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*Summer Institute / HIT Series*

# Health IT for Disease Management: Population Health IT Implications

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Johns Hopkins University

♦ *School of Public Health*

♦ *School of Medicine*

*1.5 hrs / ~55 slides*

## **Overview**

- ❖ **Background**
  - Chronic Diseases
  - Population Health Management
  - Promise of Health IT
- ❖ **Consumer Health Informatics Solutions**
  - Concept and Definitions
  - Categories and Sample Systems
  - Behavioral Change Models
- ❖ **Resources**
  - Books
  - Web



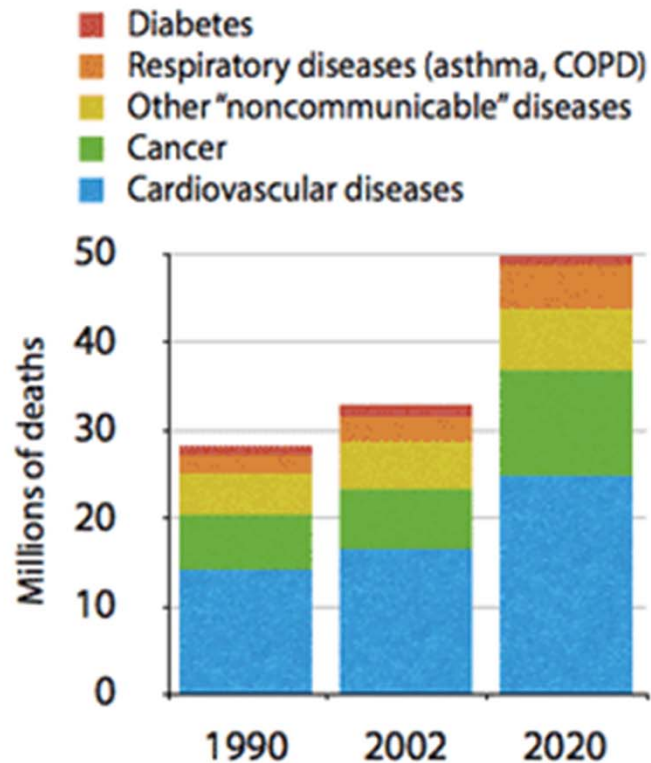
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## **Background**

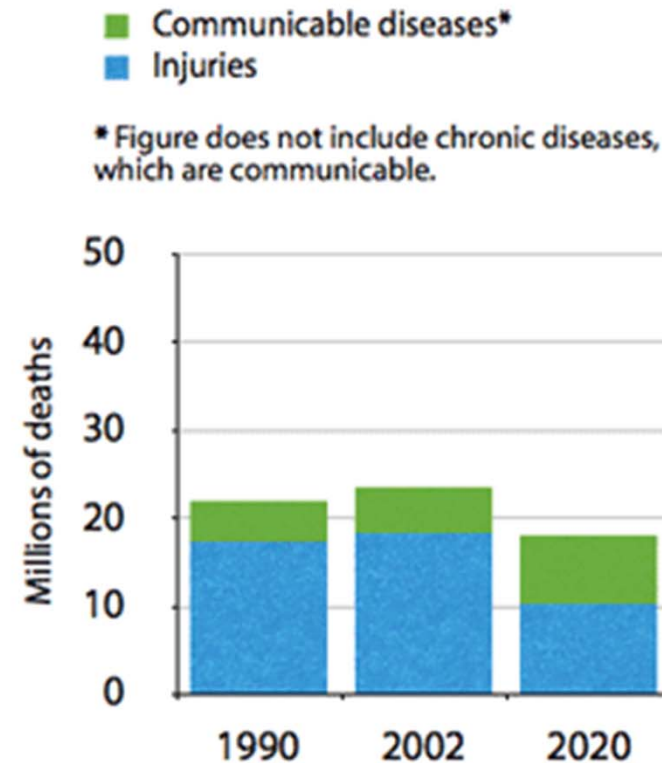
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## Background – Chronic Diseases → Global

### Chronic Illness



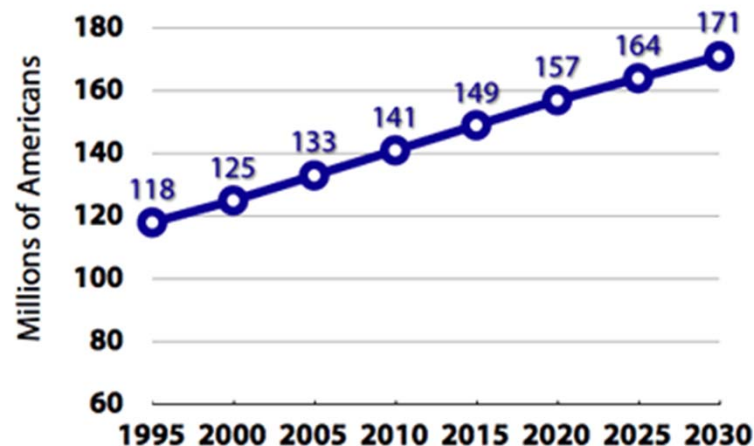
### Injuries & Communicable Disease



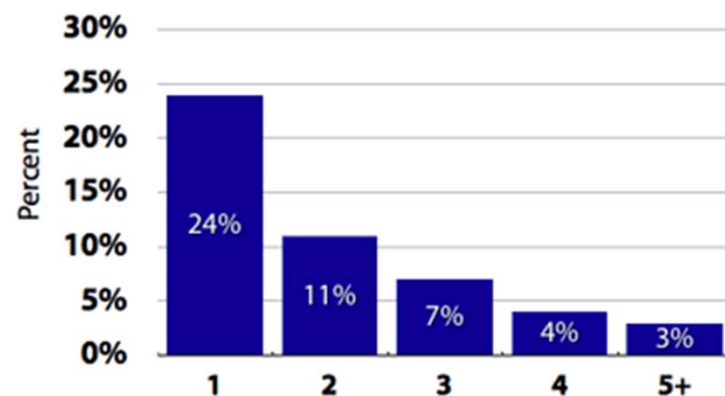
Annual Global Mortality by Category (Chronic vs non-Chronic)

## Background – Chronic Diseases → US

- Almost one **out of every two U.S. adults** reported having at least one of six chronic illnesses of cardiovascular disease, cancer, chronic obstructive pulmonary disease, asthma, diabetes or arthritis in 2008.
- **Seven out of 10 deaths** among Americans each year are from chronic diseases. Heart disease, cancer and stroke account for more than 50% of all yearly deaths.
- In 2012, **9.3% of the US population**, had diabetes (8.3% in 2010). Diabetes is the leading cause of kidney failure, non-injury lower-limb amputations and blindness among 20 to 74 year-olds.
- **One in three** U.S. adults have hypertension or high blood pressure. Nearly 70% of first heart attacks and 77% of first strokes occur in people with hypertension.

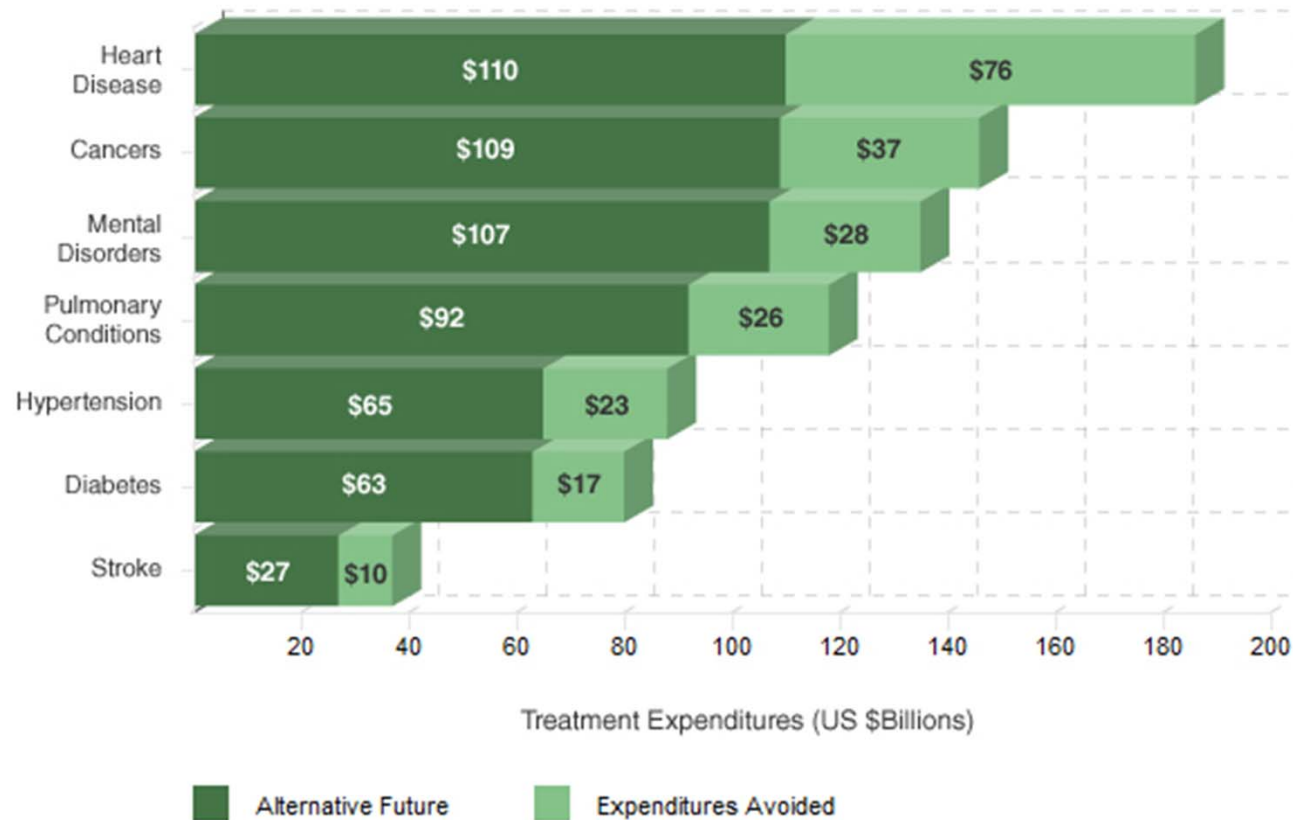


Prevalence of Chronic Diseases in the US



Number of Chronic Conditions Suffered by Americans

## Background – Chronic Diseases in the US → Cost Breakdown

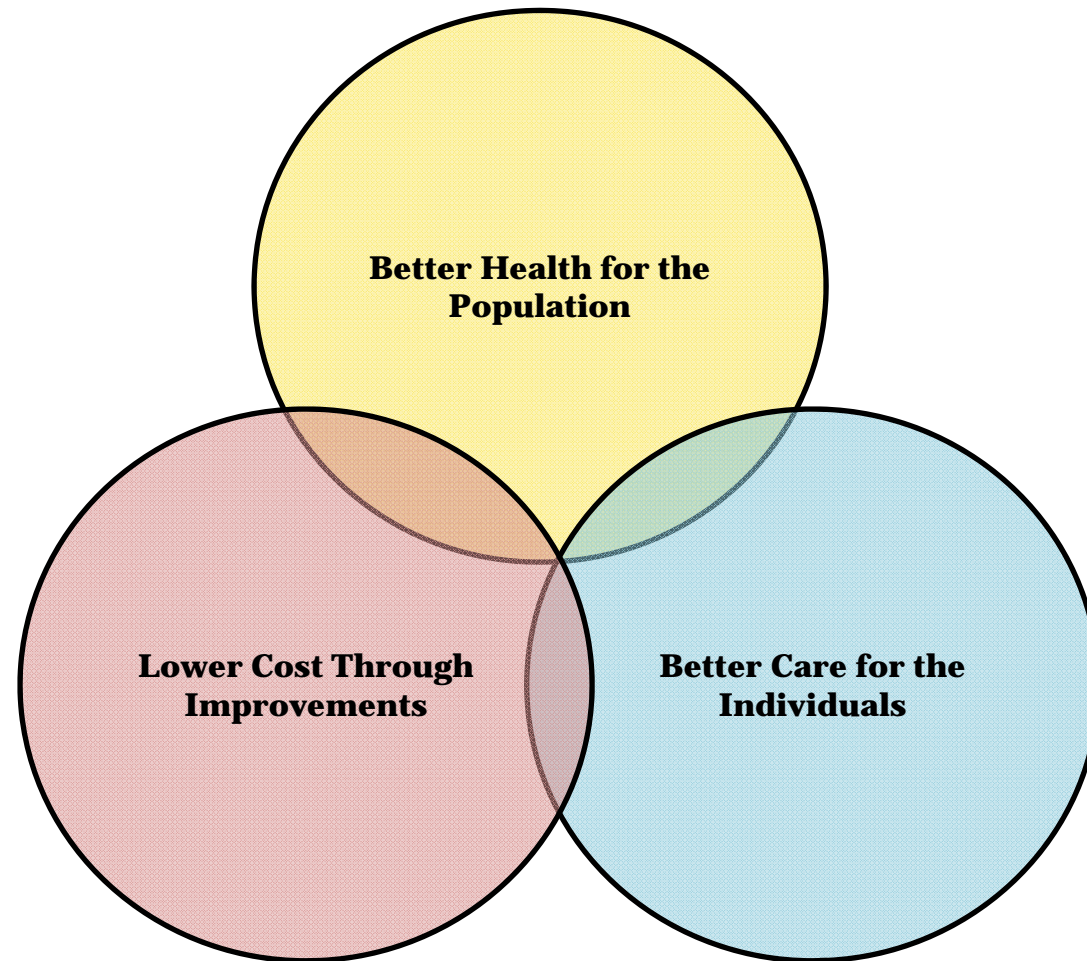


Avoidable treatment expenditure (2023 projections)

