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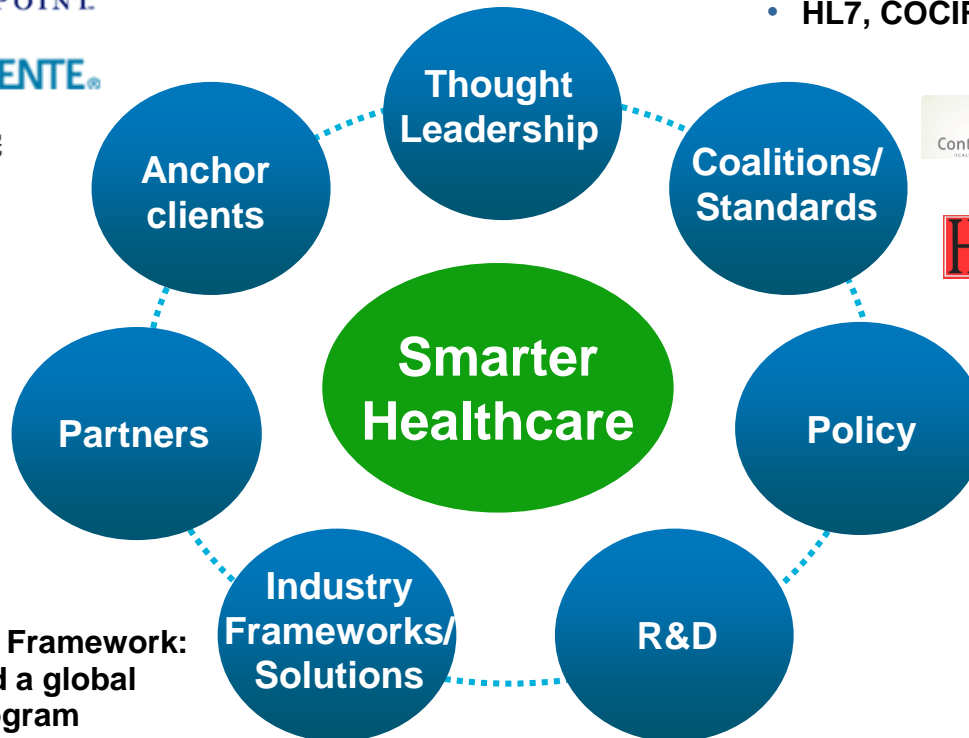


IBM Healthcare Market Presence



- Healthcare point of view and IBV studies
- Over 8,000 employees work in healthcare
- Leadership as a best practice employer and promoter of open collaboration
- Smart Value Perspective

- Patient-Centered Primary Care Collaborative
- Continua Health Alliance
- HL7, COCIR and epSOS



- Global solution partners: Cerner, Siemens, McKesson, Trizetto, EPIC, SAP
- IBM Health Integration Framework: 28 software assets and a global partner ecosystem program
- Integrated Big Data/Analytics stack
- Cloud EHR and Desktop Services
- Global solution centers: Hawthorne, La Gaude, Dallas, Berlin, Austin, Beijing

- Policy advisor to 10 US state Medical Home initiatives
- eHealth, privacy/security
- World Community Grid

- 600 patents
- \$100M Research Initiative (56 MD's)
- Apple Partnership to develop Healthcare Apps



The Healthcare Industry is Undergoing a Significant Transformation



Ultimately Demographics drives the need for change

Economic Forces

Buyers of care (including governments, private insurers, employers and individuals) **expect greater value, improved quality and better outcomes** – at a more **affordable cost**

17.6%

of U.S. GDP consumed by healthcare spending

90%

of the population of OECD countries has health insurance

Demographic Forces

The changing face of the population and their illnesses will continue to shape the healthcare transformation.

