2nd International Conference on
Health Informatics and Technology
July 27-29, 2015 Valencia, Spain

Big data and cognitive computing at point of care. A big challenge: How we should manage it at the Primary Care?

Josep M Picas





Key topics

- ✓ The health care systems are converging worldwide on their conceptual models
- ✓ Primary care should evolve under the framework of the Population Health Management
- ✓ Big Data and Cognitive Computing will be the tools of the post-industrialization era of the health care systems
- ✓ We must address the future needs of doctors and their required skills

WORLD ECONOMIC FORUM

COMMITTED TO IMPROVING THE STATE OF THE WORLD

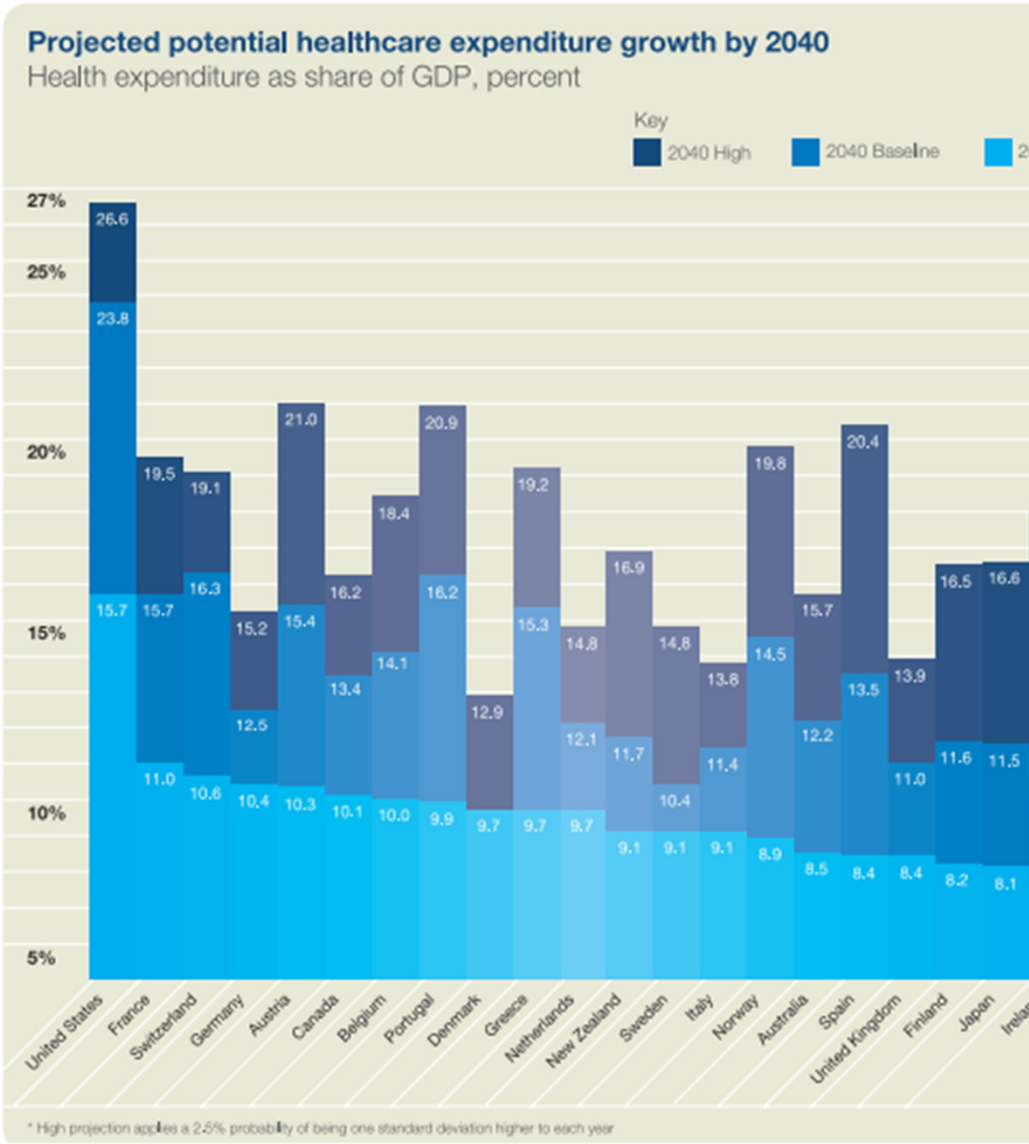
2013

nable Health
ns
s, Strategies,
l Uncertainties
cenarios

orld Economic Forum
ation with McKinsey & Company

Figure 2: Projections of GDP Share of Health in OECD Countries

Source: World Economic Forum 2012.



World Health Organization

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Media centre

The right to health

Fact sheet N°323
Reviewed November 2013

Key facts

- The WHO Constitution enshrines the highest attainable standard of health as a fundamental right of every human being.
- The right to health includes access to timely, acceptable, and affordable health care of appropriate quality.
- Yet, about 150 million people globally suffer financial catastrophe annually, and 100 million are pushed below the poverty line as a result of health care expenditure.
- The right to health means that States must generate conditions in which everyone can be as healthy as possible. It does not mean the right to be healthy.
- Vulnerable and marginalized groups in societies tend to bear an undue proportion of health problems.



AT THE INTERSECTION OF HEALTH, HEALTH CARE, AND POLICY

Health Affairs

September 2014 Vol. 33 No. 9 healthaffairs.org

Advancing Global Health Policy

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Jessica Bylander

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Continued on page 1498

VOL. 33 | NO. 9
September 2014
Advancing Global Health Policy



FROM THE EDITOR-IN-CHIEF

DOI: 10.1377/hlthaff.2014.0921

Our Health Is Global Health

BY ALAN R. WEIL



It may take an Ebola outbreak for Americans to be reminded of the importance of global health, but opportunities abound for international learning for those who take the time to look. Last year *Health Affairs* reported that "The 'Triple Aim' Goes Global," and in this issue we see how developing and industrialized countries around the world are confronting challenges and learning from each other on all three aims: cost, quality, and population health.

Mark McClellan and colleagues launch the discussion by examining the global movement toward accountable

leagues analyze retail prices and c
clude that although prices for mala
medicines decreased in six of seven
lots in Africa, wholesalers and retail
may be capturing subsidies designed
reduce those prices, leaving room
further price reductions.