## Background – Population Health Management → Definition

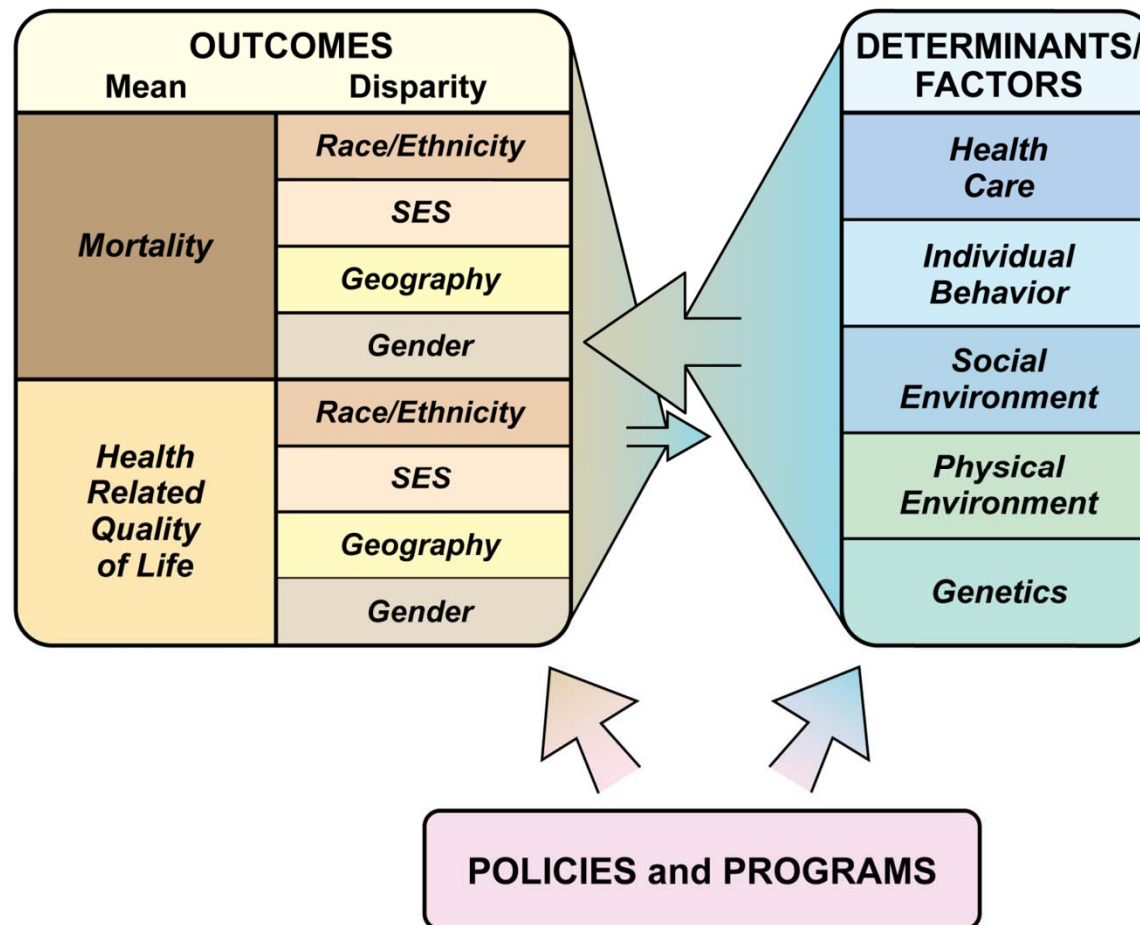
- Population health has been defined as “the **health outcomes of a group of individuals**, including the distribution of such outcomes within the group”.
- The population health improvement model highlights three components: (1) the central care delivery and leadership roles of the **primary care physician**; (2) the critical importance of **patient activation**, involvement and personal responsibility; and (3) the patient focus and capacity expansion of **care coordination** provided through wellness, disease and chronic care management programs.
- To accomplish all of this, a provider organization must supply proactive preventive and chronic care to all of a provider’s patients, both **during and between encounters** with the healthcare system. This requires providers to maintain regular contact with patients and support their efforts to manage their own health. At the same time, care managers must **manage high-risk patients** to prevent them from becoming unhealthier and developing complications.
- AHRQ → “**practice-based population health (PBPH)** is an approach to care that uses information on a group of patients within a primary care practice or group of practices to improve the care and clinical outcomes of **patients within that practice.**”

## Background – Population Health Management → Triple Aims



Triple Aims developed by the Institute for Healthcare Improvement (IHI)

## Background – PHM → Conceptual Framework

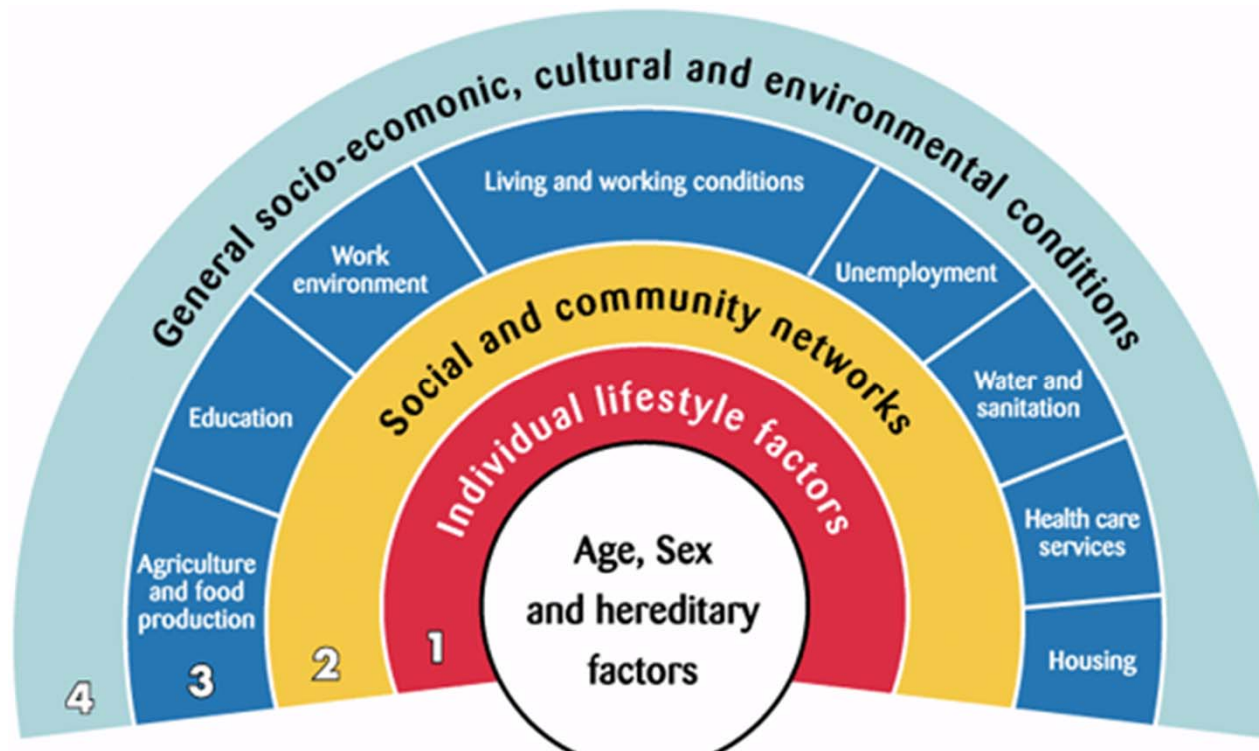


Conceptual Population Health Framework

Copyright Kindig et.al.