80 years

Life expectancy at birth exceeds 80 years across majority of OECD countries

30%

10 year improvement rate for heart attack survival

Technological Forces

Increasing demand for healthcare and social services is **driving the creation of new technologies**

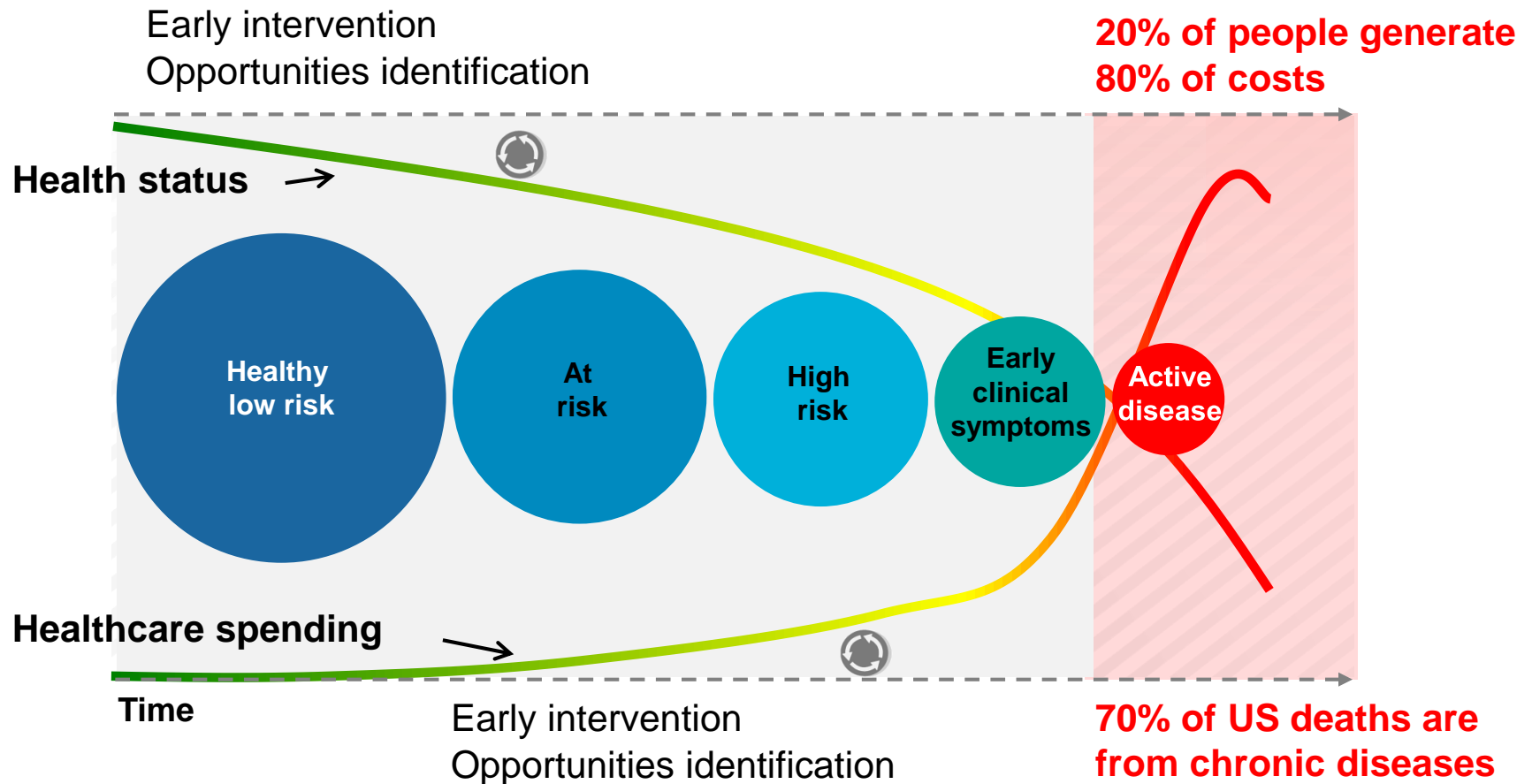
247 million

The number of mHealth users (those who download a smartphone mHealth app)

1 billion

Projected annual health-related apps downloaded by year 2016

Disease and cost of care progression



Healthcare is moving to a system focused on value, coordinated around the patient and integrated into our communities

Core Principles of Current System

Over-emphasis on expensive treatments and incremental improvement

Myopic focus on **capacity for acute care**

Use of **volume-based reimbursement** models

Patients are responsible for coordinating their own care

Care varies by venue and clinician

Quality is determined **by the provider**

Tomorrow's Healthcare System

Focus is on **value, coordinated** around the patient and integrated into communities

Emphasis is on **proactive care** to meet health needs

Payment is based upon **value** and **outcomes**

Primary care teams provide **comprehensive care** throughout patient life

Care is **standardized** according to **evidence-based** guidelines

Empowered consumers determine market

The market is rejecting the major structural deficiencies that have resulted in the industry's systemic challenges

Transforming Healthcare via Population Health Management and Value Based Care

- Definition: *“the health outcomes of a group of individuals including the distribution of such outcomes within the group”*
- Volume to Value Based Care
- Triple Aim: *Improved Health, Improved Care, Reduced Cost*
- Steps to Population Health Management
 - Define Population
 - Stratify Risks
 - Identify Care Gaps
 - Manage Care
 - Engage Patients
 - Measure Outcomes



“There is nothing more important [in healthcare] than the transition from traditional medicine to population health and the implications that will have. No Outcome No Income.”