LEARN GLOBALLY, ACT LOCALLY

The desire to accelerate the spread of
fective innovation is also global. Oli
Keown and colleagues draw lesso
from eight countries in how innovati
spreads. Going beyond the structu
analysis that dominates most work
innovation, they focus on the "cultu
dynamics that are required on the fr
lines of health care to support inno
tion and its diffusion."

We should not overstate similarit
around the world. The World Hea
Organization reports that mater
mortality rates are 510 per 100,000 l
births in sub-Saharan Africa, while th
are only 16 per 100,000 in the most

Cochrane Community (beta)
Trusted evidence. Informed decisions. Better health.

vidence-based health care

- **Evidence-based health care** is the conscientious use of current best evidence in making decisions about the care of individual patients or the delivery of health services. Current best evidence is up-to-date information from relevant, valid research about the effects of different forms of health care, the potential for harm from exposure to particular agents, the accuracy of diagnostic tests, and the predictive power of prognostic factors [1].
- **Evidence-based clinical practice** is an approach to decision-making in which the clinician uses the best evidence available, in consultation with the patient, to decide upon the option which suits that patient best [2].
- **Evidence-based medicine** is the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients. The practice of evidence-based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research [3].

15 July 2015] Available from:
munity.cochrane.org/about-us/evidence-based-health-care

Evidence-based health care and systemat
reviews
Evidence-based health care

Are scientific methods us
determine which drugs and proced
are best for treating diseas

The answers may surprise you. Mo
health care is undergoing a l
overdue and dramatic evolu



The Evidence-based Medicine Triad
Source: Florida State University, College of Medicine. Retrieved

The
COMMONWEALTH
FUND

| PUBLICATIONS | INTERACTIVES & DATA | GE

nwealth Fund is a private foundation that aims to promote a
ming health care system that achieves better access, improved
greater efficiency, particularly for society's most vulnerable,
w-income people, the uninsured, minority Americans, young
d elderly adults.

The
COMMONWEALTH
FUND

e-

January 2, 2015

New 'Perspective' Series in the New England Journal of Medicine Spo Health Systems from Around the World



A new monthly series of "Perspective" articles focusing on selected health care systems across the globe debuted in the January 1 issue of the *New England Journal of Medicin* series, a collaboration with The Commonwealth Fund, will shine a light on new, innovati potentially instructive health policies in place or under development in Europe, Asia, No South America, Africa, and Australasia.



http://www.commonwealthfund.org/publications/fund-reports/2015/jan/international-profiles-2014

The NEW ENGLAND

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EDITORIAL

International

Stephen Morrissey, Ph.D
Malina, Ph.D.
N Engl J Med 2015; 372:

The NEW ENGLAND JOU

HOME | ARTICLES & MULTIM



Perspective

INTERNATIONAL HEALTH

The Public–Privat
Sweden

Anders Anell, Ph.D.
N Engl J Med 2015; 372:1-4 | Janu

The N JOU

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Perspective

INTERNATIONAL HEALTH CA

A System in Name
Canada's Provinces

Steven Lewis, M.A.
N Engl J Med 2015; 372:497-500 | F

The NEW ENGLAND JOURNAL of MEDICINE

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Perspective

INTERNATIONAL HEALTH CARE SYSTEMS

Lessons from the East — China's Rapidly Evolving Heal
System

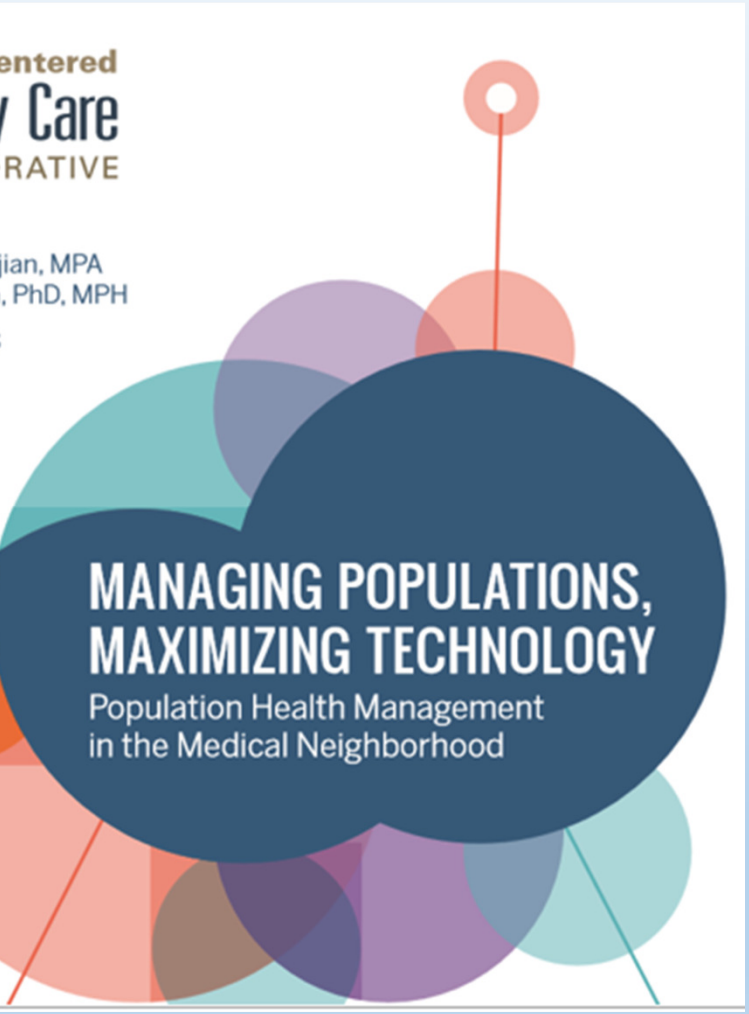
David Blumenthal, M.D., M.P.P., and William Hsiao, Ph.D.
N Engl J Med 2015; 372:1281-1285 | April 2, 2015 | DOI: 10.1056/NEJMp1410425

Primary Care: Team model convergence

Primary Health Care Centers: Scandinavian countries, UK, Spain..

