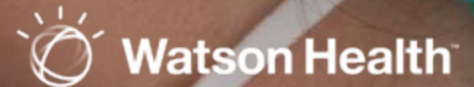


The Population Health Engine

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Learning objectives

- Understand the role of health information technology in the management of patient populations
- Explore HIT tools that enable the population health agenda and facilitate the transition from volume to value
- Learn how to turn big data into actionable information

Agenda

- System approach
- Building blocks
- Technology landscape

Product-agnostic

Separate the grain from the chaff

Focus on challenges

*Call out forward looking
opportunities grounded on reality*

*Recognize transition from FFS to
VBC*

A System Approach to Population Health Management

The closed loop of the Population Health Management Engine



The Building Blocks of the Population Health Engine

- The Workforce
- Engagement Optimization
- Advanced Analytics
- Data Governance
- Industry and Policies

Physician (and other health care workers) burnout

Physician Burnout Is A Public Health Crisis (Health Care CEOs)*

- Affecting 50% of practicing doctors**
 - For every hour spent on direct patient care, two hours are spent on EHR data entry or admin tasks
- Work imbalance, emotional exhaustion
 - Associated with bad outcomes in clinical care
 - Financial impact on health system bottom line

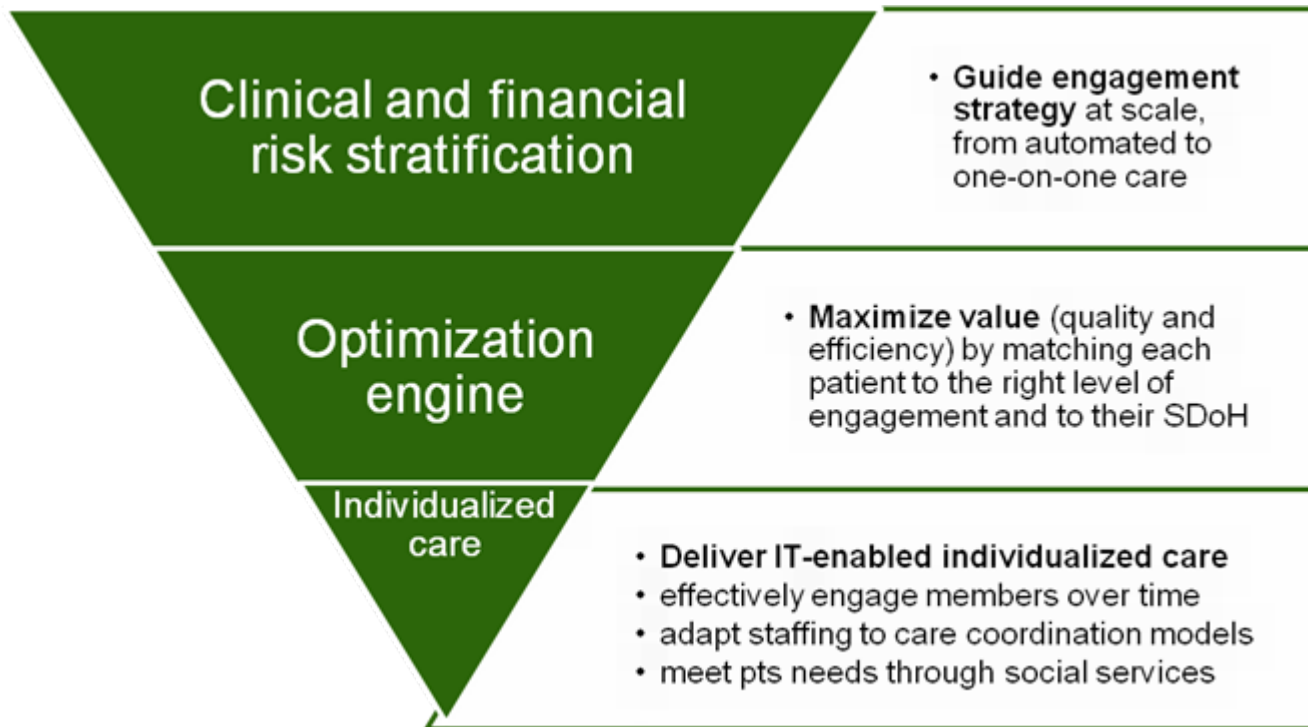
- EMR (lack of) usability
- Increased performance measurement requirements