## Background – PHM → Conceptual Framework

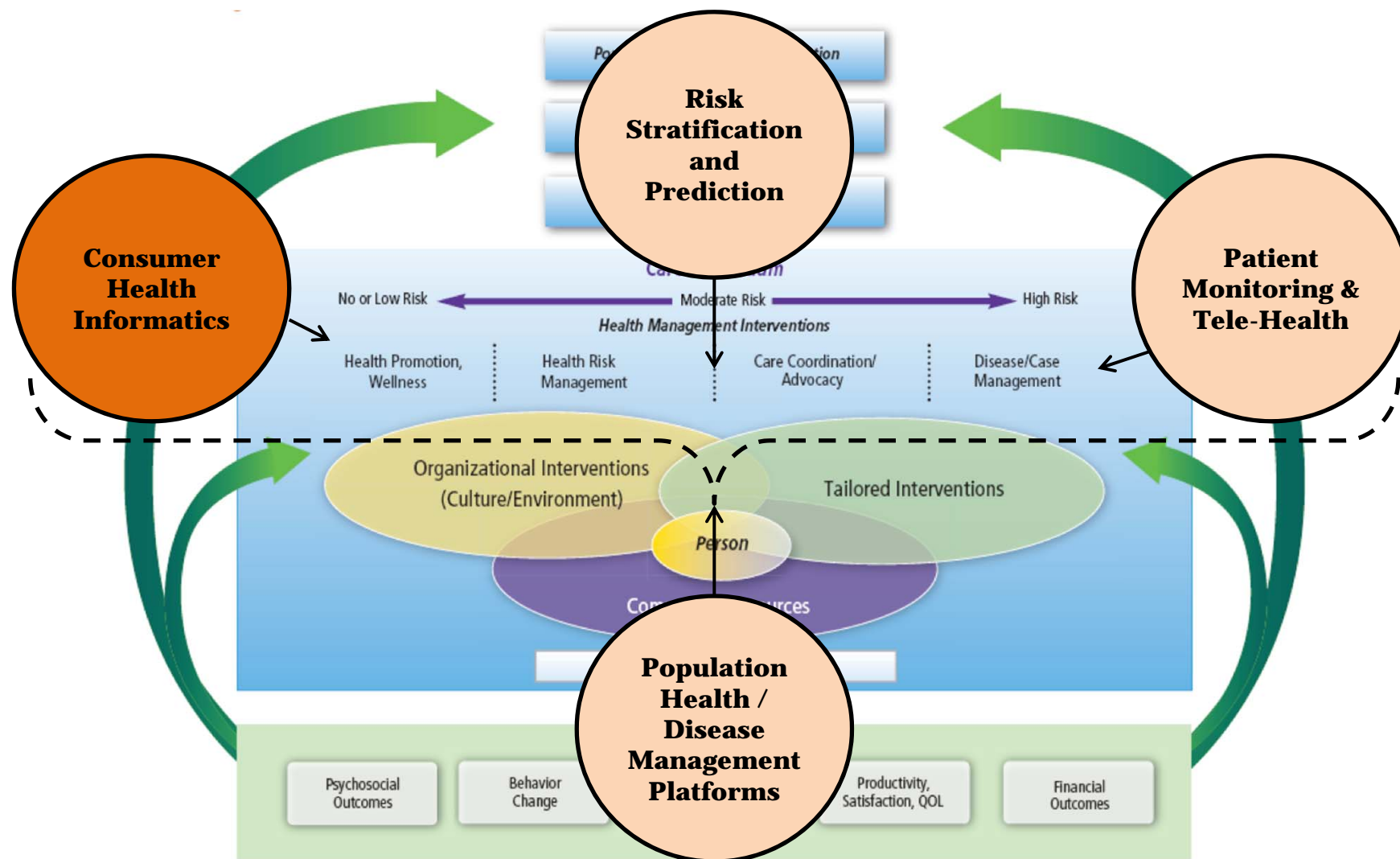
*Copyright Dahlgren et.al.*



Conceptual Population Health Framework

## Background – PHM → Management Framework

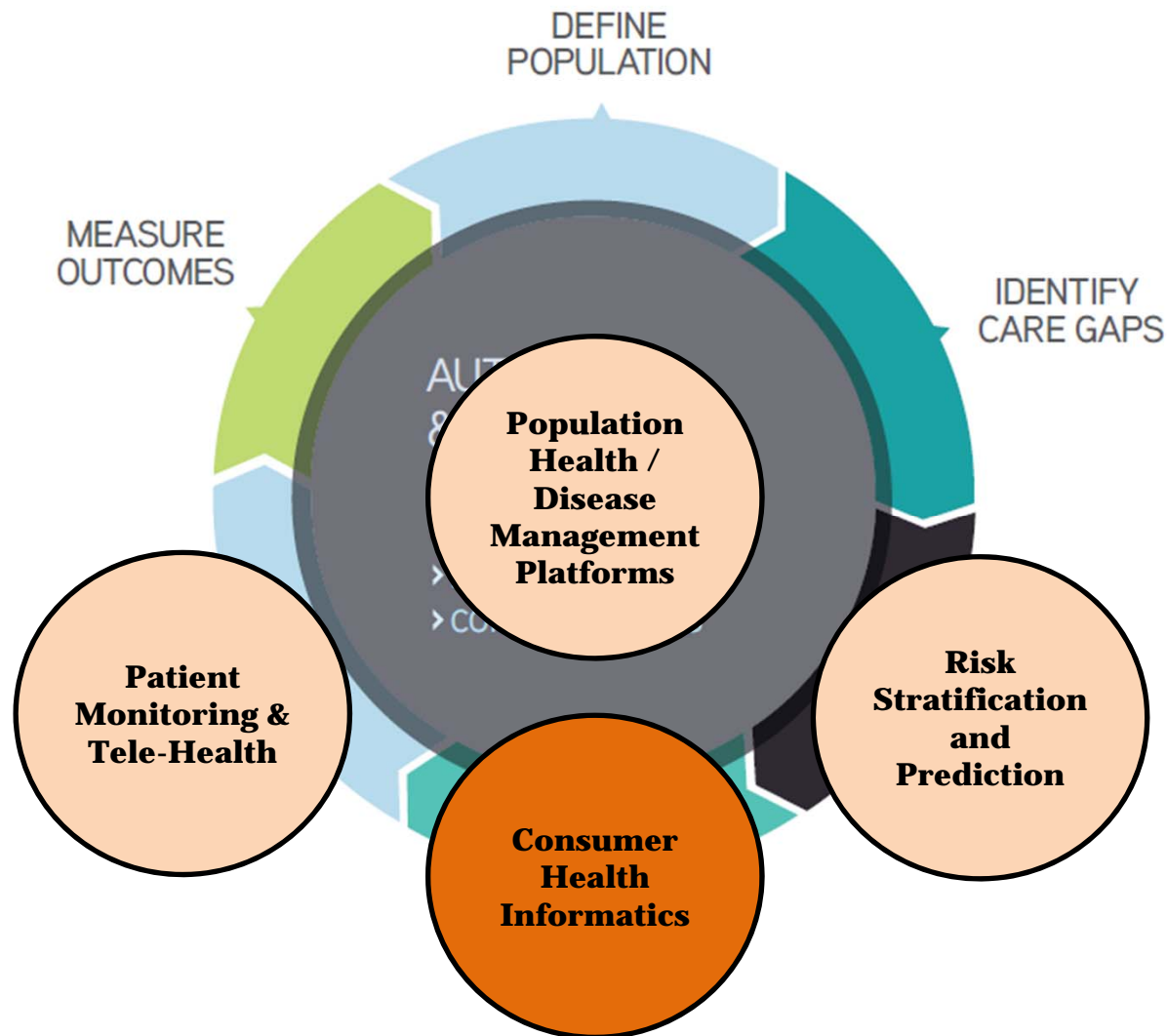
Copyright Care Continuum Alliance



Conceptual Population Health Management Framework

## Background – PHM → Management Framework

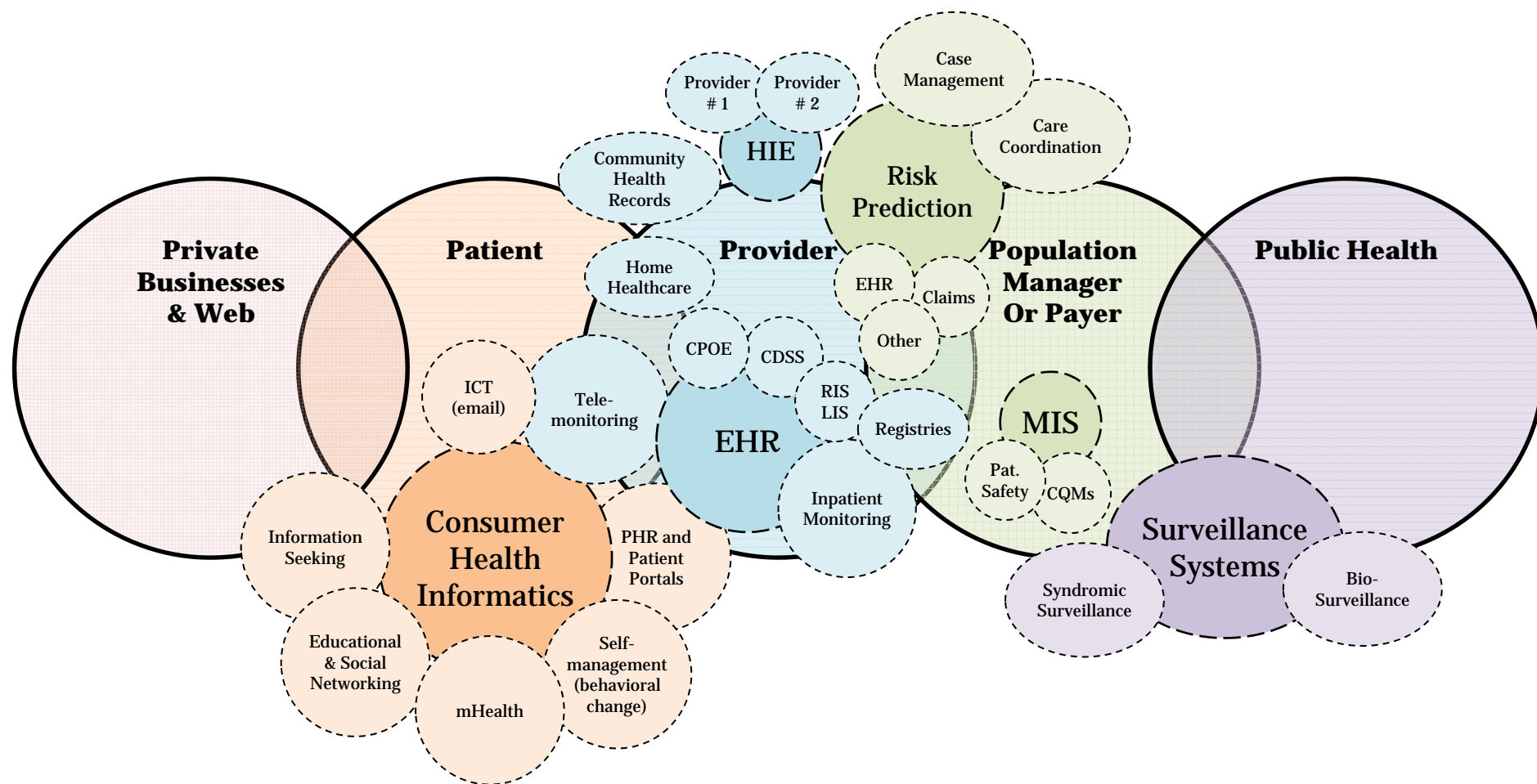
Copyright iHT<sup>2</sup>



Conceptual Population Health Management Framework

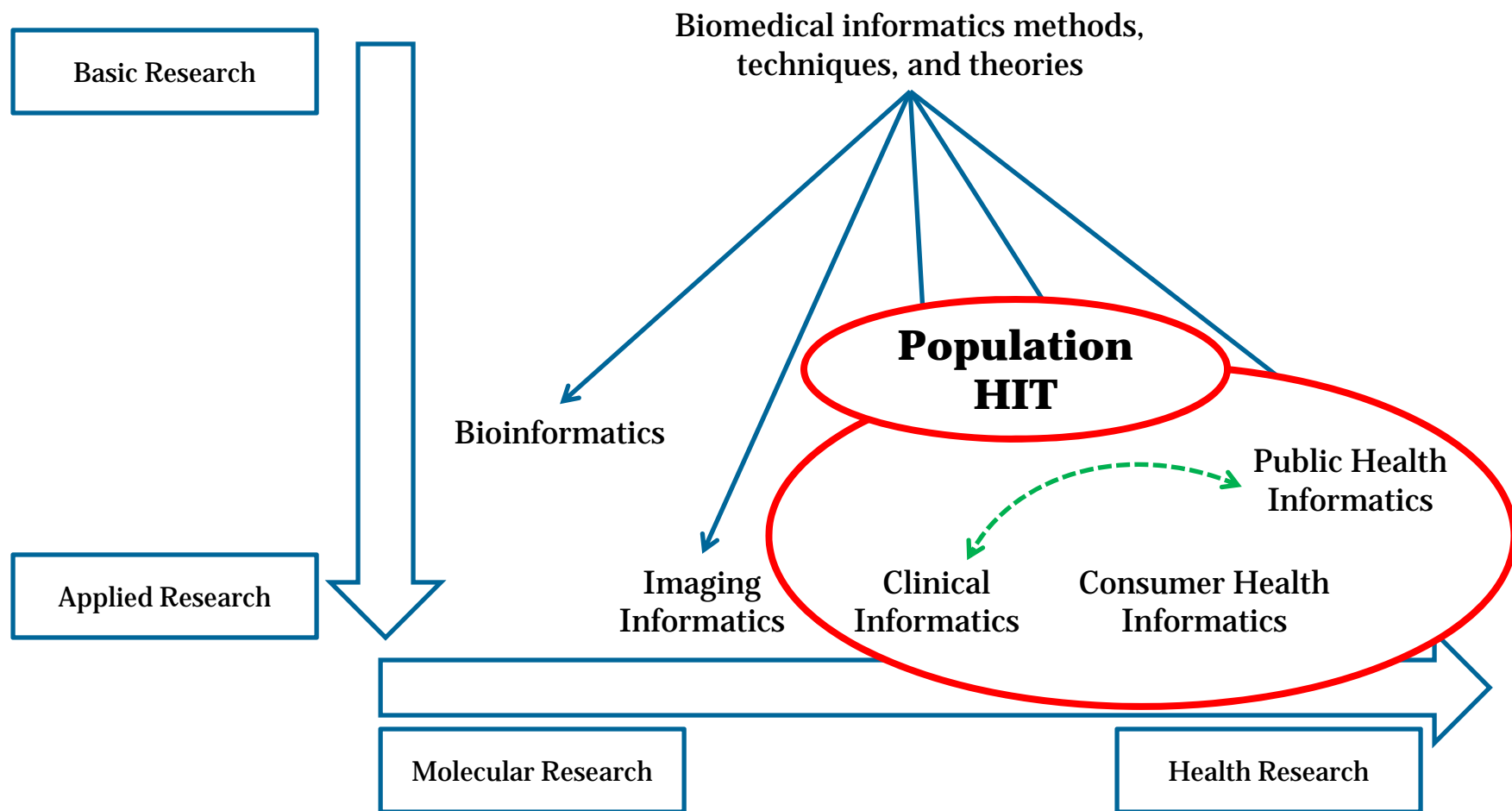
## Background – PHM → Promise of Health IT

Copyright Hadi Kharrazi

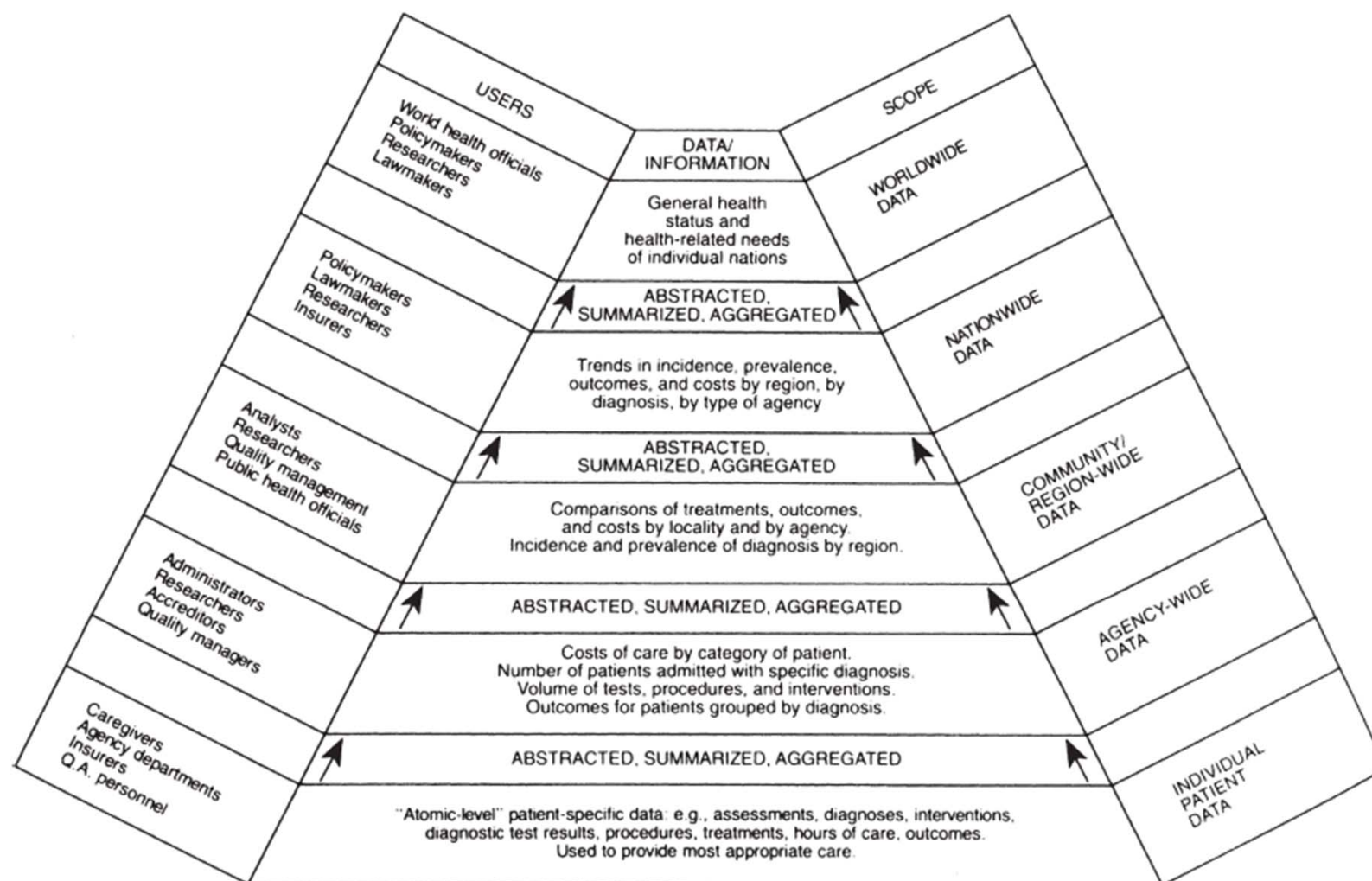


Population health stakeholders and health IT platforms/tools

## Background – PHM → Role of Consumer Health Informatics



## Background – PHM → Atomic Patient Level Data to Public Health



Examples of uses for atomic-level patient data collected once but used many times.



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# **Consumer Health Informatics**

## *(Concepts and Use Cases)*

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## Consumer Health Information (CHI) – Concept & Definition

- **Concept** of Consumer Health Informatics (CHI): CHI is the intersection of Health Information (HI) and Health Education (HE)
- **Health information consumer** is “a person who seeks information about health promotion, disease prevention, treatment of specific conditions, and management of various health conditions and chronic illnesses” (AMIA CHI WG).
- **CHI definitions:**
  - “CHI is the study of development and implementation of computer and telecommunication applications and interfaces designed to be used by health consumers” (US GAO).
  - “CHI is the use of modern computers and telecommunications to support consumers in obtaining information, analyzing their unique health care needs and helping them make decisions about their own health” (Academic)
- **CHI focuses** on: (1) consumer needs and preference → customization of information; (2) consumer behavior → integration of behavior change models; (3) target wellness in addition to chronic diseases / modifiable risks → healthy users (exercise, diet, travel, outbreaks and others).

## CHI – Systems → Information Seeking

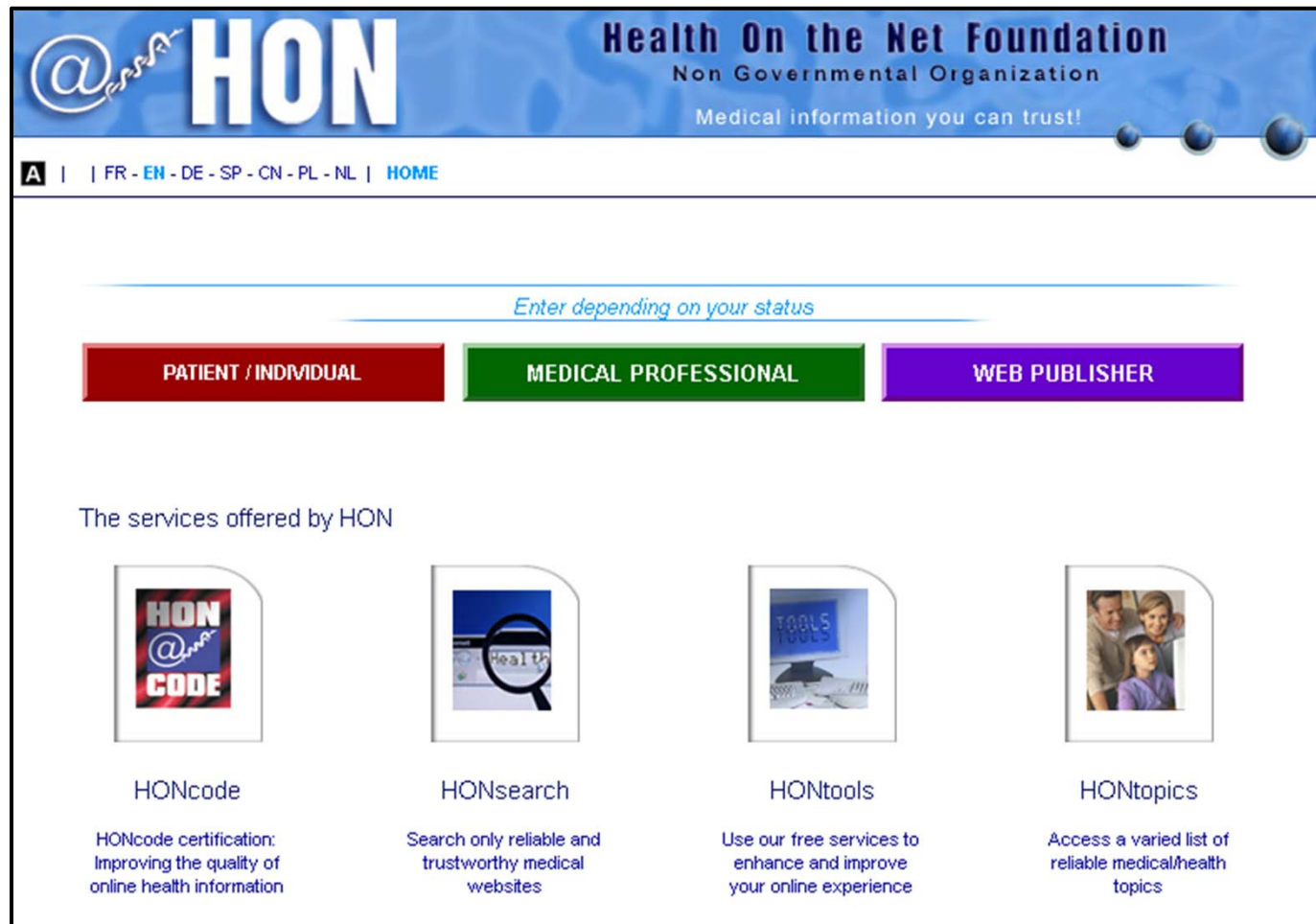


The screenshot displays the MedlinePlus website interface. At the top, the WebMD logo is on the left, and the MedlinePlus logo with the tagline "Trusted Health Information for You" is in the center. To the right of the MedlinePlus logo, it states "A service of the U.S. National Library of Medicine NIH National Institutes of Health". Below the logo, there are navigation links: Home, About MedlinePlus, Site Map, FAQs, and Contact Us. A search bar labeled "Search MedlinePlus" contains the text "appendicitis" and a "GO" button. Below the search bar, there are three main categories: "Health Topics", "Drugs & Supplements", and "Videos & Cool Tools", each in a green button. To the right of these buttons is an "ESPAÑOL" button. On the left side of the page, there is a sidebar with a "Refine by Type" section. This section lists various content types with their respective counts: All Results (137), Health Topics (1), External Health Links (86), Drugs and Supplements (1), Medical Encyclopedia (30), Videos and Tutorials (3), News (1), MedlinePlus Magazine, Other Resources (3), and Multiple Languages (12). The main content area is titled "Appendicitis" and contains a detailed description of the condition, its symptoms, and a link to "Read more". To the right of the text is an anatomical illustration of the human digestive system, highlighting the appendix. A "Search Help" link is located in the top right corner of the main content area.