Team model: Medical Home… US, Maisons de Santé Fr…., Germany, The Netherlands

Payment systems: From fee for service to payment for results & value, bundled payments



2. Comprehensive, Team-Based Care

A critical solution for successful PHM is the transition to a **care team** model. A team-based model of care ensures that all patients from the lowest risk level to the highest risk level are cared for in the right place, at the right time, and in the manner most appropriate for the patient. Teams may include any configuration of physicians, nurses, care coordinators, medical assistants, social workers, diabetes educators, nutritionists and/or health coaches.

International Journal of Nursing Studies 52 (2015) 727–743

Contents lists available at ScienceDirect

International Journal of Nursing Studies

journal homepage: www.elsevier.com/ijns

Skill mix, roles and remuneration in the primary care workforce: Who are the healthcare professionals in the primary care teams across the world?

Tobias Freund [a,*], Christine Everett [b], Peter Griffiths [c], Catherine Hudon [d], Lucio Naccarella [e], Miranda Laurant [f,g]

[a] Department of General Practice and Health Services Research, University Hospital Heidelberg, Germany
[b] Health Innovation Program, University of Wisconsin-Madison, United States
[c] National Institute for Health Research Collaboration for Leadership in Applied Health Research and Care (Wessex) and University of Southampton Centre of innovation and Leadership in Health Sciences, United Kingdom
[d] Department of Family Medicine and Emergency Medicine, Université de Sherbrooke, Québec, Canada
[e] The Australian Health Workforce Institute, Melbourne School of Population and Global Health, The University of Melbourne, Australia
[f] Scientific Institute for Quality of Healthcare (IQ healthcare), Radboud University Nijmegen Medical Centre and Knowledge Centre of Sustainable Healthcare, Nijmegen, The Netherlands
[g] HAN University of Applied Sciences, Nijmegen, The Netherlands

T

shortages of primary care physicians and an increased demand for services
l the impetus for delivering team-based primary care. The diversity of the
workforce is increasing to include a wider range of health professionals such
titioners, registered nurses and other clinical staff members. Although this
is observed internationally, skill mix in the primary care team and the speed
deliver team-based care differs across countries. This work aims to provide
f education, tasks and remuneration of nurses and other primary care team
ix OECD countries.

Based on a framework of team organization across the care continuum,
experts compare skill-mix, education and training, tasks and remuneratio
professionals within primary care teams in the United States, Canada, Austra
Germany and the Netherlands. Nurses are the main non-physician health
working along with doctors in most countries although types and roles in
vary considerably between countries. However, the number of allied health
and support workers, such as medical assistants, working in primary care
Shifting from 'task delegation' to 'team care' is a global trend but limited by tra
concepts, legal frameworks and reimbursement schemes. In general, r
follows the complexity of medical tasks taken over by each profession.



http://innovation.cms.gov/initiatives/aco/

nAffairs Blog

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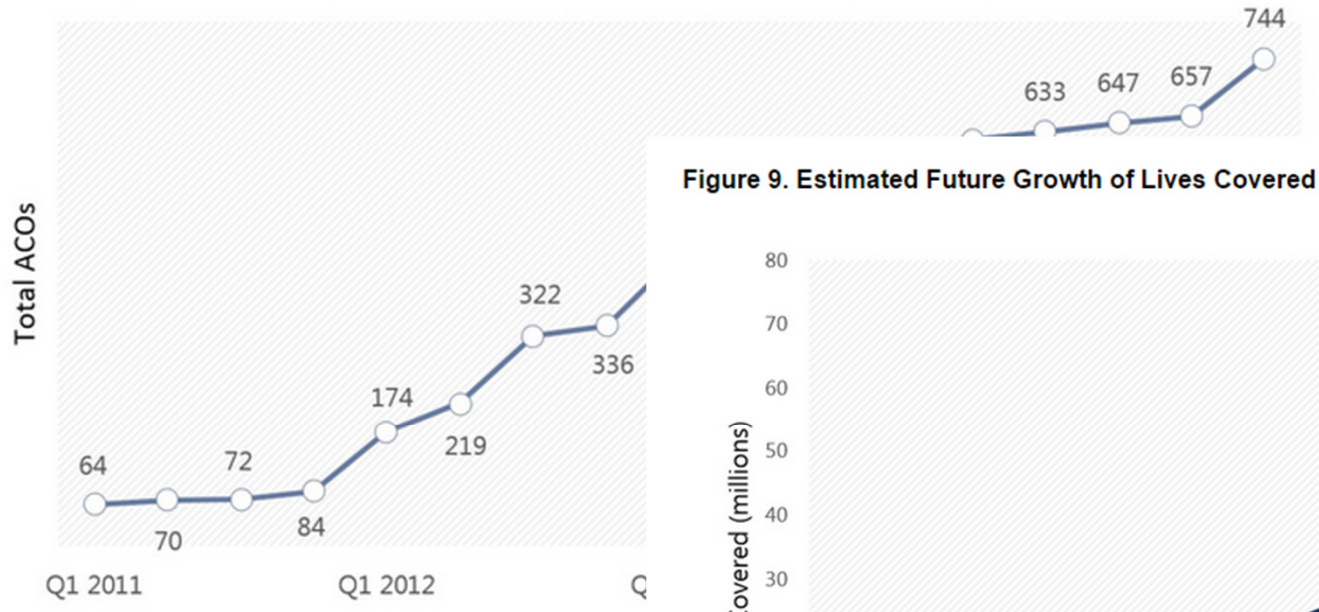
ality Of Life National Movement: Igniting Advocacy To Integrate Palliative Care In Our
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Turns Back Payment Suit By Medicaid Providers »