Dr. David Nash

Founding Dean, Jefferson School of Population Health

Population Health Management Priorities

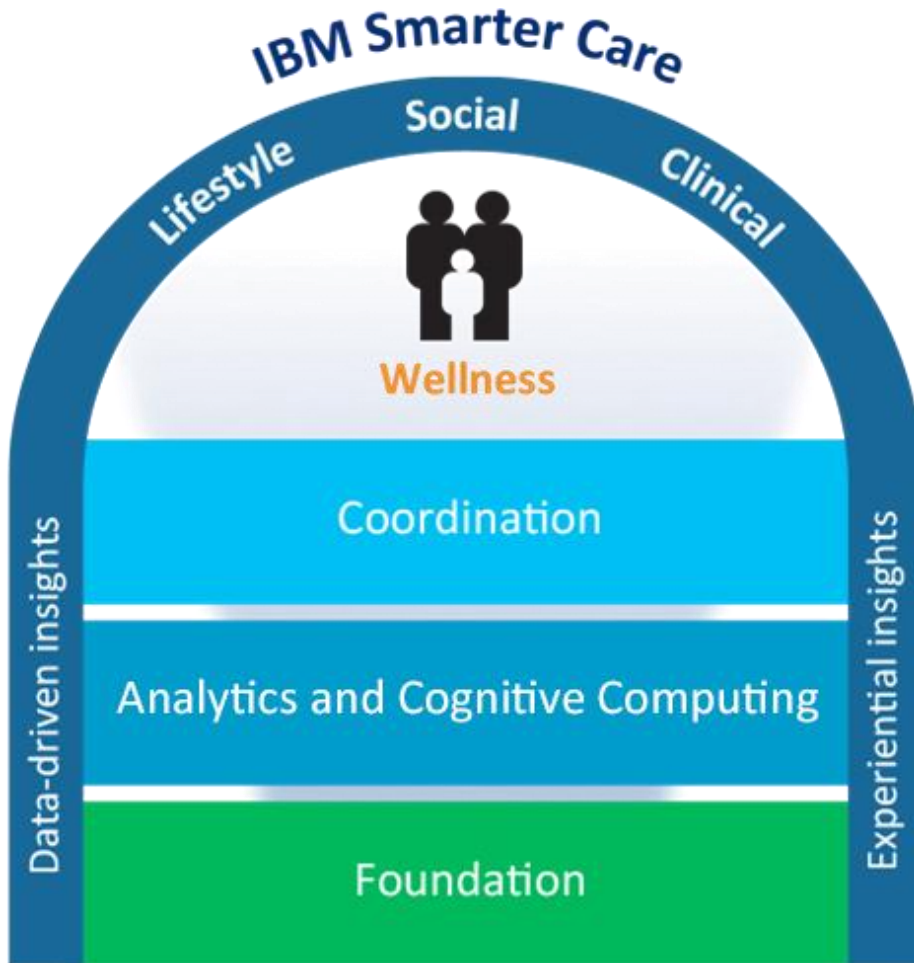
- **Information-powered clinical decision making**
 - Right Data at the Right Point of Care at the Right Time
 - Requires integrated data network
 - Requires new leadership focused on population health
- **Primary Care-led Clinical Work Teams**
 - Comprehensive care management outside of 4 walls
 - Individualized care plans based on social/clinical data
 - Technology enables extension and knowledge of PCP teams
- **Patient Engagement**
 - Use data to understand non-clinical barriers to care
 - Use data to activate personal health and wellness
 - Use data to map services to population need
 - Use data to identify high risk patients



Big Data and Analytics



IBM Smarter Care uncovers valuable insights into **lifestyle choices, social determinants, clinical and financial factors** that effect the overall health of an individual ...