A successful PHM system technology must:

- ➔ Embrace physician well-being
- ➔ Enable effectiveness by reducing clerical burden and inappropriate allocation of work
- ➔ Enforce team-based models where health worker expertise is maximally utilized for patient benefit

* Health Affairs Blog, March 2017 ** Mayo Clinic, December 2015

Engagement optimization starts with risk stratification



Proactively engage populations at scale

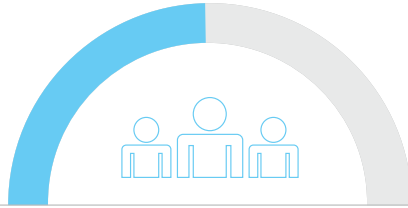


Whole Population

Fully Automated Population Engagement

Fully transparent solutions that identify and communicate with:

- ›Patients who need primary and secondary prevention
- ›Patients who need follow up for chronic conditions
- ›Patients recently discharged

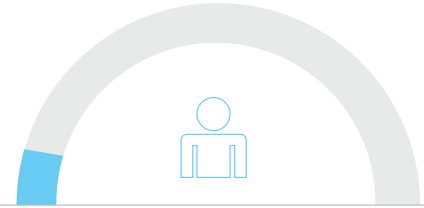


Small Portion of the Population

Team Directed Tools

Semi-automated solutions that enable identification and selective targeting of:

- ›Patients that have care gaps
- ›Patients that need to come to group visit or education
- ›Patients already scheduled for a visit
- ›Patient who will benefit from targeted campaigns



Individual

Individual Engagement

Solutions that enable me to work **one on one** with Jane Doe to help her achieve her health goals and lower her health risks

Social determinants of health (SDoH)

*Social determinants of health account for up to 60% of health outcomes**

- Include:
 - socio-economic risk factors
 - individual behavior
 - environmental exposure
- Heavily influence clinical outcomes**
- Generate higher health care costs**
- Key to successful risk-based contracts

- Strongly influenced by the distribution of money, power, and resources

- Largest hurdle for data collection

A really comprehensive PHM engine must:

- ➔ Identify the unique social-behavioral barriers for each individual
- ➔ Map SDoH to personalized healthcare delivery and behavioral changes
- ➔ Develop socio-behavioral prediction models

* World Economic Forum, 2016

** NASEM, 2017

The optimization engine

Maximize value (quality and efficiency) of care by matching each patient to the right level of engagement