Dispersion Of Accountable Care Organ

5

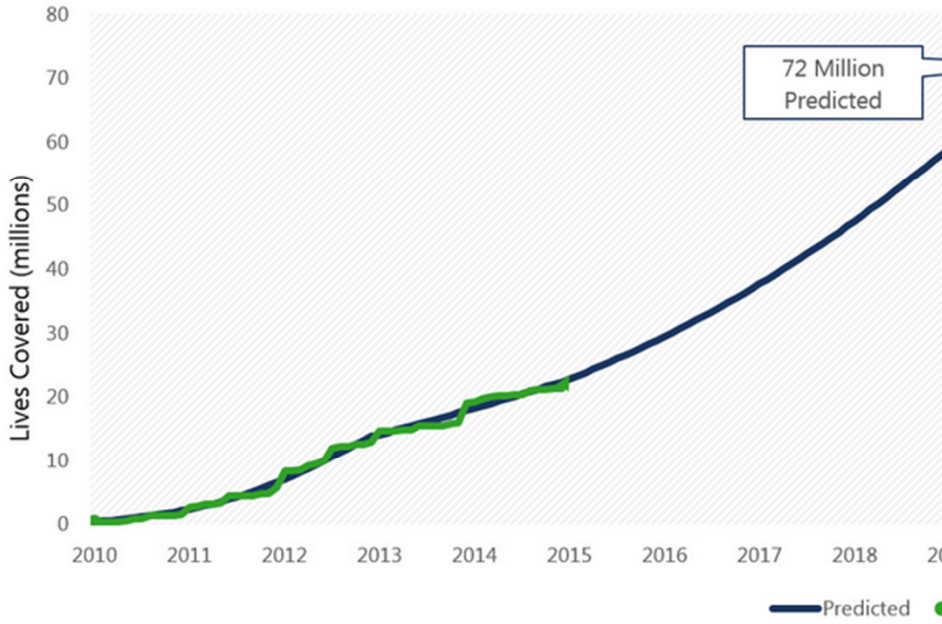
lestein

Figure 1. Total Public and Private Accountable Care Organizations, 2011 to January 2015



Source: Leavitt Partners Center for Accountable C

Figure 9. Estimated Future Growth of Lives Covered by ACOs



Source: Author's Analysis

Primary Care: some remarks

Prestige (and economic income) of hospital doctors versus primary care doctors

Lack of experience of working in **processes**

The understanding of the **role of nursing in PC**

Complex relationship with hospitals, social care, long term care

Primary Care: computerization

Diversity: some countries high level (Spain, UK, Scandinavia) but with difficulties of interoperability with other care levels (hospitals, social care, long term care..)

Lack of **Minimum Data Sets** (reliability & relevance weak) specialist relevance

Advances

- More structured clinical info
- CPOE: e-prescription, e-referrals, DSS
- P4P based on registered information

INSTITUTE OF MEDICINE
OF THE NATIONAL ACADEMIES

Advising the nation • Improving health

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Stephen M. Shortell

A Bold Proposal for Advancing Population Health

Stephen M. Shortell*

July 24, 2013

question is how best to link the health care delivery system with the public health
m and the community and social services sectors, including education, housing,
portation, public safety, and others involved with the upstream environmental
social determinants of health. In other words, how can we move from a culture of
ess and a culture of care to creating a culture of health? Or, alternatively, how do
nove away from a market that rewards caring for sick people to a market that also
rds keeping people well?

tell, S. M. 2013. A bold proposal for advancing population health. Discussion Paper, Institute of Medicine,
hington, DC. http://www.iom.edu/Global/Perspectives/2013/BoldProposal.



A Proposal for Financially Sustainable Population Health Organizations

"Reconfiguring our health delivery sector to provide safe and effective care, improve health, and simultaneously reduce costs requires both efficient, high-quality medical services and community-wide population health and prevention activities, supported by the immediate availability of comprehensive electronic patient information.

asnoff W, Shortliffe E, Shortell S. A Proposal for Financially Sustainable Population Health Organizations opulation Health Management 2014;17:255–256

The Kings Fund Ideas that change health care

Population health systems

Going beyond integrated care

Tweet 449 | g+1 0 | Like 35

23 February 2015 | Comments: 5

Hugh Alderwick, Chris Ham, David Buck

Integrated care has become a key focus of health service reform in England in recent years, as a response to fragmentation within the NHS and social care system. Yet efforts to integrate care services have rarely extended into a concern for the broader health of local populations and the impact of the wider determinants of health. This is a missed opportunity.

http://www.kingsfund.org.uk/publications/population-health-systems



How to evaluate population management?

'Work in progress'

JN Struijs[1,2,3]
HW Drewes[1]
R Heijink[1]
CA Baan[1]

[1] National Institute of Public Health and the Environment (RIVM)
[2] Commonwealth fund
[3] Harvard School of Public Health

Health Policy. 2015 Apr;119(4):522-9. doi: 10.1016/j.healthpol.2014.12.003. Epub 2014 Dec 10.

How to evaluate population management? Transforming the Care Continuum Alliance population health guide toward a broadly applicable analytical framework.

Struijs JN[1], Drewes HW[2], Heijink R[2], Baan CA[2].

Population Management?