*webmd.com & medlineplus.com*

Consumer Health Information Seeking Behavior (>80% of population) → Health Promotion Strategies

## CHI – Systems → Information Seeking (cont.)




*hon.ch*

Validation of Healthcare Information on the Web

## CHI – Systems → Information Seeking (cont.) → Definitions and Measures

### CHIRr

*Consumer health  
informatics research  
resource*



#### MEASURES

- Age
- Behavioral intention
- Exposure
- Habits
- Health information seeking
- Health literacy
- Health orientation
- Information sufficiency
- Perceived message cognition value
- Perceived message sensation value
- Perceived severity
- Perceived susceptibility
- Race/ethnicity
- Reactance restoration
- Response efficacy
- Self-efficacy
- Sensation seeking
- Source credibility
- Spiritual health locus of control
- State reactance
- Subjective norm
- Technological acceptance model
- Trait empathy

#### Variable Definitions

##### Age

Age - On the surface, age seems easy enough to measure, and it is for many research projects. However, the concept of age can vary depending on a variety of factors, including the purpose of the research, the target respondents, policy implications, and such. For example, a research project that measures demographics of a broad population may measure age in one-year increments. Another project may group age based on some predefined ordinal scale. Yet another project may be interested in a particular age group that may be tied to other foci of the research, such as at risk populations, adolescents, elderly, developmental and lifestyle issues, etc. (Chaffee, 1991).

Typically, age is conceptualized as the length of time, most often in completed years, that a given person has been alive, measured at the beginning of birth.

##### Behavioral intention (BI)

Behavioral intention (BI) is defined as a person's perceived likelihood or "subjective probability that he or she will engage in a given behavior" (Committee on Communication for Behavior Change in the 21st Century, 2002, p. 31).

BI is behavior-specific and operationalized by direct questions such as "I intend to [behavior]," with Likert scale response choices to measure relative strength of intention. Intention has been represented in measurement by other synonyms (e.g., "I plan to [behavior]") and is distinct from similar concepts such as desire and self-prediction (Armitage & Conner, 2001). Ajzen (1991) argued that BI reflects how hard a person is willing to try, and how motivated he or she is, to perform the behavior.

In theory in which it is included, BI is the most proximate predictor of behavior (Ajzen, 1991), and behavior is ultimately the variable that most health communication interventions aim to influence.

##### Exposure

Exposure in mass communication has been defined conceptually as "the extent to which audience members have encountered specific messages or classes of messages/media content" (Slater, 2004, p. 168); and "the degree to

<http://chirr.nlm.nih.gov/definition.php>

### Consumer Health Information Seeking Definitions and Measures

## CHI – Systems → Education

The screenshot displays the Nicoderm CQ website, which is a commercial site for a transdermal nicotine patch. The website features a blue header with navigation links: Home, About NicoDerm CQ, Using NicoDerm CQ, **Quitting Support**, and My Quit. Below the header, there are several tabs: What to Expect When You Quit Smoking (selected), Quitting Timeline, Success Stories, FAQs, Quitting Resources, and E-Cigs vs. Nicotine Replacements. The main content area is titled "What to Expect When You Quit Smoking" and includes an image of a hand holding a lit cigarette. The text explains that quitting smoking is a challenge and provides tips on how to stay quit. A sidebar on the left contains links to various resources, including "Tips From Former Smokers", "About the Campaign", "I'm Ready to Quit", "Quit Guide", "Quitting Resources", "Real Stories", "Diseases/Conditions Featured in the Campaign", "For Specific Groups", "Partners", "Campaign Resources", "Stay Connected", and "Newsroom". A "Related Links" section at the bottom left includes "Smoking & Tobacco", "Smokefree.gov", and "National Cancer Institute". On the right side, there is a "Buy Now" button and a "How It Works" section with a "Time Release" graphic. A "See How Nicoderm CQ Worked" section is also visible. The website is designed to provide educational information and promote the use of Nicoderm CQ patches for smoking cessation.

Various educational sites for smoking cessation (federal, state and commercial)

## CHI – Systems → Education (cont.)

The screenshot displays the JDRF Kids Online website. The header features the JDRF logo with the tagline "IMPROVING LIVES. CURING TYPE 1 DIABETES." and a navigation bar with links: "About JDRF", "Life with T1D", "Get Involved", "Advocacy", and "Research". Below the header, there are "QUICK LINKS" and "ALSO IN THIS SECTION" sections. The "QUICK LINKS" section includes links for "Life with T1D", "Get Support", "Newly Diagnosed", "Adult T1D", and "More Life Stages". The "ALSO IN THIS SECTION" section includes links for "T1D Information", "Frequently Asked Questions", "Articles by Topic", "Other Resources", and "For Kids with T1D". A personalized welcome message reads: "Hello, JDRF Kids Online community!". Below this, a large heading says "Welcome to JDRF Kids Online". The main content area is titled "KIDS ONLINE" and features a list of links: "New to Diabetes?", "Your Life (with Diabetes)", "Basic Stuff", "At Home", "In School", "With Your Friends", "On the Go", "On Special Occasions", "The Search for a Cure", "Make a Difference", and "Your Stuff". A sidebar on the right contains a "SEARCH" box and a "Go" button. The main content area also includes a section titled "Your Life (with Diabetes)" with a photo of two kids and text: "Whether you are new to diabetes or have been dealing with it for a long time, there is something here for you." Below this, there are two sub-sections: "If You're New to Diabetes" and "If You're an 'Old Pro'".

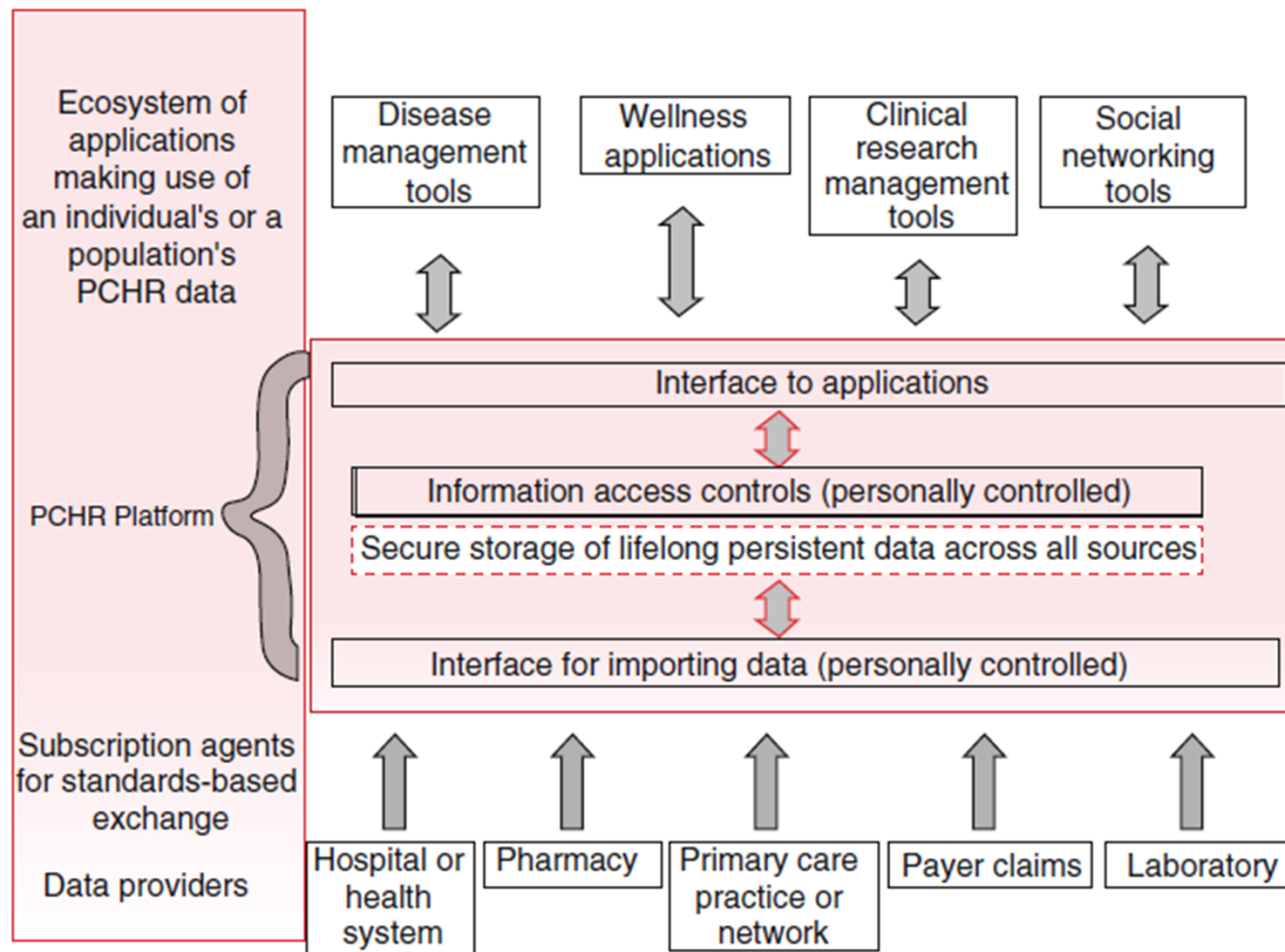
<http://jdrf.org/hello-jdrf-kids-online-community/>

Customization of health data based on age and other demographic data (human computer interaction issues)

## CHI – Systems → Personal Health Records (PHRs) → Definition

- Definition: “A personal health record, or PHR, is a health record where health data and information related to the care of a patient is **maintained by the patient.**”
- Main questions:
  - *Who owns the data? Who controls the data?*
  - *How confidentiality and security will be handled in a PHR system?*
  - *Who will pay for the record? What is the business model? Federal funding/incentives or Health Record Banking?*
  - *Should we have a national PHR system?*
  - *Who can access the PHR data?*
  - *How to resolve conflict of patient-entered data with provider-entered data?*

## CHI – Systems → PHRs → Architecture / Data Connections



An architecture for a personally controlled health record system (PCHR). The PCHR has a secure repository of data with subsequent accesses controlled by the patient or her proxy.

## CHI – Systems → PHR → Integrated Patient Portals

**OpenNotes**  
patients and clinicians on the same page

What is OpenNotes? Who Is Sharing Notes? Toolkit Research News About Us

In *The Washington Post*: Pilot at Boston's Beth Israel Deaconess gives patients electronic access to therapists' notes

Photo credit: (Gretchen Ertl) for The Washington Post

**Patients and Doctors on the Same Page**

Patients and Doctors on the Same Page

**What is OpenNotes?**  
Sharing clinicians' notes with patients—a simple idea for better health. [More >](#)

**Why it Works**  
Patients become more actively involved in their care. [More >](#)

**Toolkit**  
Get started reading, writing, and sharing notes. [More >](#)

[Find Participating Sites >](#)

**News**

**BBC World Service:** Clinicians let patients read their therapist's notes. [Read More >](#)

**NPR Weekend Edition:** When Patients Read What Their Doctors Write. [Read More >](#)

**Give patients easy access to health records, says Canadian Medical Association Journal**. [Read More >](#)

**About OpenNotes**  
Toward a new standard of care: working to give patients access to clinicians' notes. [Learn More >](#)

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Robert Wood Johnson Foundation

## Inviting Patients to Read Their Doctors' Notes

### A Quasi-experimental Study and a Look Ahead

October 2012 | Publisher: American College of Physicians | Publication: *Annals of Internal Medicine*

Author(s): Delbanco T, Walker J, Bell SK, Darer JD, Elmore JG, Farag N, Feldman HJ, Mejilla R, Ngo L, Ralston JD, Ross SE, Trivedi N, Vodicka E, and Leveille SG

[Tweet](#) 51[+1](#) 0[Like](#) 8[Share](#)[Print](#) [Email](#)

### [Read the story behind this study in the author interview](#)

This article could help drive a culture of more transparency between patients and providers, empowering two-way communication that levels the proverbial *playing field*.

In this OpenNotes study, the authors examined the impact on patients and doctors when patients were allowed access to their doctors' notes via a secure Internet portal. Through the use of surveys, patients' benefits, concerns, and behaviors, as well as physicians workload, were measured.

Beth Israel Deaconess Medical Center (BIDMC) in Boston, Geisinger Health System (GHS) in Pennsylvania, and Harborview Medical Center (HMC) in Seattle were selected for this quasi-experimental year-long study. The study included 105 physicians and 13,564 of their patients. Patients were notified when their notes were available, but whether or not to open the note was at their own discretion.

[Read article \(Web\) >](#)

### Recommended

#### 2012 Year in Research

Poll to determine the most influential research articles of the year.

[Learn more >](#)

#### Topics

[Patient-centered care >](#)

*myopennotes.org*

Integrated Patient Portals (e.g., across multiple providers)

## CHI – Systems → PHR → Advanced PHRs

The image displays a collage of digital health resources. At the top left, a desktop browser window shows a patient record for Daniel Jeffrey (Male 27y) with tabs for Overview and Summary. Below this, the myPHR website is shown, featuring a navigation bar with links like START A PHR, HEALTH LITERACY, TOOLS + RESOURCES, BLOG, and FAQ. A central banner highlights 'RESOURCES FOR SENIORS, PARENTS, CHRONICALLY ILL, CAREGIVERS, PHYSICIANS'. A featured story titled 'Organize Your Health Records' is also visible. At the bottom, a 'QUICK GUIDE TO CREATING A PHR' is advertised. To the right, a tablet displays a 'Not Registered? Register Today!' prompt. A smartphone in the foreground shows a health app interface.

