Leveraging a “Big Data Stethoscope” for Personalization Health Management

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Health centers offer safety net, but rising demand a strain

By Larry Wheeler, Gannett News Service

Americans are used to hearing bad news about their health care system — that millions of people lack health insurance and medical costs are spinning out of control.

But amid those trends is evidence that a vital and often overlooked health care safety net is performing effectively and efficiently.

That national network of 952 federally approved community health centers serves more than 14 million poor and uninsured patients who otherwise might go without prenatal care, cancer screenings, diabetes treatment and a long list of other services.

CROWDS: Hispanics, uninsured drive growth at health centers

UNIQUE SERVICE: Baltimore centers help most vulnerable patients

DATABASE: Find the center nearest you

"I have no idea where else I would go for health care," said Shirley Dorsey, 51, a patient at Baltimore Medical System’s health center. "It’s important to have some place where poor people who don’t have insurance can come and not be afraid of being turned away."

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Dr. Kyu Rhee, chief medical officer for Baltimore Medical System, examines 7-month-old Sabrina Paige as her father, Brian Paige, 19, of Baltimore holds her at Middlesex Health Center in Baltimore.
Traditional Evidence

Real World Evidence
This is one of Zeweine's original (sic) sketchbooks, and it was presented by him to Dr. Begin, a French Army surgeon, whose widow gave it to me in 1863.
Tabulating Systems Era
1900 – 1940s

Programmable Systems Era
1950s – Present

Artificial Intelligence Era
2011 –
Multiple Industries Impacted by AI/Cognitive
IBM Leadership in **AI and Health** and the Birth of Watson Health

- IBM implemented the first EMR with Akron Children’s Hospital
- IBM’s Deep Blue beat the world chess champion Garry Kasparov in a six-game match
- Cognitive test case results in creation of Watson.

**Timeline:**

- **1961**: IBM implemented the first EMR with Akron Children’s Hospital
- **1977**: IBM’s Deep Blue beat the world chess champion Garry Kasparov in a six-game match
- **2005**: The next GRAND CHALLENGE
- **2010**: IBM enables an “evidence-based healthcare ecosystem”
- **2011**: IBM enables an “evidence-based healthcare ecosystem”
- **2012**: IBM enables an “evidence-based healthcare ecosystem”
- **2014**: IBM enables an “evidence-based healthcare ecosystem”
- **2015**: IBM enables an “evidence-based healthcare ecosystem”
- **2016**: IBM enables an “evidence-based healthcare ecosystem”
- **2017**: MIT & IBM $240M collaboration
- **Today**: 7,000 employees; 13,000+ clients & partners

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How to Translate “Big Data” to “Actionable Insights”...
How to Translate “Big Data” to “Actionable Insights”...

Provider

Payer

Purchaser

Policymaker

Patient

Pioneer

Product Manufacturer

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“5 Cs” Foundation for Delivering Change in this New Era...

Content  Cloud  Cognitive  Collaboration  Care/Clinical Evidence
Secure Health **Cloud** with Diverse Health **Content**

- **Analytics/Insights Platform**
- **Image Analytics**
- **Cognitive Knowledge Platform**

**HIPAA Enabled/GxP-Compatible**

- **End-to-End Security**

- **Purpose Built for Health Data**

- **Continuous Updates**

- **Business Continuity/Resiliency**

**Analytics**:
- 1.2M Medical Abstracts
- 40M+ Research Documents

**Insights**:
- 3B+ Reference Points

**Platform**:
- 4M+ Drug Patents
- 30B+ Images
- 100M+ Patient Records
- 200M+ Lives
- Billions of Global Data Points

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What is **Cognitive**?

**Understands**
Reads and understands data – both structured and unstructured – at a massive scale.

**Reasons**
Searches millions of pages of data in seconds and can recognize context and interpret the language of health and medicine.

**Learns**
Learns from leading human experts and real world cases and continues to improve over time and experience.

**Empowers**
Previously “invisible” data and knowledge are delivered into actionable insights. Cognitive and AI empowers humans and is transparent.
Creating Innovative **Cognitive** Solutions with Watson APIs

**ONCOLOGY & GENOMICS**
- Watson for Genomics
- Watson for Oncology
- Clinical Trial Matching for Oncology

**GOVERNMENT**
- Social Program Management
- Health & Human Services
- Next Generation Program Integrity

**LIFE SCIENCES**
- Clinical trials
- Watson for Drug Discovery
- Watson for Patient Safety

**VALUE BASED CARE**
- Next Generation Population Health Suite
- Next Generation Payer Analytics
- Next Generation Provider Portable Analytics

**IMAGING**
- Watson Imaging for cardiac disease
- Voice to Report (V2R) for Cardiologists and Radiologists
- Cognitive Breast Advisor

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**Highly Adaptable Cognitive API Services**