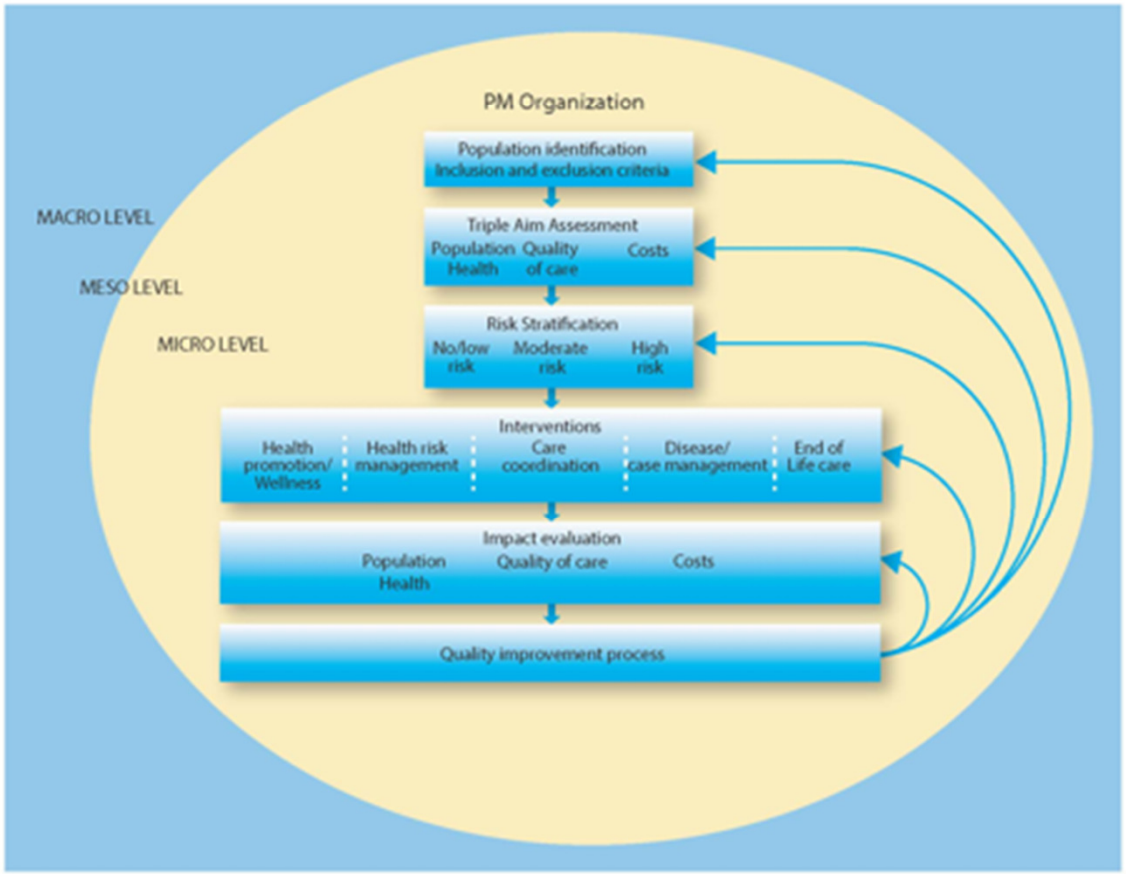
• No unambiguous definition and broadly agreed on definition is lacking but in general (Drewes et al., in preparation):

'PM strives to address health needs for the population at-risk and the chronically ill at all points along the health continuum by integrating services across health care, prevention, social care and welfare'.

• Impact assessed by the extent to which they contribute to the Triple Aim (Berwick, 2008):

1) to improve (experienced) quality of care
2) to improve the health of the population
3) to reduce per capita costs (or cost growth?)

Analytical framework Dutch monitor PM



n Cities Safer Cities Healthier Cities

hier Cities

healthier

N

harmacies Payers Manufacturers

pulation Health Management

n Health Management

Population Health | Solutions | Resou



ion Health

IBM Industries & solutions Services Products Support & downloads My IBM

IBM Industries > Healthcare >

Healthcare: Population health management

España

INTERSYSTEMS

Quiénes Somos Su Sector Nuestros Productos Servi



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Population Health Management: Th Framework for Real-Time Analytics Actions

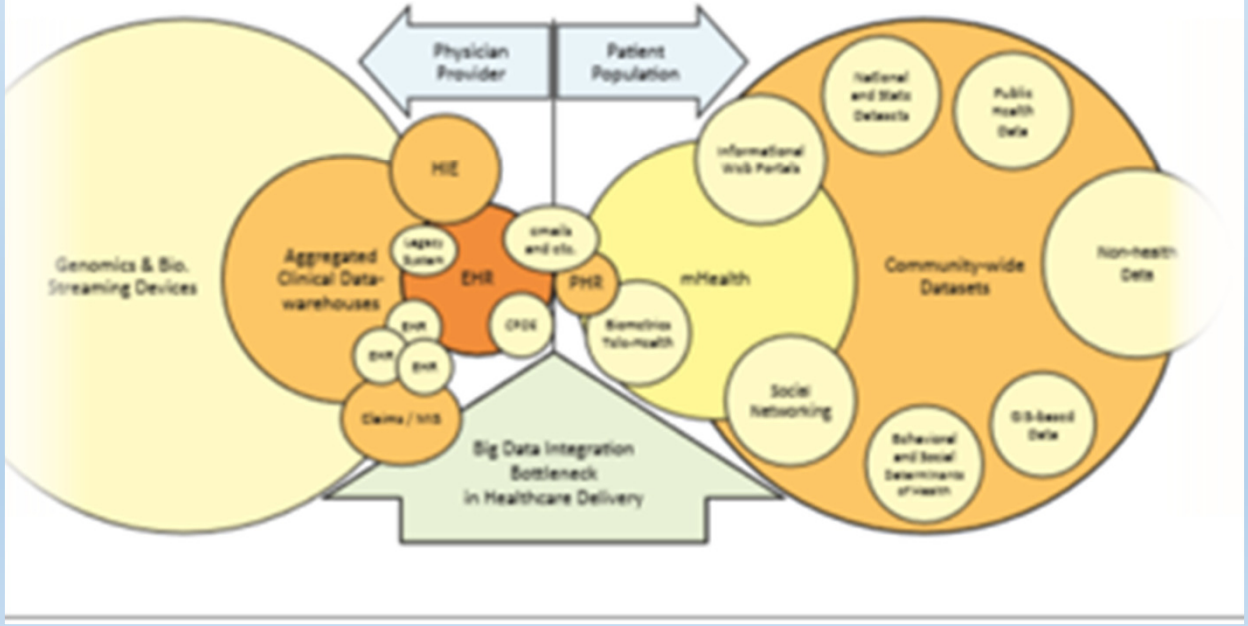
JOHNS HOPKINS
BLOOMBERG SCHOOL of PUBLIC HEALTH
CENTER FOR POPULATION HEALTH INFORMATION TECHNOLOGY

The Role of Big Data in Community-wide Population Healthcare Delivery and Research: Cast Study and Matching Conceptual Framework

Hadi Kharrazi (kharrazi@jhu.edu)

■ *Sources of Big Data in Population Health*

As shown in the next diagram, the integration of existing and potential sources of big data for population health solutions has reached a tipping point. The major bottleneck for big-data-driven community-wide population health interventions is the overreliance on EHRs to provide all necessary raw data and processing platforms for big data solutions.