Lifestyle

Choices have direct impact on an individual's mental and physical wellness.

Social

Demographic determinants such as where one is born, grows, lives, works and ages have direct impact on an individual's overall health, mental health and well-being.

Clinical

Factors such as specific medical symptoms, history, medications, diagnoses, etc are indicators of an individual's health.

Financial

Costs, insurance, reimbursement, incentive to modify behavior, new payment models, co-pays, etc. will play a significant role.

Healthcare leaders face an intensifying mission for transformation

...That lead directly to requirements for Big Data & Analytics

Predict future resource demands and requirements to serve your patient population

Recognize patterns of disease progression and take targeted action

BUILD SUSTAINABLE HEALTHCARE SYSTEMS

Understand total cost of care & areas for efficiencies and process changes

Provide cost transparency and superior care to an ever more demanding public



COLLABORATE TO IMPROVE CARE AND OUTCOMES

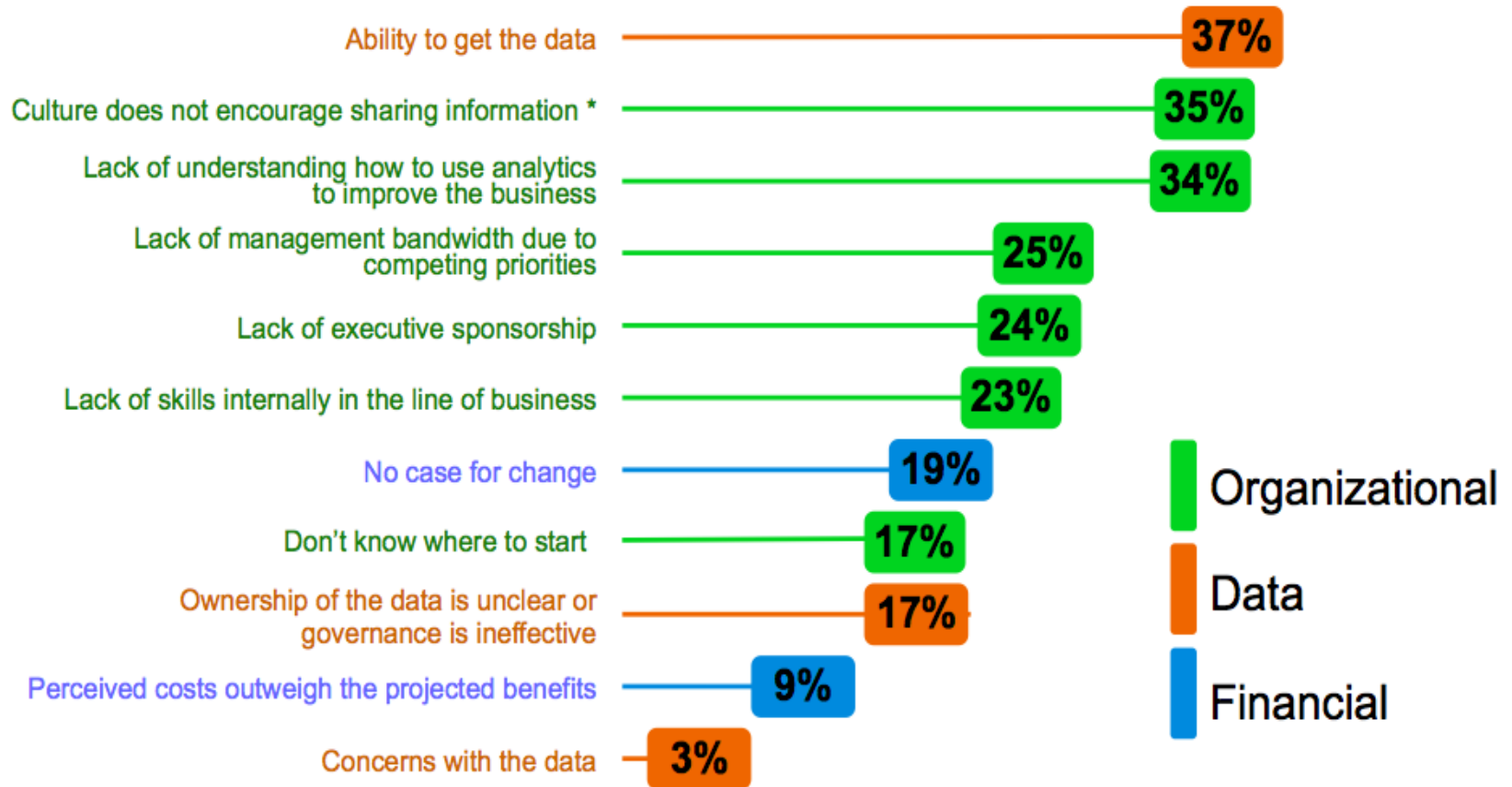
Understand effects of treatments on the broader population and individual patients