Inputs

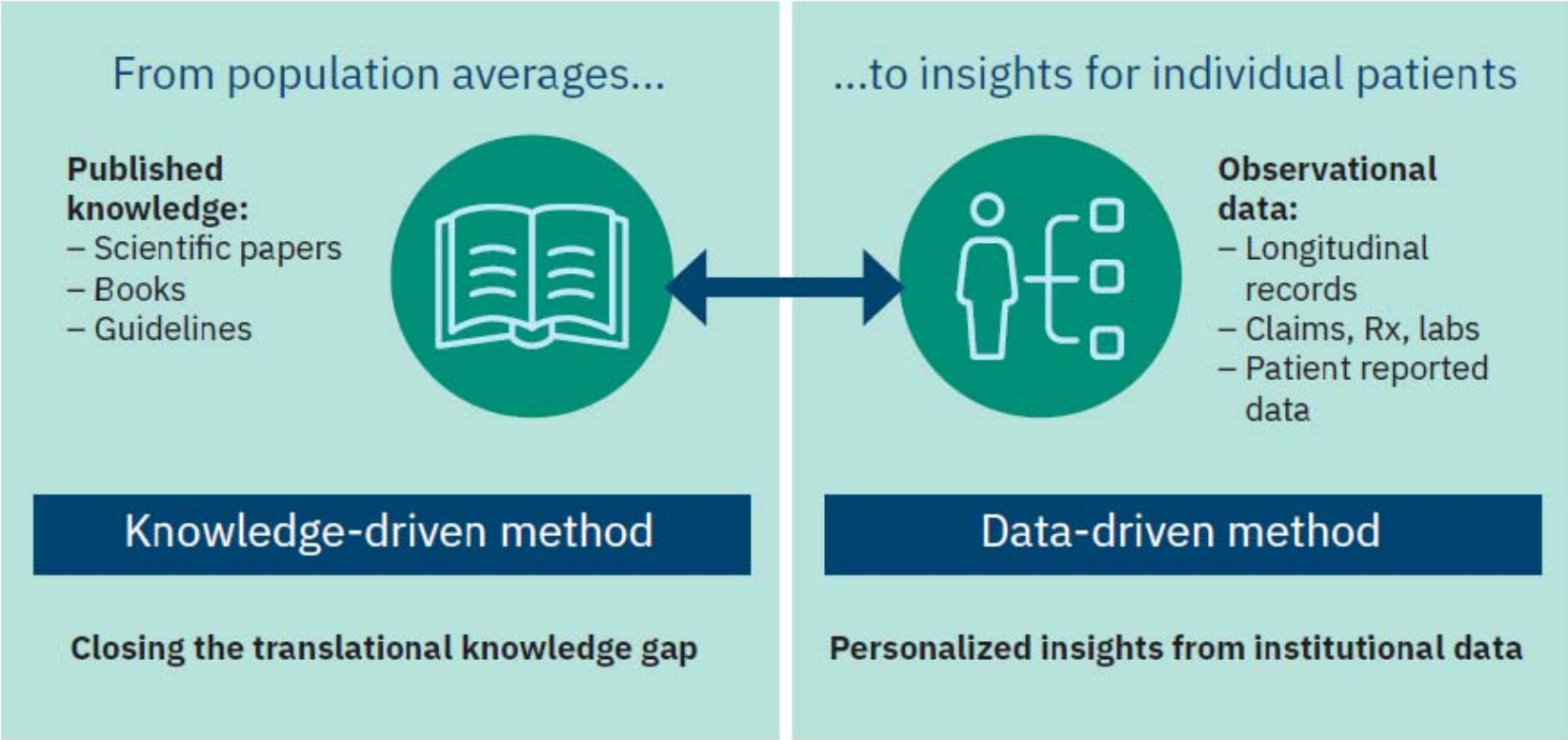
- Risk stratification
- SDoH
- Resources capacity and costs
- Program availability
- Incentive payments programs
- System feedback:
 - Impact on outcomes
 - Response history

Output

➔ Multimodal and multichannel engagement strategy

- Automated, semi-automated, and one-on-one engagement
- Modalities and timing
- Program matching
- Resources efficiency

Advanced analytics for the Population Management Engine: generate insights from knowledge and data



The challenges of a data analytics framework for PHM

- Comprehensive strategy to leverage both knowledge-driven and data-driven sources
- Build the closed loop system
- Data governance
 - Responsible use of data
 - Recognize and reward data ownership
- Patient attribution for VBC
- Future: predictive power (→ transition to Cognitive?)

How do we know it is working?
Outcomes driven metrics and benchmarking

The Technology Landscape

- Artificial Intelligence / Cognitive Computing
- Cloud Computing
- Blockchain

Navigate the hype of artificial intelligence

- Multi-billion dollar landscape: genomics data processing, pharmaceutical discovery, imaging analytics, clinical decision support, etc...
- High, and sometimes overstated expectations
- True AI (Turing Test) does NOT exist (yet)

The data scientist point of view on current “AI” capabilities:

- *integrated pattern recognition and machine learning technologies*
- *only as good as the datasets that are fed into them*
- *clinical applications must rely on pre-verified training data*
- *the system “learns” by assessing the algorithm outcomes, and folding that data back into itself to refine its approach for next time*

The cognitive approach

*A computational approach to augmenting human intelligence**

Machine-driven effort to:

1. Understand
2. Reason
3. Learn
4. Interact

1. Rapidly process structured and unstructured (text and images) data (NLP and pattern recognition)
2. Connect data and make logical inferences
3. Update models from repeated problem-solving iterations
4. Generate probabilistic recommendations and predictive models

* IBM, 2015

The “laws” of cognitive computing

- Traceable source of evidence (who trained the system?)
- Take advantage of large sources of data (this is where machines are better than humans)
 - Use structured and unstructured data
 - Natural Language Processing (NLP)
- Data is sharable (data is NOT locked!)
 - ➔ Data governance
 - ➔ Responsible use of data
 - ➔ Recognize and reward data ownership
- Usability, usability, usability!