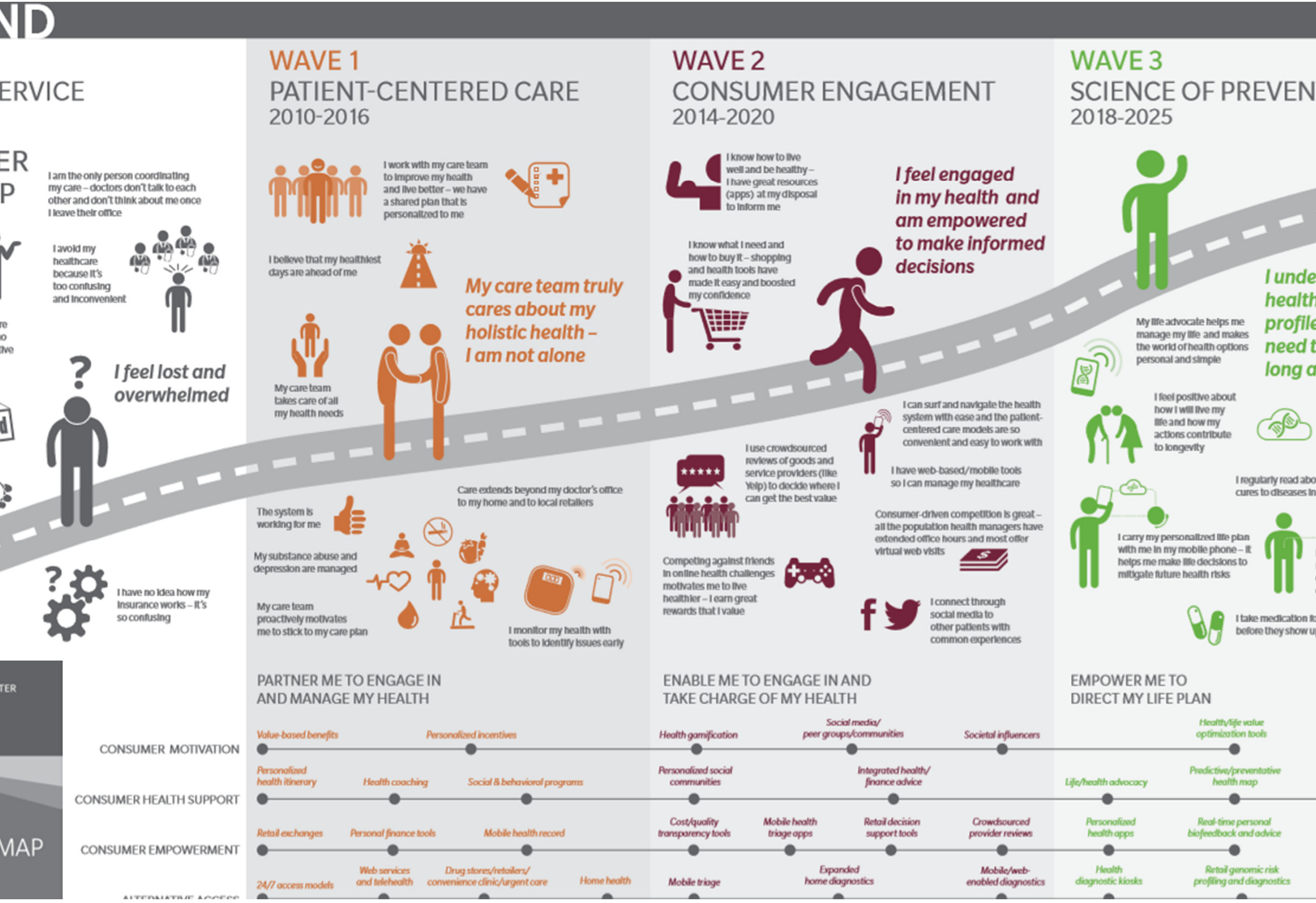
Post industrialization era of the healthcare

omputerized Clinical Process

atient Relationship Management

g data at point of care in primary care

- Computerized Clinical DSS
- PHM
- Managed by:
  - Nurses (skilled) APN
  - Other technicians and professionals
  - Primary Care Doctors ??


ND
ERVICE
ER
P
I am the only person coordinating my care – doctors don't talk to each other and don't think about me once I leave their office
I avoid my healthcare because it's too confusing and inconvenient
I feel lost and overwhelmed
I have no idea how my insurance works – it's so confusing
WAVE 1
PATIENT-CENTERED CARE
2010-2016
I work with my care team to improve my health and live better – we have a shared plan that is personalized to me
I believe that my healthiest days are ahead of me
My care team takes care of all my health needs
My care team truly cares about my holistic health – I am not alone
The system is working for me
My substance abuse and depression are managed
My care team proactively motivates me to stick to my care plan
Care extends beyond my doctor's office to my home and to local retailers
I monitor my health with tools to identify issues early
WAVE 2
CONSUMER ENGAGEMENT
2014-2020
I know how to live well and be healthy – I have great resources (apps) at my disposal to inform me
I know what I need and how to buy it – shopping and health tools have made it easy and boosted my confidence
I feel engaged in my health and am empowered to make informed decisions
I can surf and navigate the health system with ease and the patient-centered care models are so convenient and easy to work with
I have web-based/mobile tools so I can manage my healthcare
I use crowdsourced reviews of goods and service providers (like Yelp) to decide where I can get the best value
Consumer-driven competition is great – all the population health managers have extended office hours and most offer virtual web visits
Competing against friends in online health challenges motivates me to live healthier – I earn great rewards that I value
I connect through social media to other patients with common experiences
WAVE 3
SCIENCE OF PREVEN
2018-2025
I unde
health
profile
need t
long a
My life advocate helps me manage my life and makes the world of health options personal and simple
I feel positive about how I will live my life and how my actions contribute to longevity
I regularly read abo
cures to diseases in
I carry my personalized life plan with me in my mobile phone – it helps me make life decisions to mitigate future health risks
I take medication fo
before they show u
TER
MAP
PARTNER ME TO ENGAGE IN AND MANAGE MY HEALTH
ENABLE ME TO ENGAGE IN AND TAKE CHARGE OF MY HEALTH
EMPOWER ME TO DIRECT MY LIFE PLAN
CONSUMER MOTIVATION
Value-based benefits
Personalized incentives
Health gamification
Social media/ peer groups/communities
Societal influencers
Health/life value optimization tools
CONSUMER HEALTH SUPPORT
Personalized health itinerary
Health coaching
Social & behavioral programs
Personalized social communities
Integrated health/ finance advice
Life/health advocacy
Predictive/preventative health map
CONSUMER EMPOWERMENT
Retail exchanges
Personal finance tools
Mobile health record
Cost/quality transparency tools
Mobile health triage apps
Retail decision support tools
Crowdsourced provider reviews
Personalized health apps
Real-time personal biofeedback and advice
ALTERNATIVE ACCESS
24/7 access models
Web services and telehealth
Drug stores/retailers/ convenience clinic/urgent care
Home health
Mobile triage
Expanded home diagnostics
Mobile/web-enabled diagnostics
Health diagnostic kiosks
Retail genomic risk profiling and diagnostics

What to expect from technology ?