**Deep Learning Technology**

**Sequence Learning Capabilities**

**Natural Language Processing Technology**

**Highly Domain-specific Annotation and Curation**

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*Offerings currently available*  
*Offerings available; additional cognitive integration in process*  
*Offerings in development*
Scaling Expertise across a **Global Oncology Community**

155 Hospitals and Health Organizations using Watson
Humans + **Cognitive** = “AI” or “Actionable Insights”

**People excel at:**
- Common sense
- Dilemmas
- Morals
- Compassion
- Imagination
- Dreaming
- Abstraction
- Generalization

**Cognitive systems excel at:**
- Natural Language
- Pattern Identification
- Locating Knowledge
- Machine Learning
- Eliminate Bias
- Endless Capacity

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Catalyzing **Collaboration** across the Health Ecosystem

- Providers
- Purchasers
- Payers
- Policymakers
- Product Manufacturers
- Pioneers

PATIENTS
AI/Cognitive for Patients/Consumers

Welltok
Welltok: Improving **Health Engagement** with Consumers

**Health Optimization Platform**® organizes the growing spectrum of health improvement and condition management resources, obtains unparalleled consumer insights through applied analytics, and leverages cognitive computing to create personalized, adaptive health itineraries.
AI/Cognitive for Opioid Epidemic

Watson Care Manager and Opioid Insights
Breaking Data Silos to Combat the Opioid Epidemic
Hot-spotting Evidence-Based Practices

Any state, USA
AUGMENTED INTELLIGENCE FOR THE OPIOID EPIDEMIC

DATA

INSIGHT

ACTION
PREVENT

DETECT
TREAT

ANALYTICS AND COGNITIVE SOLUTIONS

SUPPORTS KEY DECISION MAKERS IN THE ECOSYSTEM
Care Evidence / Science @ Watson Health

Research

Real World Evidence

Cognitive
"This change of MFCC 2 corresponds to clinical impressions that patients with depression have muffled voices. MFCC 2 could be useful in making a diagnosis of depression."
Use of Speech Analyses within a mobile application for the Assessment of cognitive impairment in elderly people

“This tool can provide the clinician with meaningful information for assessment and monitoring of people with MCI and AD based on non-invasive, simple and low-cost method.”

SCI v. AD (N=165)
Subjective Cognitive Impairment v. Alzheimer’s

92%
The Human Behavior Change Project (HBCP) will build an Artificial Intelligence system to continually scan the world literature on behavior change, extract key information, and use this to build and update a model of human behavior to answer the big question: ‘What behavior change interventions work, how well, in what setting, for what behaviors and why?’
Real-World Evidence
To our knowledge this is the first study to examine the association between WIC and birth outcomes using this approach.
A predictive model... considering age, past arrests, mental health diagnosis, as well as use of a jail diversion program, outpatient, medical and case management services predicted the probability of re-arrests with fair accuracy.
Mining Electronic Health Records Data: Domestic Violence and Adverse Health Effects

1) Acute injuries
2) Chronic conditions
3) Gynecological and pregnancy-related problems
4) Mental and behavioral health

2429 terms more prevalent among victims of domestic abuse mostly in 4 categories (N = 5,780)

“This type of knowledge will reduce misdiagnosis, will assist in developing more effective screening tools and treatments, and will improve the quality of life and healthcare for victims of IPV and violent assault.”
"Molecular tumor boards empowered by cognitive computing can significantly improve patient care by providing a fast, cost-effective, and comprehensive approach for data analysis in the delivery of precision medicine."
Annals of Oncology, January 2018

Watson for Oncology and breast cancer treatment recommendations: agreement with an expert multidisciplinary tumor board

"This study demonstrates that the AI clinical decision-support system Watson for Oncology may be a helpful tool for breast cancer treatment decision making, especially at centers where expert breast cancer resources are limited."

Watson for Oncology demonstrated 93% concordance for breast cancer rates (N = 638)
AI/Cognitive for Life Sciences

Watson for Lou Gehrig’s Disease (ALS)
Use of IBM Watson to identify additional RNA-binding proteins (RBPs) altered in amyotrophic lateral sclerosis

“Overall, we successfully used IBM Watson to help identify additional RBPs altered in ALS disease, highlighting the use of artificial intelligence tools to accelerate scientific discovery in ALS and possibly other complex neurological disorders.”

Watson for Drug Discovery found 5 RBPs previously unlinked to ALS.
“5 Cs” for Delivering Community Health in this New Era...

Content

Cloud

Cognitive

Collaboration

Care/Clinical Evidence

- Systematic Reviews
- Randomized Controlled Studies
- Case Control & Cohort Studies
- Case Studies & Reports
Let’s Partner to INVENT the Future…

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www.ibm.com/watson/health/

“The best way to predict the future is to invent it.”

-Alan Kay