INCREASE ACCESS TO HEALTHCARE

Optimize care and service to the citizen, consumer and patient at any point of contact

Locating the data and having the right resources to turn it into insights are obstacles widespread adoption of analytics

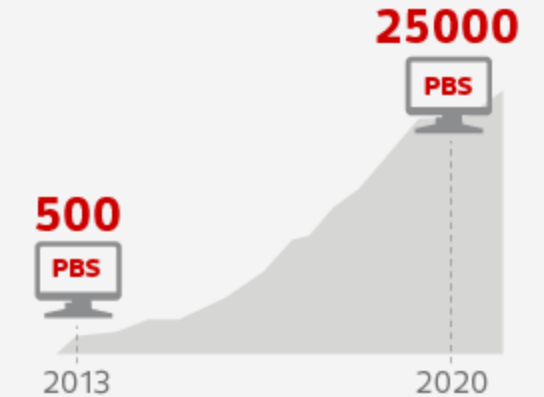
Primary obstacles* to widespread analytics adoption



*** An obstacle is anything of that impedes and/or deters the healthy application of analytics**

Explosive growth of patient data creates opportunity for Healthcare Transformation

EXPLOSIVE GROWTH



The healthcare industry is experiencing **explosive growth in data**—from 500 petabytes (PBs) in 2013 to 25,000 PBs by 2020.¹



The Broad Institute uses **10 PETABYTES OF STORAGE** to perform gene sequencing.²

ONE 3D CT SCAN CONSUMES
1GB OF STORAGE³



665TB

By 2015, the average hospital could generate **665TB of data**.⁵

THE AVERAGE HOSPITAL HAS
800,000 TOTAL RECORDS.

64,000–96,000 ARE DUPLICATES.

THE AVERAGE COST OF A DUPLICATED
MEDICAL RECORD IS \$50.
IF THE RECORDS AREN'T RECONCILED,
THE COSTS ARE EVEN HIGHER.⁶



Issues Impacting Patient Data Management

- ☐ Growth driven by increased EMR and HIT application adoption
- ☐ Increased data sharing with patients (e.g. MU Stage 2 requirements)
- ☐ M&A creating convergence of multiple systems
- ☐ ACO movement demanding deeper mining and analysis of data
- ☐ Tighter mandates for data security

80%

**unstructured data in EMRs,
devices, publications, drug
structures...**

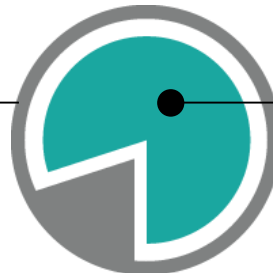
... Biggest blind spot still remains unstructured data

- How are you measuring and reducing preventative readmissions?
- How are you providing clinicians with targeted diagnostic assistance?
- Which patients are following discharge instructions?
- How are you using data to predict intervention program candidates?
- Would revealing insights trapped in unstructured information facilitate more informed decision making?



Does unlocking the unstructured data help accelerate your transformation?

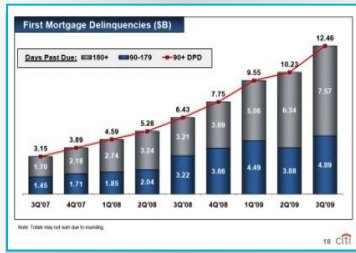
- ✓ Physician notes and discharge summaries
- ✓ Patient history, symptoms and non-symptoms
- ✓ Pathology reports
- ✓ Tweets, text messages and online forums
- ✓ Satisfaction surveys
- ✓ Claims and case management data
- ✓ Forms based data and comments
- ✓ Emails and correspondence
- ✓ Trusted reference journals including portals
- ✓ Paper based records and documents