The NEW ENGLAND JOURNAL of MEDICINE

Unraveling the IT Productivity Paradox — Lessons for Health Care

Spencer S. Jones, Ph.D., Paul S. Heaton, Ph.D., Robert S. Rudin, Ph.D., and Eric C. Schneider, M.D.

Studies of the IT productivity paradox suggested that the productivity payoff of an IT investment did not follow quickly but required periods of intensive process reengineering

n engl j med 366;24 nejm.org june 14, 2012

MIHealth Health Management & Clinical Innovation FORUM



Transforming Health Care in the Information Age

Jack Cochran, Executive Director of The Permanente Federation at Kaiser Permanente

Old Organization (OO)

+

New Technology (NT)

=

Costly Old Organization (COO)

MIHealth Forum, Barcelona, Spain, 2012

MIT Technology Review

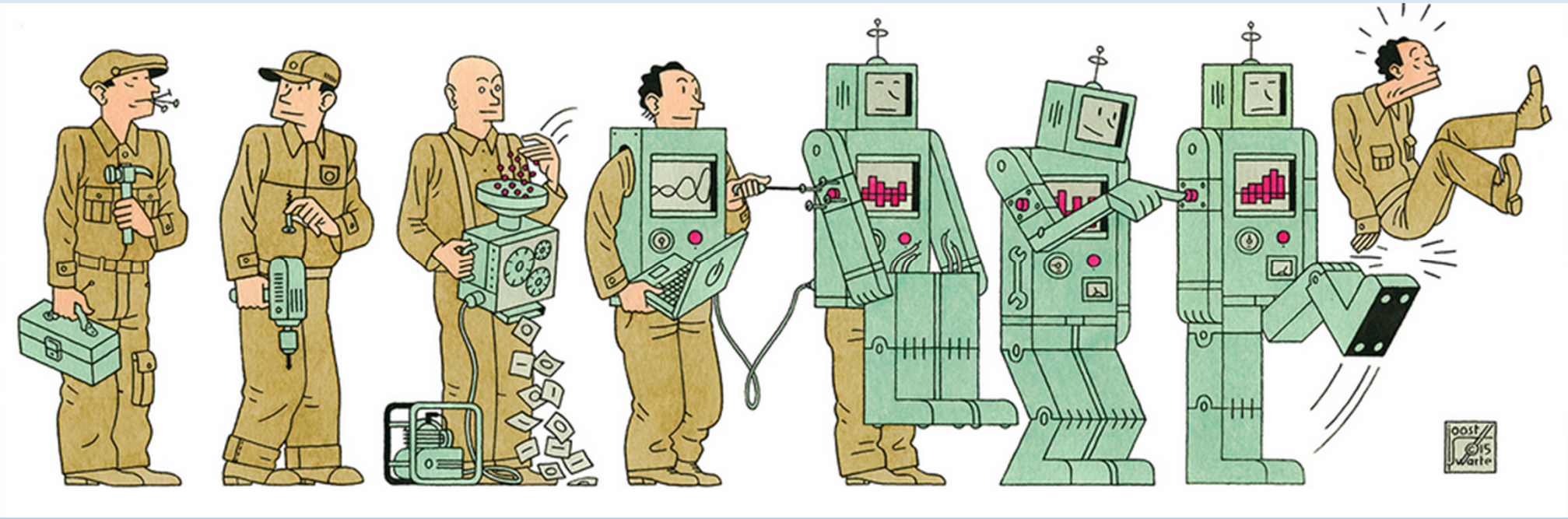
July 3, 2015

Weekly Business Newsletter

FEATURED STORY

Will Advances in Technology Create a Jobless Future?

We're in the midst of a jobs crisis, and rapid advances in AI and other technologies may be one culprit. How can we get better at sharing the wealth that technology creates?



ology Review [2015] Who Will Own the Robots? [Accessed: 15 July 2015] Available from:
w.technologyreview.com/featuredstory/538401/who-will-own-the-
tm_campaign=newsletters&utm_source=newsletter-weekly-business&utm_medium=email&utm_content=20

e-patients.net

because health professionals can't do it alone

Home | Categories | I am an e-Patient | Found on the Net

About Us | Contribute / Contact Us | Search | Go

E-PATIENTS.NET > PT/DOC CO-CARE > TOO MANY DOCTORS?

Too Many Doctors?

Dan Hoch | March 7, 2011

20 Tweet | 0 Me gusta

I don't hide the fact that I am a dyed in the wool liberal. I read, and agree with, pretty much everything Paul Krugman writes. But, it's rare for me to discover the kind of synergy between my Krugman-inspired ire over economic policy and politics generally and the e-Patient movement that I awoke to this morning. In today's column, Krugman makes the point that higher education does not automatically guarantee a comfortable, moderate wage job. No big insight there, but his argument includes some subtle implications for medical care.

The kinds of jobs that we associate with college education and beyond are also being outsourced to technology. As an example, Krugman points to a recent NYT piece on the role of software in analyzing legal documents. He also makes passing mention of computer assisted diagnosis in medicine. I've argued for a long time that much of what I do as a physician could be better done by either machines, or patients themselves. Taking that idea one step further, it's clear that we'll need fewer, not more, doctors in the future. I imagine that this morning Paul Krugman would agree.

Here's a link to his column.

7 | 20

Welcome



Participatory Medicine is a model of cooperative health care that seeks to achieve active involvement by patients, professionals, caregivers, and others across the continuum of care on all issues related to an individual's health. Participatory medicine is an ethical approach to care that also holds promise to improve outcomes, reduce medical errors, increase patient satisfaction and improve the cost of care.