*myphr.com*

Sample Personal Health Records (PHRs)

## CHI – Systems → PHR → Patient Decision Support Systems

Part One Claims Mailing Database

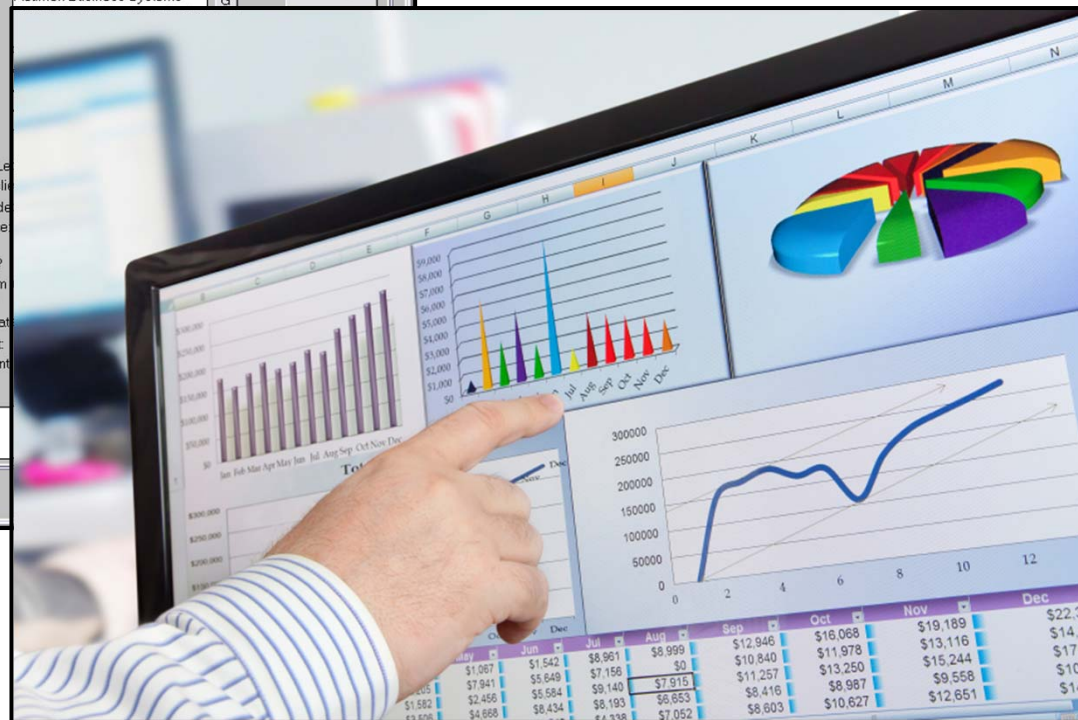
General  
Utilities  
Clients/Schemes

**Client**

Data Entry - Client Find: Whitehouse In: Name Go! Show All Copy Delete Print Close Mail Shots Reports Mail Merge

Record ID: 65163 Record Date: 28/10/2005 Name: Rik Whitehouse  
 Reference: Rik234 622-84 Dear Name: Rik  
 Property Claim Address: Acumen Business Systems Correspondence Address: Acumen Business Systems  
 Suite 5 Cash's Business Centre  
 Cash's lane, Coventry  
 Postcode: CV1 4PB  
 Sort Claim Address: A11 Attleborough Bypass  
 Scheme: A11 Attleborough Bypass  
 Date Of Opening: 01/01/2006  
 Date Acquired: Council Tax Band:  
 Mortgagee Name: Mortgagee Address: Mortgagee Acct No: Other Int. Parties: NONE  
 Claimants Interest: FREEHOLDER & OCCUPIER AS  
 Manner Acquired: PURCHASED  
 Adjacent Land: NONE  
 Improvements: NONE  
 Mailmerge Mark: ☐  
 Client Active? ☒

Reports  
Help



PHR-based DSS

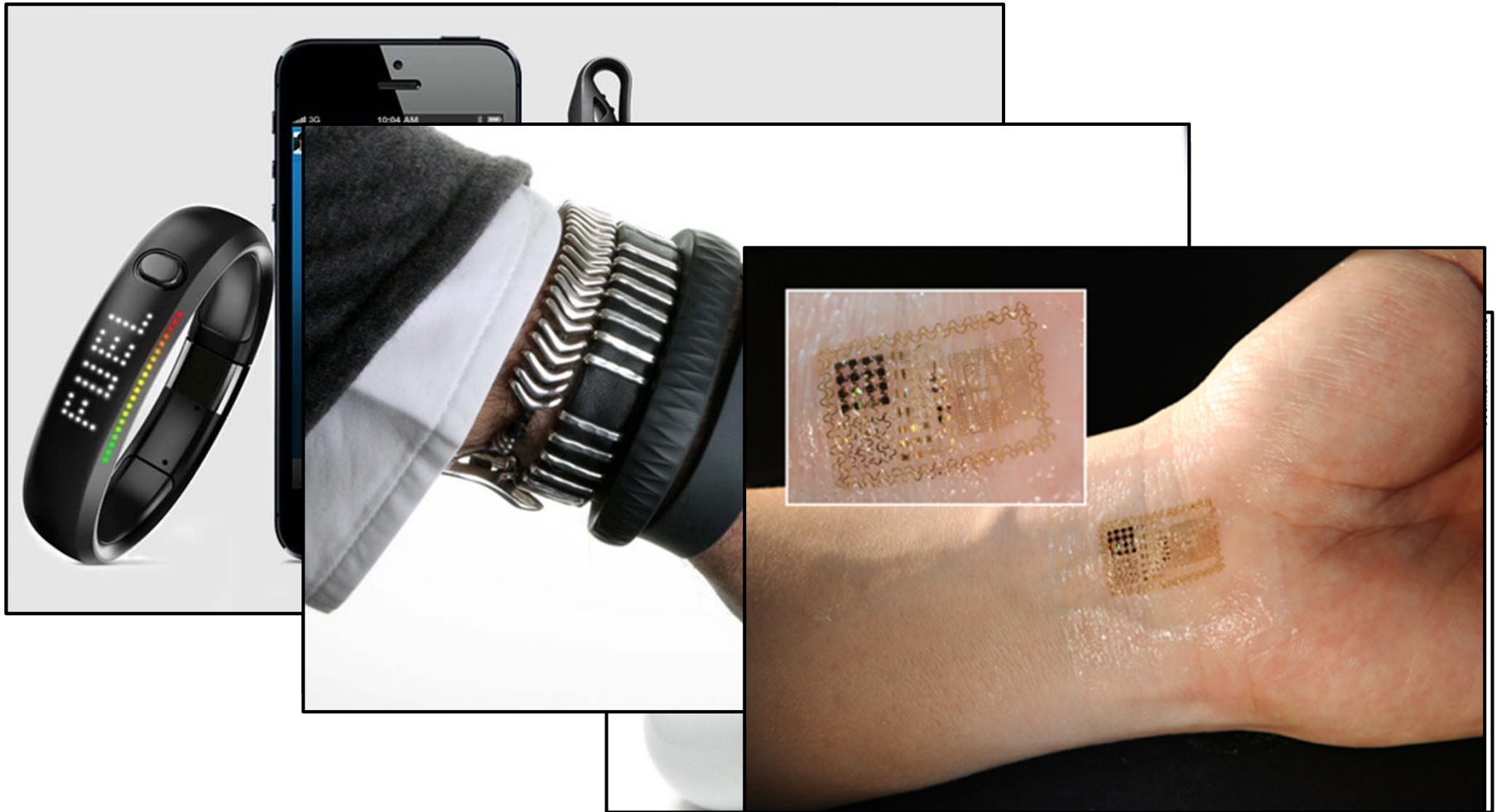
## CHI – Systems → PHR → mobile PHRs

**Table 7 – Mobile PHR features.**

mPHR name	Features			
	Import/export	Images	ICE feature	Password
Capzule PHR	X	X		X
Cloud PHR	X			X
Polka Health			X	
ExpressWell	X	X		X
Health n Family	e	X		X
HealthNotes	e			
HealthRecord			X	
motionPHR <sup>(iOS)</sup>	X		X	X
Emergency – I.C.E.			X	
Emergency Info			X	X
Emergency Inform.				
My Family	E		X	X
My Medical Pro	E		X	X
Health Care Manag.				
MedRecordsToGo				
motionPHR <sup>(Android)</sup>	X		X	X
Stabilix PHR Lite				X
Stabilix PHR Pro			X	X
ZipHealth		X	X	X
Average mPHRs covering a specific feature	42.11%	15.79%	52.63%	63.16%
e – email only; E – export only.				

### Features of mobile PHRs

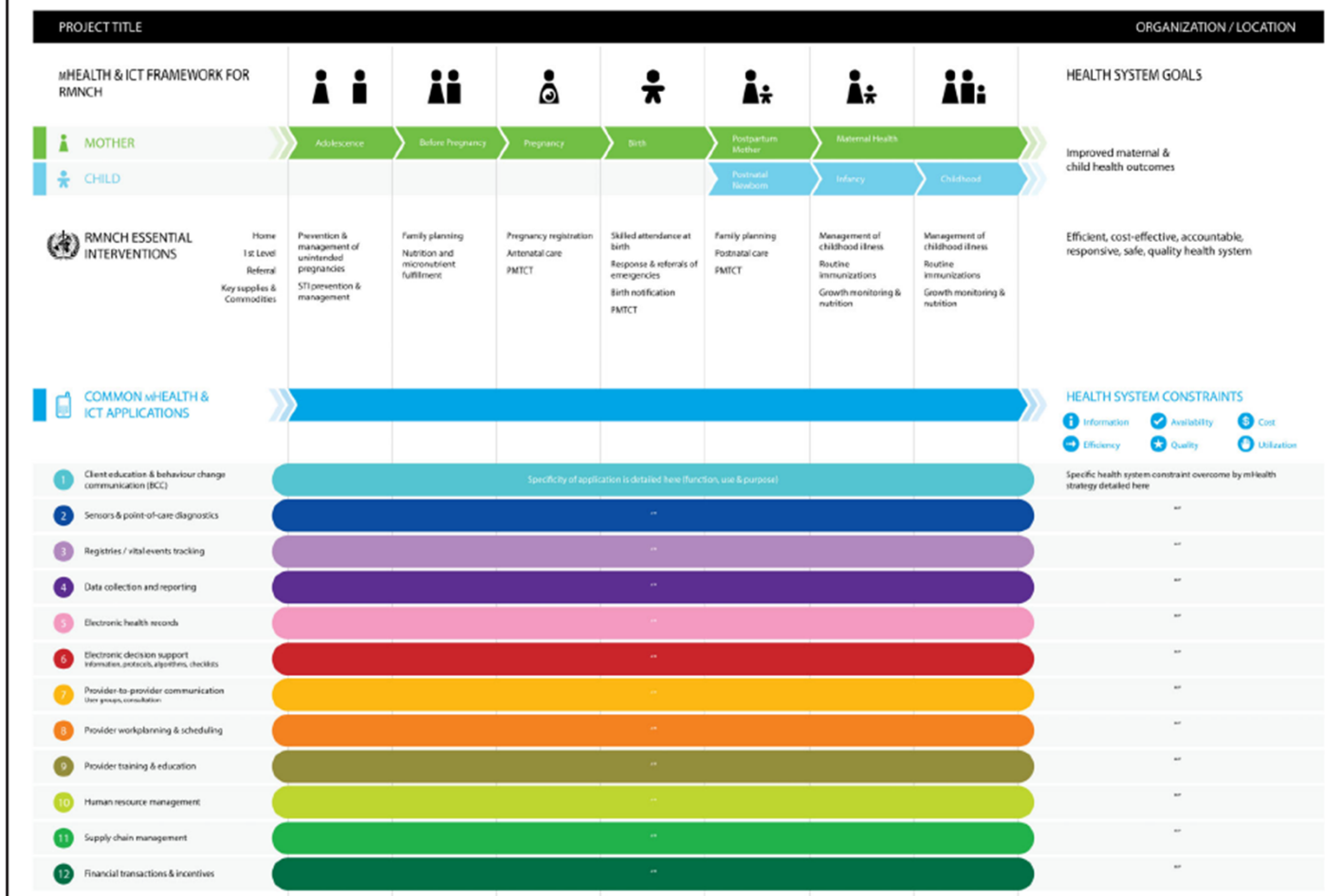
## CHI – Systems → mHealth → Wearables



mHealth (mobile health)

# CHI – Systems → mHealth → Conceptual Models for Specific Domains

**FIGURE 1. The mHealth and ICT Framework for RMNCH**



The mHealth and ICT Framework for reproductive, maternal, newborn, and child health

## CHI – Systems → mHealth → Developing Countries

Copyright A. Labrique

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**Global mHealth Initiative**  
A Community of Excellence in mHealth Research, Innovation and Leadership

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**Aezon - Top 10 Finalists!**  
XPRIZE, the global leader in incentivized prize competitions, today announced the 10 finalist teams competing for the \$10M Qualcomm Tricorder XPRIZE.

**Aezon - The JHU XPrize Team**  
This JHU student team is developing a revolutionary mobile device. [Learn more here.](#)

[Learn More](#)

*jhumhealth.org*  
mHealth application in developing countries

## CHI – Systems → mHealth → Developed Countries



mHealth application in developed countries (wellness and remote monitoring)