Needs and promises of cognitive technologies in Population Health Management

- Start with high-value, real-world, use cases
- Focus on outcomes, not technology
- Pursue the transformation of disparate information into predictive insights
- Harness the power of socioeconomic data

Accelerate the ability of clinicians to identify and personalize treatment options for their patients, resulting in:

- *demonstrable effectiveness (increased quality of care)*
- *efficiency (reduced cost of care)*

The promises of cloud computing

- Efficient management and seamless consumption of “big” data
- On-demand scalability of processing resources and storage
- Deeply integrated privacy and security
- Analytics and cognitive/AI technologies will become integral in core IT systems

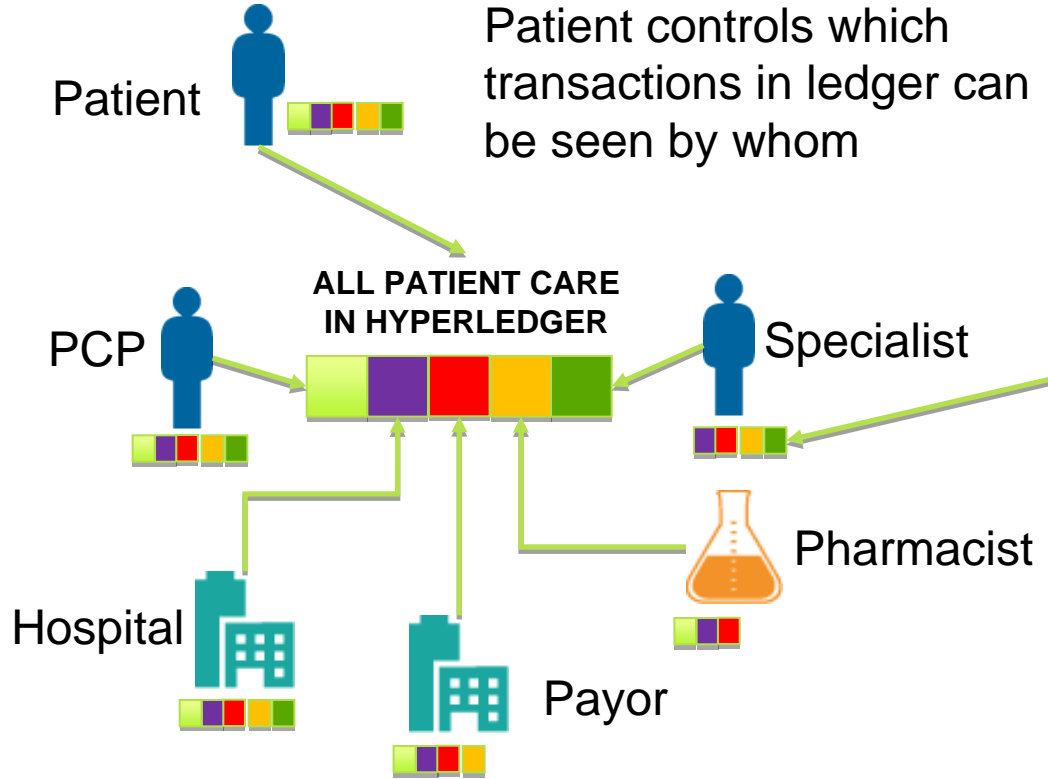
Cloud-based data aggregation and analytics will enable the population health engine to provide visibility and access to care delivery across the entire network resulting in improved end-user outcomes

Blockchain for health care

→ *Rising importance and adoption! Blockchain will:*

- Provide distributed, permissioned, and immutable shared ledger technology (trusted transactions)
- Ensure traceability and management of healthcare data (data provenance and transparency)
- Play a fundamental role in secure Internet of Things (devices, patient-reported data) environment
- Reduce the burden of health data sharing across the entire payer/provider value chain, reducing the total cost of ownership, complexities, and time

Patient-controlled data management (Identity management) *(Example)*



- Every entity in the network has immutable copy of every transaction
- The system is transparent on who made each transaction and when

Parting Thoughts

People, policies, and politics are bigger barriers than IT to the implementation of a successful Population Health Management system. However, Information Technology is THE essential enabler.

Knowledge is acquired by formulating and testing explanations, not by running an algorithm faster.*

* Pinker, 2018

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