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Daniel Brian (Dan) Hoch, MD, PhD

Director, Digital Initiatives

Benson Henry Institute for Mind Body Medicine at the MGH

"Much of what I do as a physician could be better done by either machines, or patients themselves"

Dan Hoch, neurólogo Mass General

Our approach

HM first steps: evaluating meaningful indicators & creating dashboar

- Global approach
- A Project on Aging and Dependence

xploring the evolution of PC doctors, nurses & other healthcare rofessionals

- Objective: obtain basic requirements for big data and cognitive computing appr & preparing the basis for the acceptance of the evolution
- Three ways:
  - Improve process knowledge (Lean Health Care)
  - Nursing innovation
  - Clinical leadership

POPULATION HEALTH MANAGEMENT DASHBOARD

Dashboard with a selection of relevant indicators aggregating data from:

Public Health & Environmental Health

Health & Social Care Prevention

Healthcare Services & Mental Health

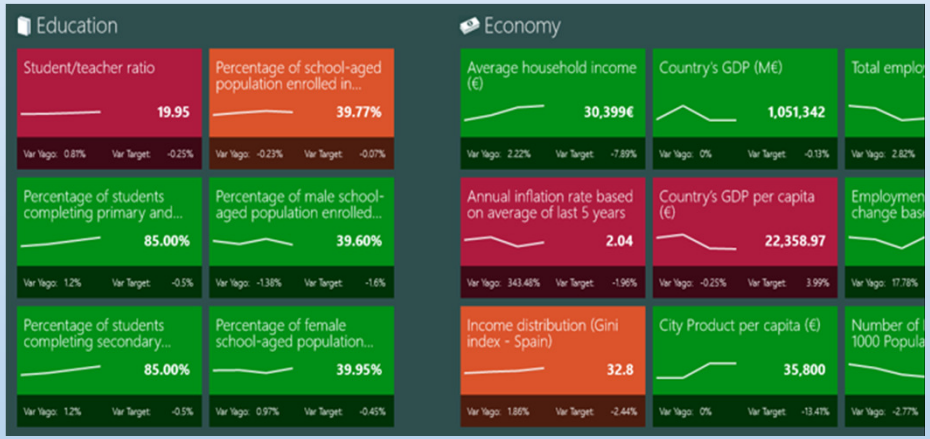
Community & Social Services

Physical activity & nutrition

Housing

Health literacy & education

Public Safety



- Identification of at-risk populations
- Analytics
- Build a framework to evaluate interventions
- Monitoring & reporting

Aging & Dependency. Dashboard

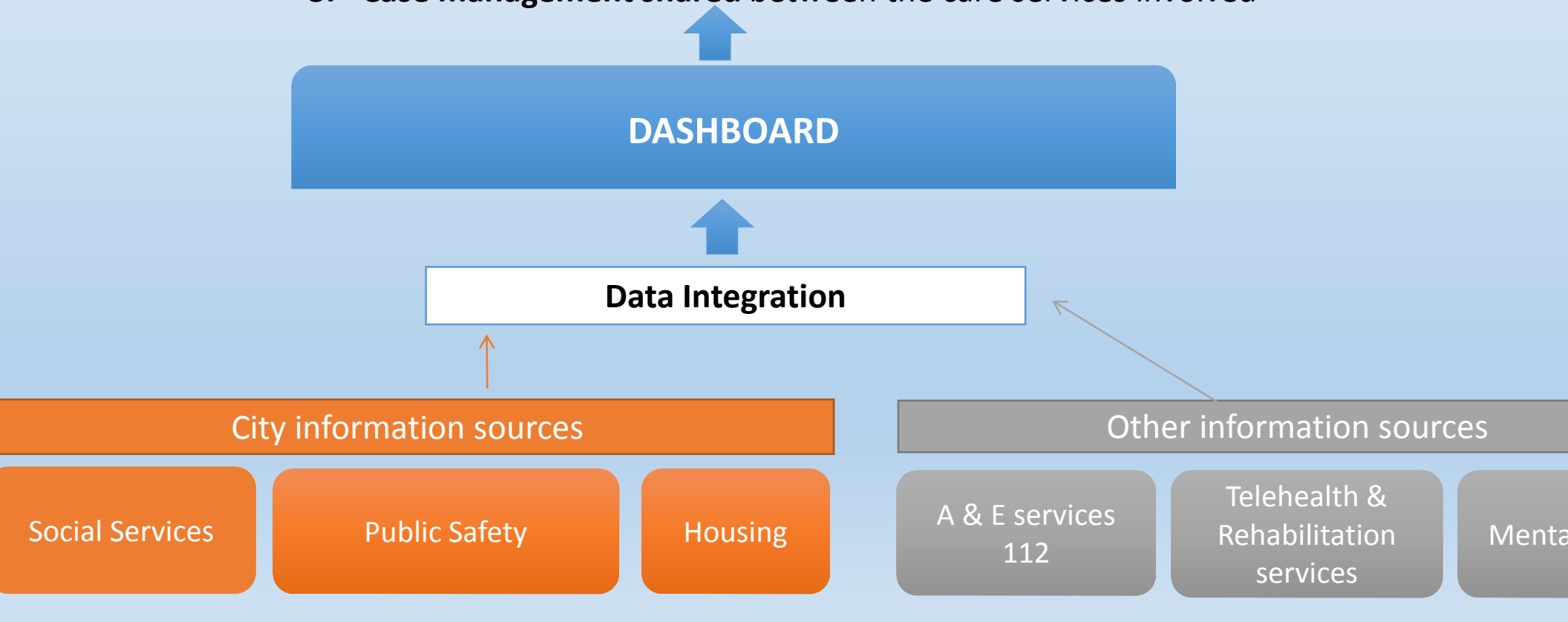


➔ Promote the coordination between the Health Care Services (Mental Health included) & the Social Services with the aim of improving the services of aged citizens

dentify, analyze, monitor areas of intervention on risk populations thanks to data integration from several sou

etect cases to manage, thanks to data integration from social services, primary care, hospital care & long term

3. **Case management shared** between the care services involved



sey&Company

arel Dörner and David Edelman



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Thank you !

Big data and cognitive computing at point of care. A big challenge: How we should manage it at the Primary Care?

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