## CHI – Systems → mHealth → Disease Management and Public Health



Track your asthma attacks



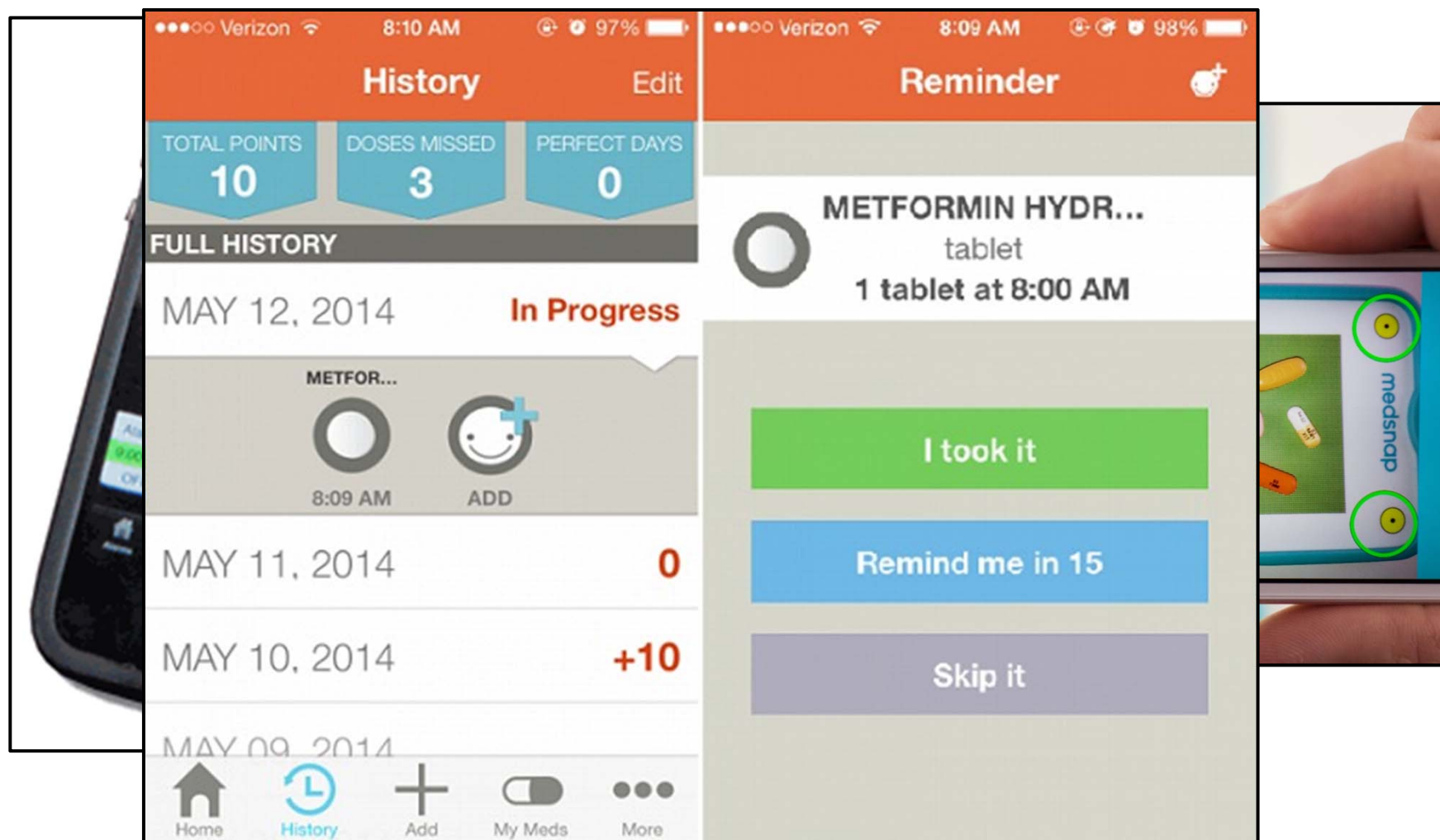
And then shared it with your community

## CHI – Systems → mHealth → Disease Management and Chronic Diseases



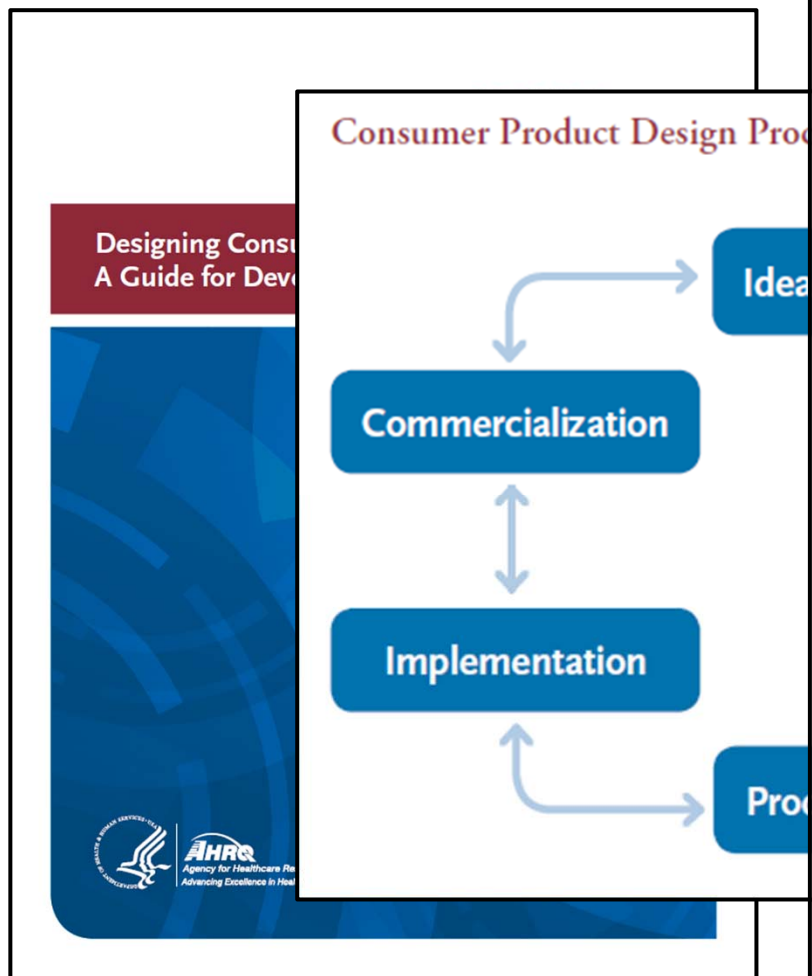
Disease Self-Management (e.g., pain and diabetes)

## CHI – Systems → mHealth → Disease Management and Medication Adherence



Medication Adherence

## CHI → mHealth → Guidelines



## AHRQ Design and Development Guidelines

### Recommendations Mapped by Development Phases

Recommendations		IDEA GENERATION	CUSTOMER IDENTIFICATION	CONCEPT DEVELOPMENT	PRODUCT TESTING	IMPLEMENTATION	COMMERCIALIZATION
1	Assemble and prepare a design team consisting of members with appropriate knowledge and skills for all product development phases.	✓	✓	✓	✓	✓	✓
2	Strive to understand customer needs within the environments that the product will be used throughout all product development phases.	✓	✓	✓	✓	✓	✓
3	Include a diverse set of customers when generating ideas for new products and when evaluating early product iterations.	✓	✓	✓	✓	✓	
4	Select and apply well-developed and established design methods in combination with intuition- or innovation-driven design approaches.	✓	✓	✓	✓	✓	✓
5	Use multiple approaches early to learn about customers and the market to inform the product's design.	✓	✓	✓			
6	Drive design decisions and modifications based on learning from prototyping and pilot testing activities.		✓	✓	✓		
7	Define and tailor success metrics based on the needs and contexts of unique customer segments.		✓	✓	✓	✓	✓
8	Balance customer needs with product safety and privacy concerns specific to health IT products.		✓	✓	✓	✓	✓
9	Build products based on established health data and transmission standards.			✓	✓	✓	
10	Incorporate successful marketing strategies to promote the product and be responsive to customers once the product is promoted and adopted.					✓	✓

## CHI – Systems → mHealth → Impact

Evidence Report/Technology Assessment  
Number 188

### Impact of Consumer Health Informatics Applications

Prepared for:  
Agency for Healthcare Research and Quality  
U.S. Department of Health and Human Services  
<http://www.ahrq.gov>

Contract No. HHSA 290-2007-120061-I  
Task Order No. 5

Prepared by:  
The Johns Hopkins University Evidence-based Practice Center

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Erica Shelton, M.D.  
Ritu Sharma, B.S.  
Eric B. Bass, M.D., M.P.H.

AHRQ Publication No. 09(10)-E019  
October 2009

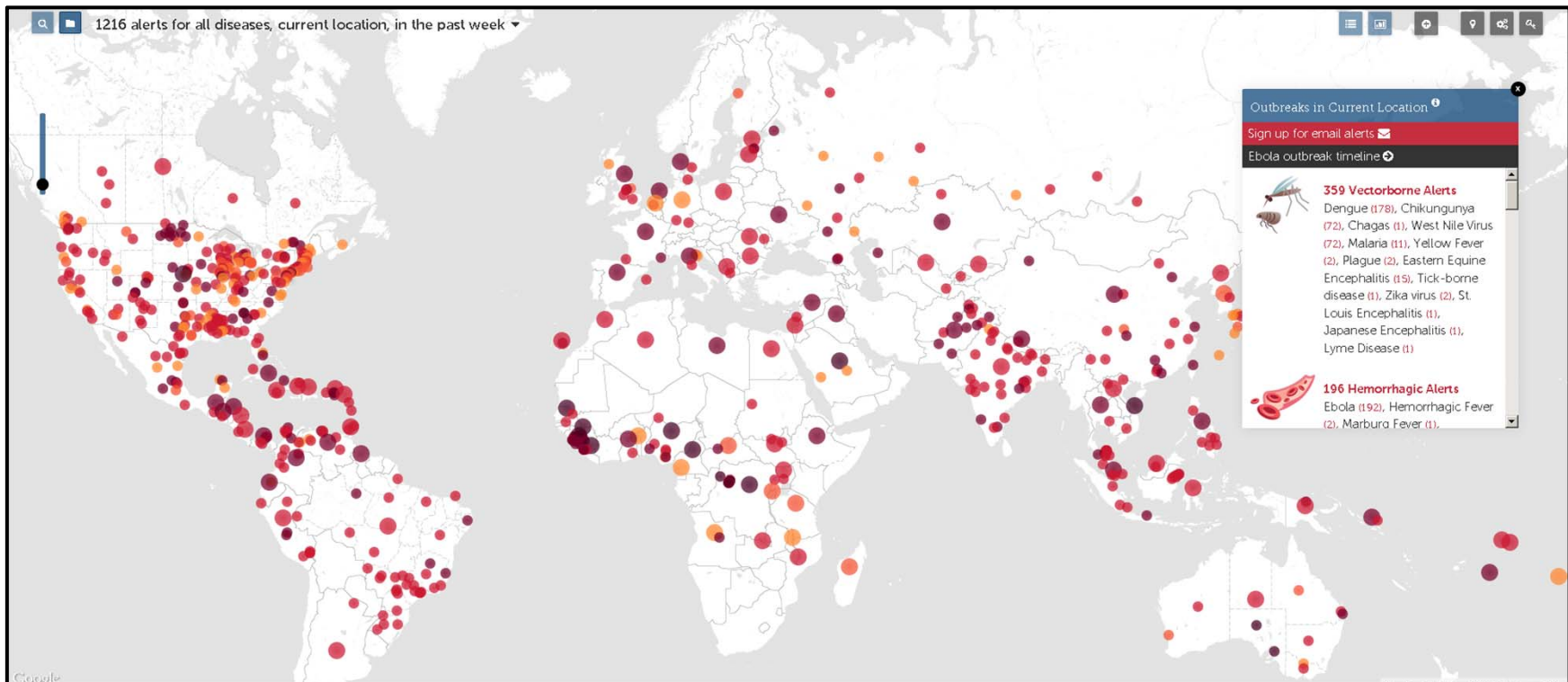
## AHRQ – Evidence of Consumer Health Informatics Applications

## CHI – Systems → mHealth → Tele-health



Tele-Health / Tele-medicine

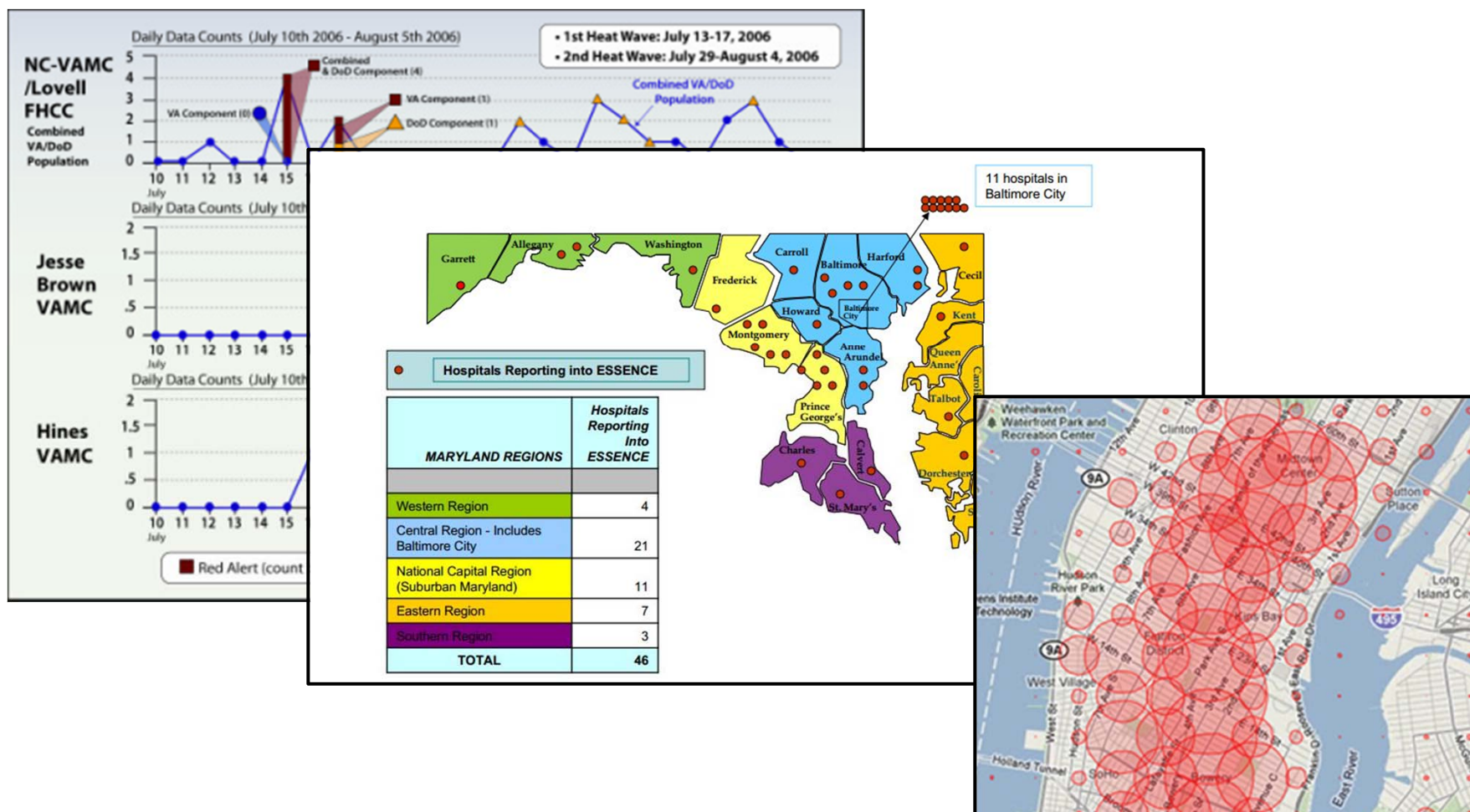
## CHI – Systems → Public Health → Consumer Health Maps



*healthmaps.org*

Consumer Surveillance Tools (e.g., Health Maps)

## CHI – Systems → Public Health (cont.)



## Consumer-oriented Biosurveillance Tools



JOHNS HOPKINS  
BLOOMBERG  
SCHOOL of PUBLIC HEALTH

# **Consumer Health Informatics**

## *(Health Games)*

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## **CHI – Systems → Health Games**

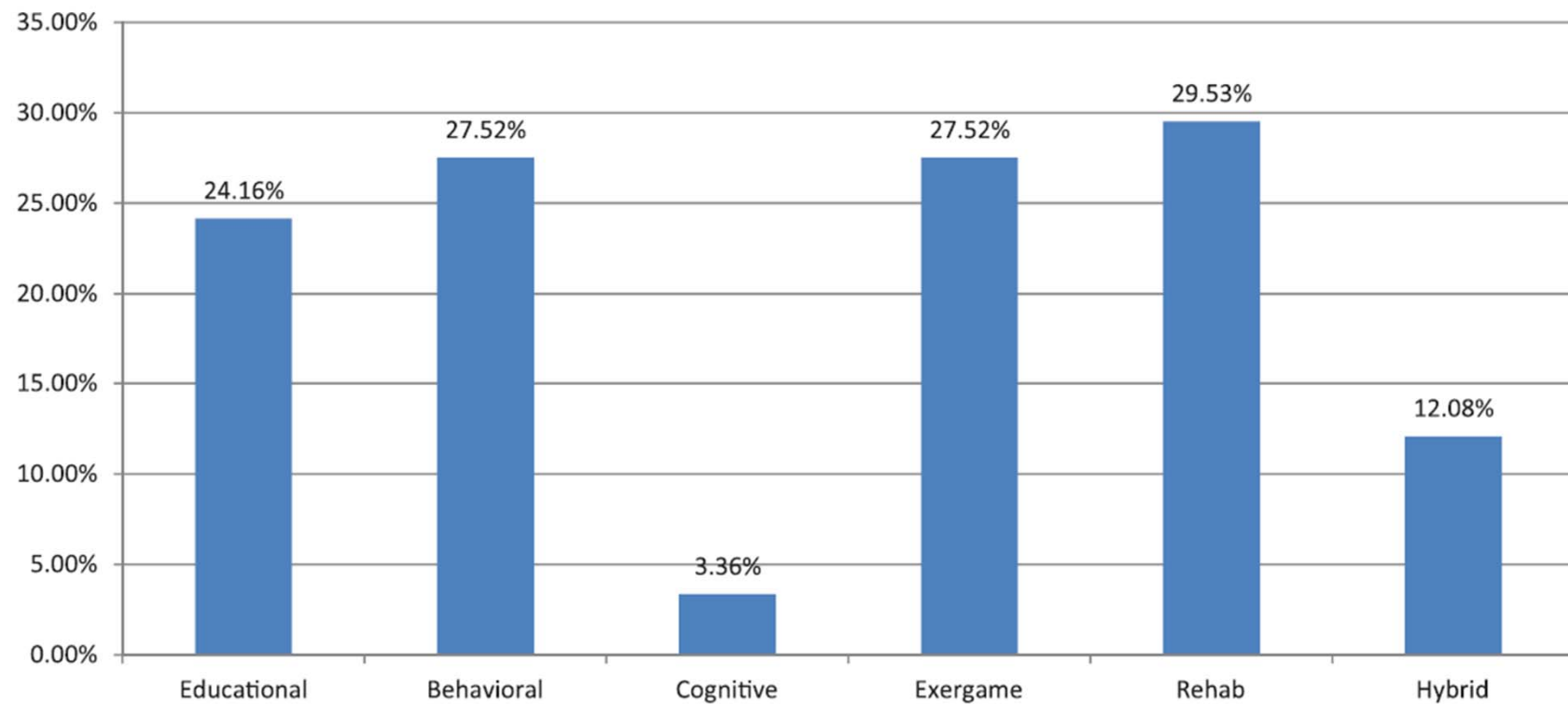
- Health games are interactive applications that can motivate users to actively engage about their healthcare.
- Health games can be specialized in one of the following domains:
  - medical training (virtual reality games)
  - health education (health edugames)
  - psychological therapy (behavioral change/self-care games/coach games)
  - physical rehabilitation (exergames)
  - cognitive rehabilitation (memory games)
  - stress relief (distraction games)

