – REALIZZAZIONE SERVIZI DI TELEMEDICINA CON «ARCHITETTURE» COERENTI
2. **PILASTRI NAZIONALI** – CYBERSECURITY, VALUTAZIONE ECONOMICA, NORMATIVE, LINEE GUIDA MEDICHE
3. **COMUNITA' TECNICO-SCIENTIFICA** – CONDIVISIONE DI ESPERIENZE, DI USO DATI/SISTEMI, PARTNERSHIP

DATI, STUDI CLINICI e ORGANIZZATIVI, STUDI BENCHMARKING (statistiche significative)

MODELLO ITALIANO DI TELEMEDICINA – METODI SCIENTIFICI DI PROGETTAZIONE e VERIFICA

PROMOZIONE DI RICERCA APPLICATIVA (NAZIONALE – INTERNAZIONALE)

Centro Nazionale per la Telemedicina e le Nuove Tecnologie Assistenziali

AFFIANCAMENTO

T.Assis.T.O.

“Telemedicina per Assistenza Territoriale e Ospedaliera”
Azienda USL Toscana Sud-Est: progetto per la realizzazione della rete integrata di presidi ospedalieri in Telemedicina nel territorio dell’Azienda (Provincie Grosseto, Siena e Arezzo).

ADI+eH
"Progettazione, sviluppo e valutazione di efficacia organizzativa e clinica, in differenti Regioni italiane, di servizi di Assistenza Domiciliare Integrata supportati da sistemi di eHealth specifici per territorio."
Per 4 Regioni (Abruzzo, FVG, Puglia Sardegna), inserimento strutturato e coordinato nei servizi di Assistenza Domiciliare Integrata (ADI) di opportune tecnologie digitali.

“Progetto per la gestione integrata e la presa in carico del Paziente tra Area Cardiovascolare, Area Medica e Territorio del paziente con scompenso cardiaco cronico attraverso la Telemedicina”
ASST Ovest Milanese: progetto di sistema di Telemedicina per la presa in carico dei pazienti cronici

Consultazioni per collaborazione nelle Regioni e P. Autonome: Abruzzo, Friuli VG, Lombardia, Marche, Piemonte, Puglia, Sardegna, Sicilia, Toscana, Valle d’Aosta,

Centro Nazionale per la Telemedicina e le Nuove Tecnologie Assistenziali

PROGETTI DI RICERCA NAZIONALI

TELEMECHRON study
"Telemedicine for home-based managementof patients with chronic diseases and comorbidities: analysis of current model and design of innovative strategies to improve quality of care and optimise resources utilization"
Collaborazione con Centro Nazionale di Tecnologie Innovative in Sanità Pubblica, UO Nefrologia e dialisi ASL Toscana Nord Ovest, Direzione Generale Welfare Lombardia, Fondazione B. Kessler di Trento.

TELEDIAB
"Impatto di un sistema di Telecare per la gestione del rischio metabolico e cardiovascolare nei pazienti con diabete di tipo 2 e diabete gestazionale seguiti presso le strutture specialistiche"
Collaborazione con Associazione Medici Diabetologi (AMD)

"Realizzazione di un osservatorio per l'adozione responsabile e regolata delle innovazioni tecnologiche, nell'attuale quadro di trasformazione digitale del servizio sanitario nazionale."
Responsabile scientifico: Ing. Mauro Grigioni – TISP-ISS
Definire metodologie per la classificazione e valutazione di software stand-alone come dispositivi medici (SaMD) e dei software non DM, ma di interesse per la salute, a favore di una loro sorveglianza e adozione regolata.

Centro Nazionale per la Telemedicina e le Nuove Tecnologie Assistenziali

GRUPPI STUDIO NAZIONALI

Gruppo Nazionale di Studio per la Cybersecurity in Sanità

Gruppo Nazionale di Studio per la valutazione economica dei servizi di Telemedicina

Gruppi Nazionali di Studio per la Telemedicina di Specialità

- Gruppo Nazionale di Studio per la Telemedicina nei Penitenziari
- Gruppo Nazionale di Studio sulla Telemedicina per la Neurofisiologia Clinica
- Gruppo Nazionale di Studio sulla Telecardiologia ???
- . . .
- . . .

Studio sugli aspetti giuridici della Telemedicina

Centro Nazionale per la Telemedicina e le Nuove Tecnologie Assistenziali

ATTIVITA’ DI SVILUPPO NAZIONALI

Ricognizione sulle attività di Telemedicina in Italia 2014-2017

Richiesta di condivisione da parte della Cabina Regia NSIS

Ricognizione sulle normative nazionali in merito alla Telemedicina

Glossario Italiano di sanità digitale

GRAZIE DELL’ ATTENZIONE

NON ESITATE A CHIAMARCI