## CHI – Systems → Health Games (cont.)



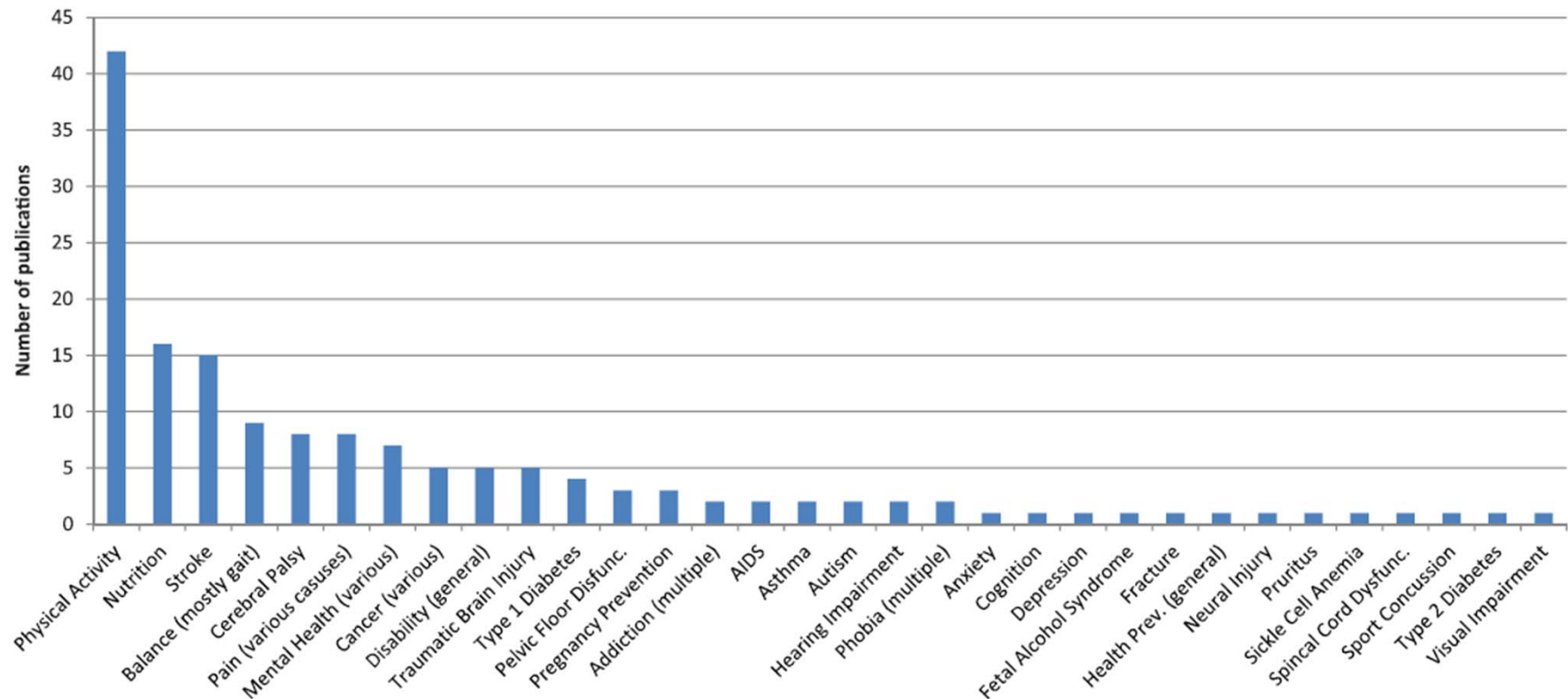
*[gamesforhealth.org](http://gamesforhealth.org) / [healthgamesresearch.org](http://healthgamesresearch.org)*

Sample Health Games

**CHI – Systems → Health Games** (cont.)

Scoping Review of Health Games - distribution of health game categories

## CHI – Systems → Health Games (cont.)



Scoping Review of Health Games - number of publications per clinical context

## CHI – Systems → Health Games (cont.)

**GAMES FOR HEALTH**

**Health Games Research**  
Advancing Effectiveness of Interactive Games for Health

**Note:** In 2013, Health Games Research completed its work. This web site is now an archive and will not be updated. Please visit the web site of the [Center for Digital Games Research](http://www.cdgr.ucsb.edu) [www.cdgr.ucsb.edu](http://www.cdgr.ucsb.edu) at UC Santa Barbara to find current information about health games and the broader field of digital games, and to use the Health Games Research online searchable database.

**Search Database**  
The online searchable database from Health Games Research.

**Who We Are**  
Health Games Research is a national program that provides scientific leadership and resources to advance the research, design, and effectiveness of digital games and game technologies that promote health. It is funded by the National Institutes of Health, the Robert Wood Johnson Foundation, and the Department of Defense. Health Games Research will be opportunities to try new tools for building and prototyping exercise and nutrition games, and a set of standard briefings on the field, market, and funding opportunities in games for health.

**Our Publications**  
**Research Briefs**  
■ [A Brief Overview of the Use of New Media in Health Campaigns and Interventions](#) by Ronald Rice, Arthur N. Rupe Chair in the Department of Health, Behavior, and Society

**What's New**  
■ Take a look at our new, improved Health Games Research [Database](#). Some of the new features include improved search capabilities, saving searches, flagging favorites, and easily discovering what's new. Health Pavilion, and for our [Games for Health University](#) tutorial event.

Robert Wood Johnson Foundation

Archive

Health Project

Games for Health

*[gamesforhealth.org](http://gamesforhealth.org) / [healthgamesresearch.org](http://healthgamesresearch.org)*

Health Games Resources



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# Behavioral Change Models

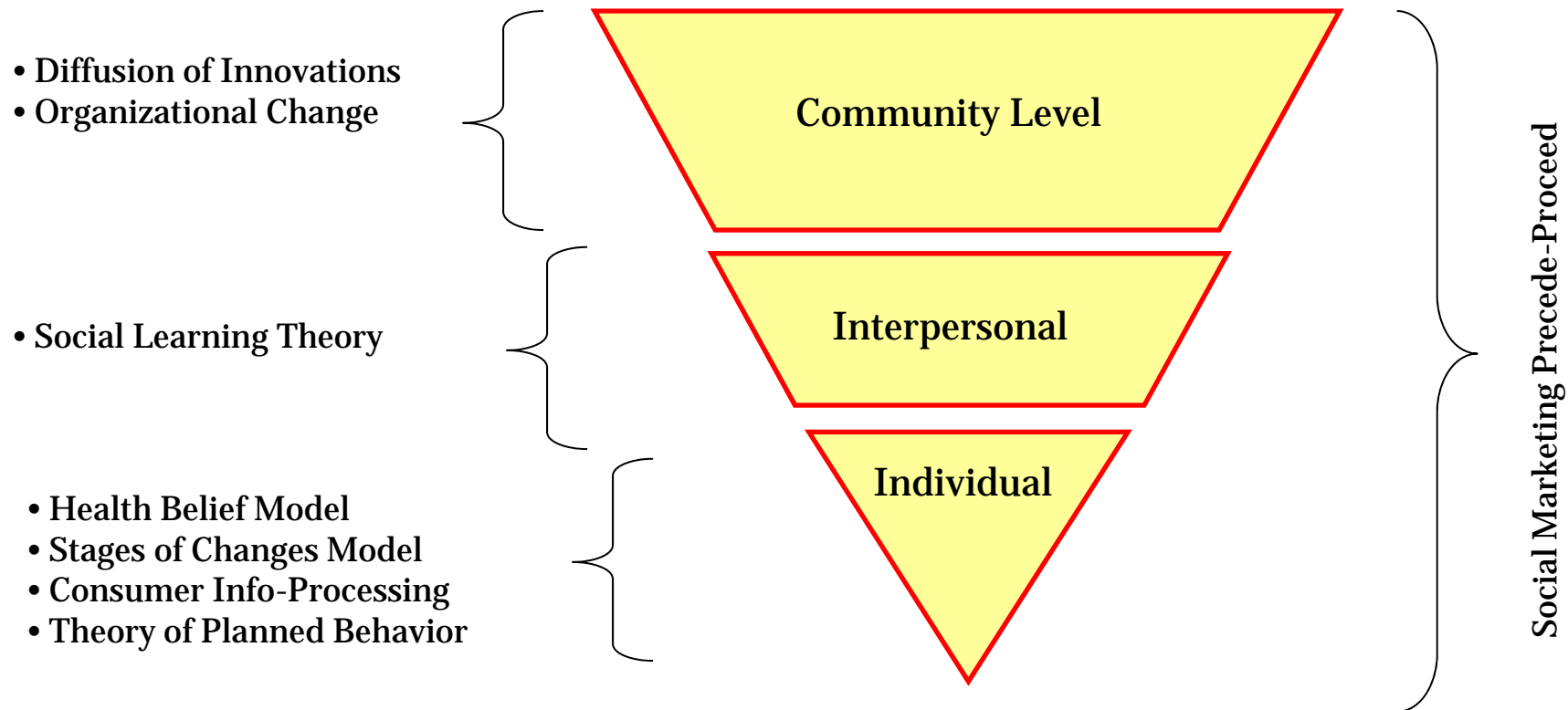
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## CHI – Behavioral Change Models (BCM) → Levels

- Behavioral change models of psychology are categorized as: Individual (HBM, TPB, SCM), Interpersonal and Community.

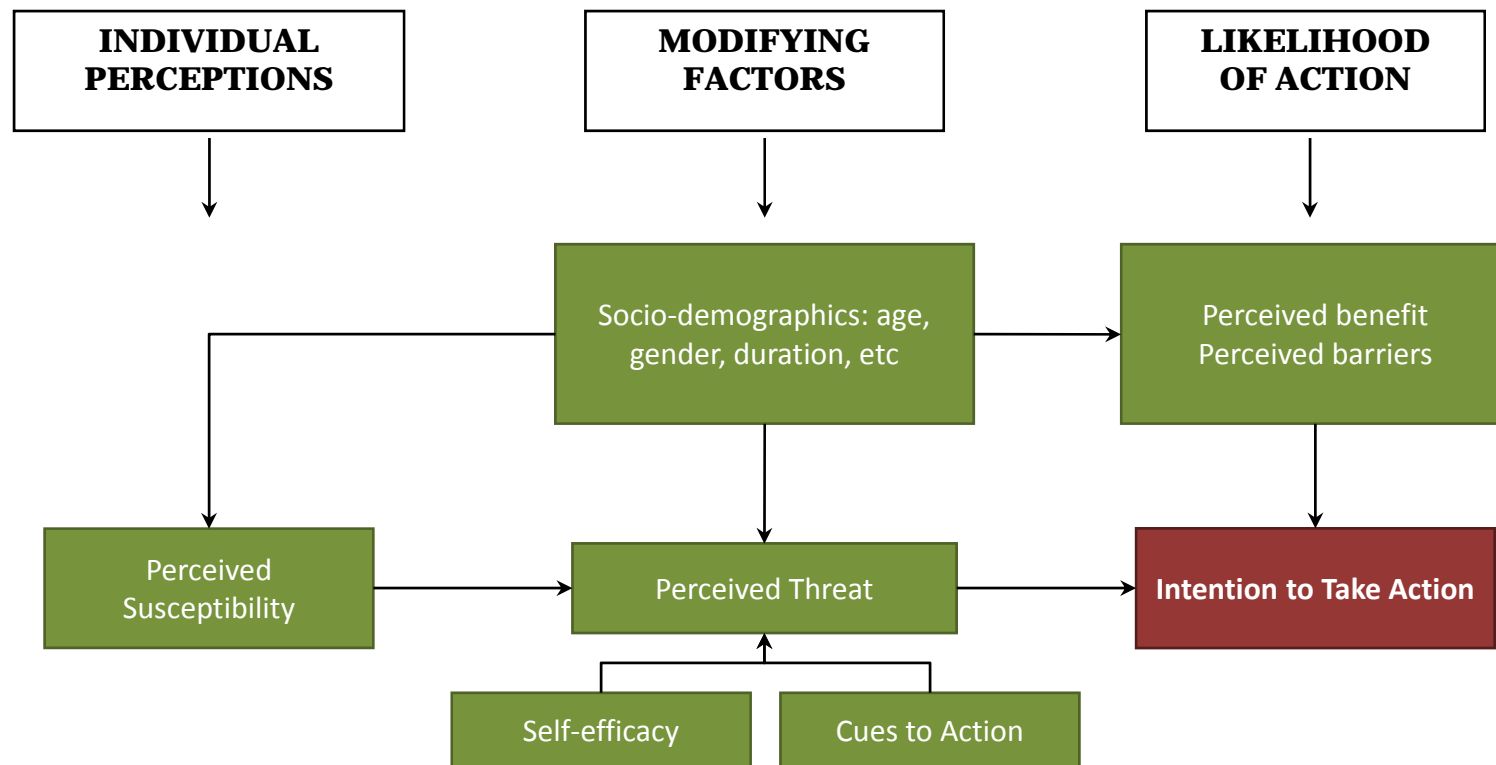
<i>Concept</i>	<i>Definition</i>
<b>Intrapersonal Level</b>	Individual characteristics that influence behavior, such as knowledge, attitudes, beliefs, and personality traits
<b>Interpersonal Level</b>	Interpersonal processes and primary groups, including family, friends, and peers that provide social identity, support, and role definition
<b>Community Level</b>	Rules, regulations, policies, and informal structures, which may constrain or promote recommended behaviors
Institutional Factors	
Community Factors	Social networks and norms, or standards, which exist as formal or informal among individuals, groups, and organizations
Public Policy	Local, state, and federal policies and laws that regulate or support healthy actions and practices for disease prevention, early detection, control, and management

## CHI – BCM → Levels (cont.)



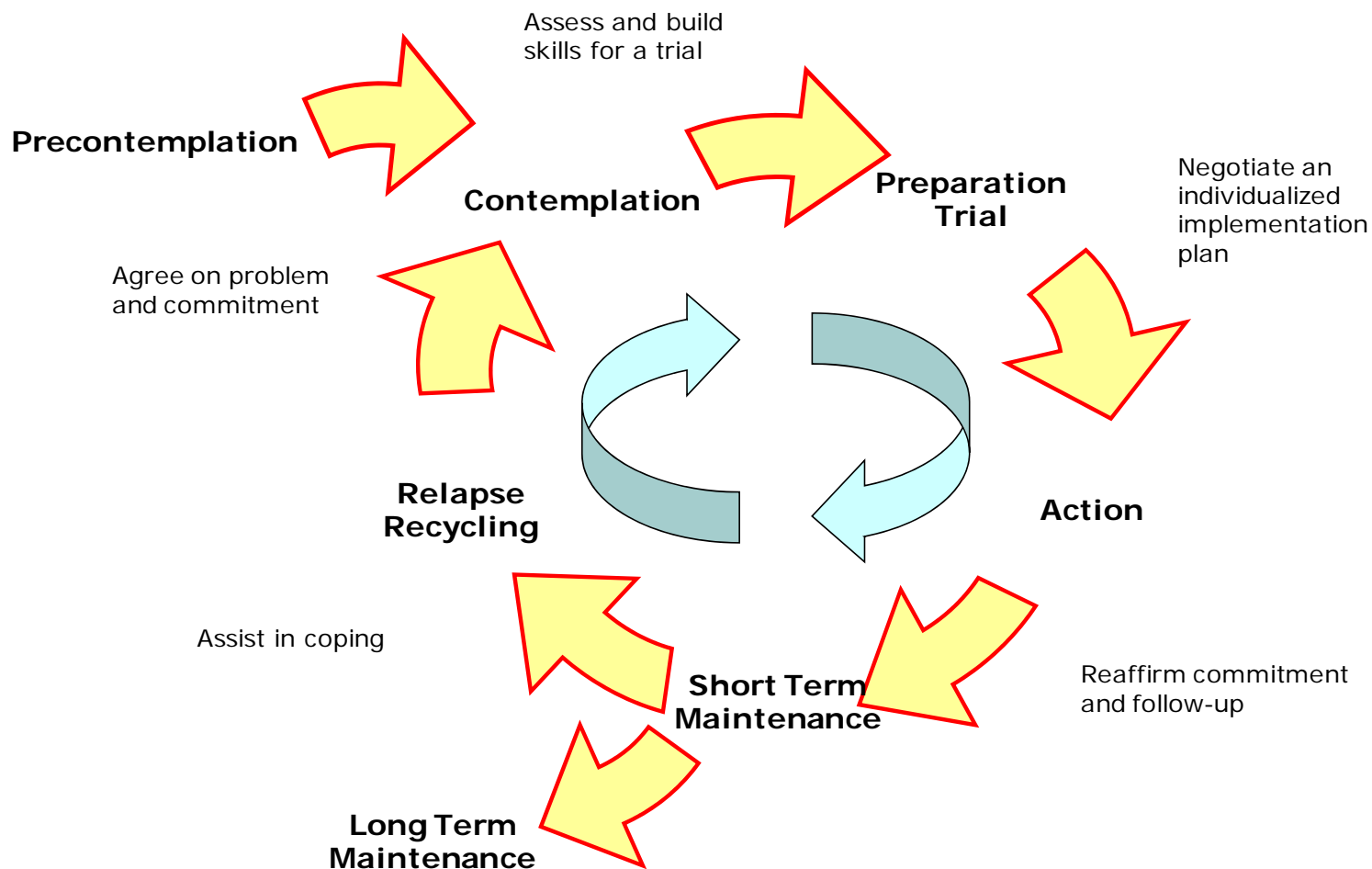
The Behavior Modification Inverse Pyramid

## CHI – BCM → Health Belief Model



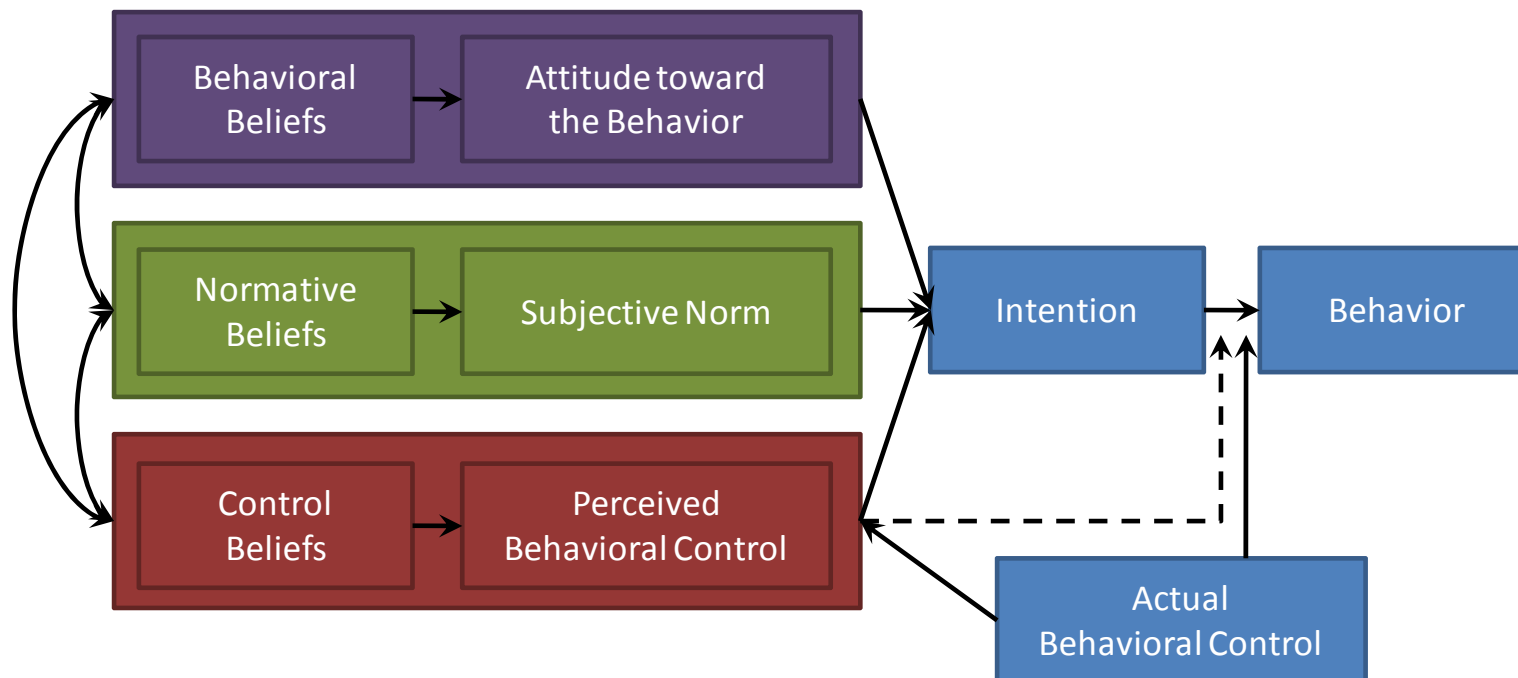
Health Belief Model

## CHI – BCM → Stages of Changes Model



Stages of Changes Model

## CHI – BCM → Theory of Planned Behavioral



Theory of Planned Behavioral



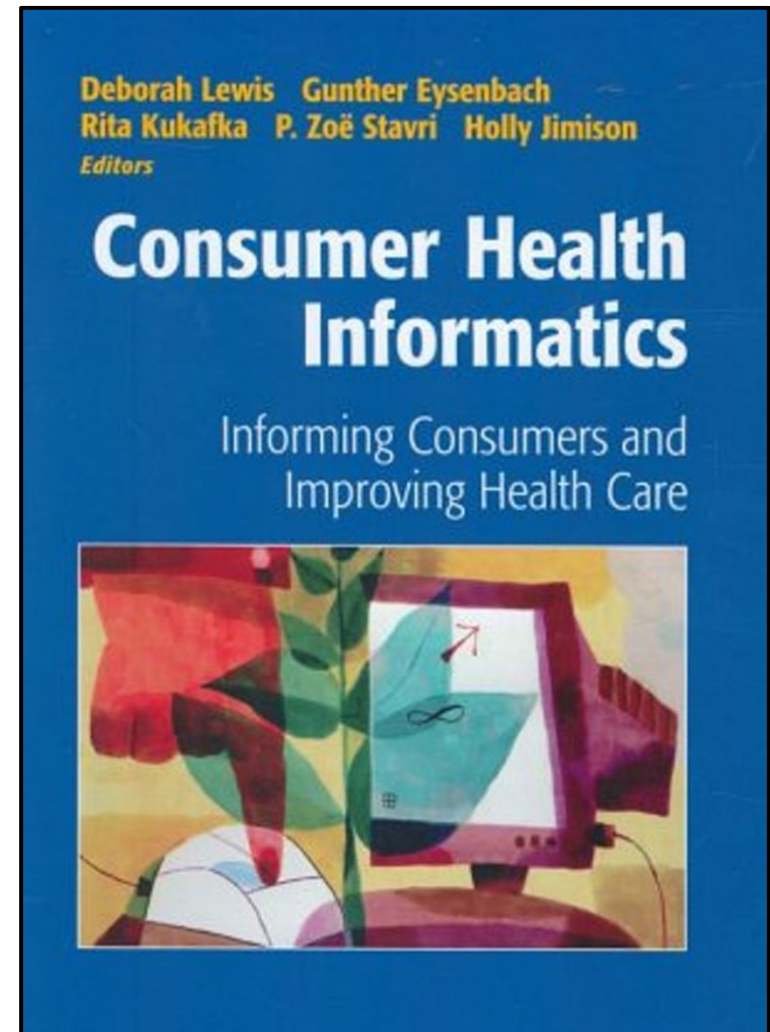
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## **Additional Resources**

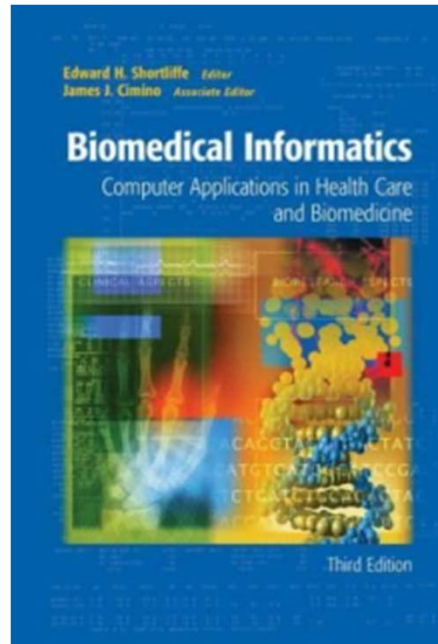
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## Resources – Books

Title	Consumer Health Informatics
Authors	Debora Lewis
Year	2005
Hardcover	258 pages
Publisher	Springer
Language	English
ISBN	038723991X



## Resources – Books (cont.)



Title	Biomedical informatics: Computer Applications in HealthCare and Biomedicine.
Authors	Shortliffe, E.H. and Cimino, J.J (eds)
Year	2006
Hardcover	1024 pages
Publisher	Springer; 3 <sup>rd</sup> edition (May 15, 2006)
Language	English
ISBN	0387289860

## Resources – Web

### ■ **Associations:**

- AMIA (American Medical Information Association): [www.amia.org](http://www.amia.org)
- IMIA (International Medical Information Association): [www.imia-medinfo.org](http://www.imia-medinfo.org)
- HIMSS (Healthcare Information and Management Systems Society): [www.himss.org](http://www.himss.org)
- Academy Health (HIT Interest Group): [www.academyhealth.org](http://www.academyhealth.org)



### ■ **Government and Non-for-profit:**

- ONC: [www.healthit.gov](http://www.healthit.gov)
- CMS MU: [www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms](http://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms)
- HL7: [hl7.org](http://hl7.org)

### ■ **Journals:**

- JAMIA (Journal of AMIA): [jamia.bmj.com](http://jamia.bmj.com)
- JMIR (Journal of Medical Internet Research): [www.jmir.org](http://www.jmir.org)
- IJMI (International Journal of Medical Informatics): [www.ijmijournal.com](http://www.ijmijournal.com)
- HIJ (Health Informatics Journal): [jhi.sagepub.com](http://jhi.sagepub.com)
- ACI (Applied Clinical Informatics): [aci.schattauer.de](http://aci.schattauer.de)

## Resources – Web (cont.)

<p><b>PRIMARY LINKS</b></p> <ul style="list-style-type: none"> <li>› About AMIA</li> <li>› Membership</li> <li>› News &amp; Publications</li> <li>› Programs</li> <li>› Education</li> <li>› Meetings &amp; Events</li> <li>› Public Policy</li> <li>› Career Center</li> </ul> <p><b>INFORMATICS CORE</b></p> <p>The Science of Informatics</p> <p><b>INFORMATICS AREAS</b></p> <p>Translational Bioinformatics</p> <p>Clinical Research Informatics</p> <p>Clinical Informatics</p> <p><b>Consumer Health Informatics</b></p> <p>Public Health Informatics</p>	<p><b>Consumer Health Informatics</b></p> <p><b>Consumer Health Informatics</b> is the field devoted to informatics from multiple consumer or patient views. These include patient-focused informatics, health literacy and consumer education. The focus is on information structures and processes that empower consumers to manage their own health—for example health information literacy, consumer-friendly language, personal health records, and Internet-based strategies and resources. The shift in this view of informatics analyzes consumers' needs for information; studies and implements methods for making information accessible to consumers; and models and integrates consumers' preferences into health information systems. Consumer informatics stands at the crossroads of other disciplines, such as nursing informatics, public health, health promotion, health education, library science, and communication science.</p> <p><b>Working Groups &amp; Communities</b></p> <p>AMIA membership includes participation in related working groups and communities including the <a href="#">Consumer and Pervasive Health Informatics Working Group</a>.</p> <p><b>Meetings &amp; Events</b></p> <p>Each year, AMIA hosts the <a href="#">Annual Symposium</a>. The variety of offerings at the AMIA Symposium assure that all attending will find new and exciting ideas to inspire them as they develop their careers or mentor our up and coming informaticians.</p> <p><b>Education</b></p> <p>AMIA offers virtual distance learning informatics training through <a href="#">10x10 courses</a> presented by university partners. More than 35,000 CE credits have been granted through the 10x10 program.</p>	<p><b>Members Like Me</b></p> <div data-bbox="1474 459 1625 656">  </div> <p><b>Catherine K. Craven, MLS, MA</b></p> <p>currently a doctoral student in health informatics at the MU Informatics Institute, University of Missouri, Columbia, MO</p> <p>› <a href="#">View More</a></p> <div data-bbox="1474 850 1625 1047">  </div> <p><b>Kevin B. Johnson, MD, MS, FACMI</b></p> <p>My particular area of interest has been thinking about medication management and ways that we can improve the safety of medication delivery in our patients,...</p> <p>› <a href="#">View More</a></p>
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AMIA (American Medical Information Association): [www.amia.org](http://www.amia.org)

## **Summary**

- ❖ **Background**
  - **Chronic Diseases**
  - **Population Health Management**
  - **Promise of Health IT**
- ❖ **Consumer Health Informatics Solutions**
  - **Concept and Definitions**
  - **Categories and Sample Systems**
  - **Behavioral Change Models**
- ❖ **Resources**
  - **Books**
  - **Web**