*Over 80% of stored health information is unstructured**

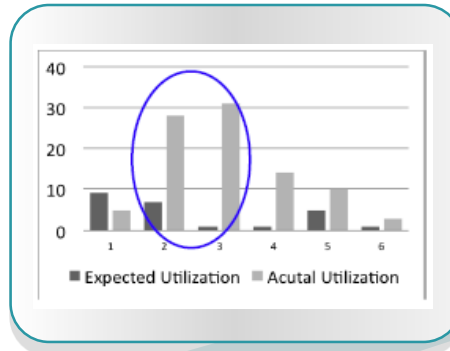
Healthcare analytics is a journey

Foundational



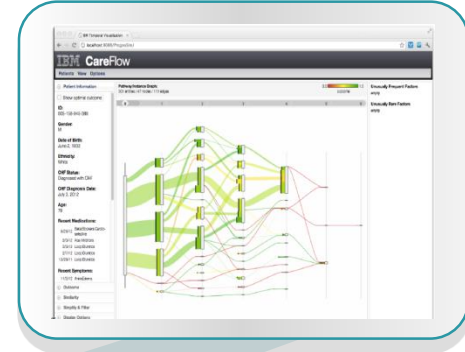
- What happened?
- When and where?
- How much?

Advanced, Predictive



- What will happen?
- What will be the impact?

Cognitive, Prescriptive



- What are potential scenarios?
- What is the best course?
- How can we pre-empt and mitigate the crisis?

BI Reporting

- Dashboards
- Clinical data repositories
- Departmental data marts
- Enterprise data warehouse

Population Analytics

- Enterprise analytics
- Unstructured content analytics
- Outcomes analytics
- Evidence-based medicine

Care Optimization

- Streaming analytics
- Similarity analytics
- Personalized healthcare
- Consumer engagement

Types of Analytics in Healthcare

PHM/Clinical Analytics

- Predictive
- Prescriptive
- Disease management

Financial Analytics

- Revenue Cycle
- Budgeting/Forecasting
- Resource costs

Consumer Analytics

- Patient Satisfaction
- Behavioral
- Wellness

Streaming Analytics

- Medical Devices
- TeleHealth
- Fitness devices

Comparative Analytics

- Clinical benchmarks
- Peer comparisons

Risk/Fraud Analytics

- Claims/Billing
- HIPAA monitoring

Regulatory Reporting

- Compliance
- PQRS/Meaningful Use

Social Media Analytics

- Patient portal activity
- Facebook/Twitter/LinkedIn

Performance Measurement

- Outcomes measures
- Process measures
- Pay for performance

Public Health

- Disease Registries
- Surveillance
- Global Data tracking

Operational Analytics

- Clinical Decision Support
- Bedside monitoring
- Staffing
- Supply chain

Pharma Analytics

- Drug discovery
- Quality assurance
- Marketing/Sales

Genomic Analytics

- Medical research
- Clinical trials

Location Analytics

- Geospatial
- Identify market place



Primary Use Case: Measure & Act on Population Health

Target Segment:

Providers

Description

Gain insights into a population of patients and take action by identifying gaps in care, re-admission risk, disease progression and performance against quality measures.

Data Types: Structured & Unstructured



EMR

Clinical data,
notes, dictation



Government

Social services,
demographics



Events

Weather, local events,
disease outbreaks



Pharmacy

Prescriptions, OTC drugs



Insurance

Claims, DRG, eligibility



Mobile Health

Email, Apps



Genomics

bio-markers, phenotype



Social/Communities

Wellness, Patients Like Me

Capabilities

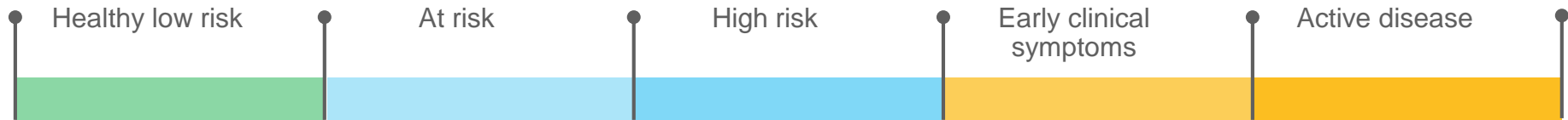
- Predict patients at risk for readmission and intervene
- Identify gaps in care by disease
- Anticipate and take pre-emptive action during disease outbreaks
- Understand clinical performance against targets and take specific action

Outcomes

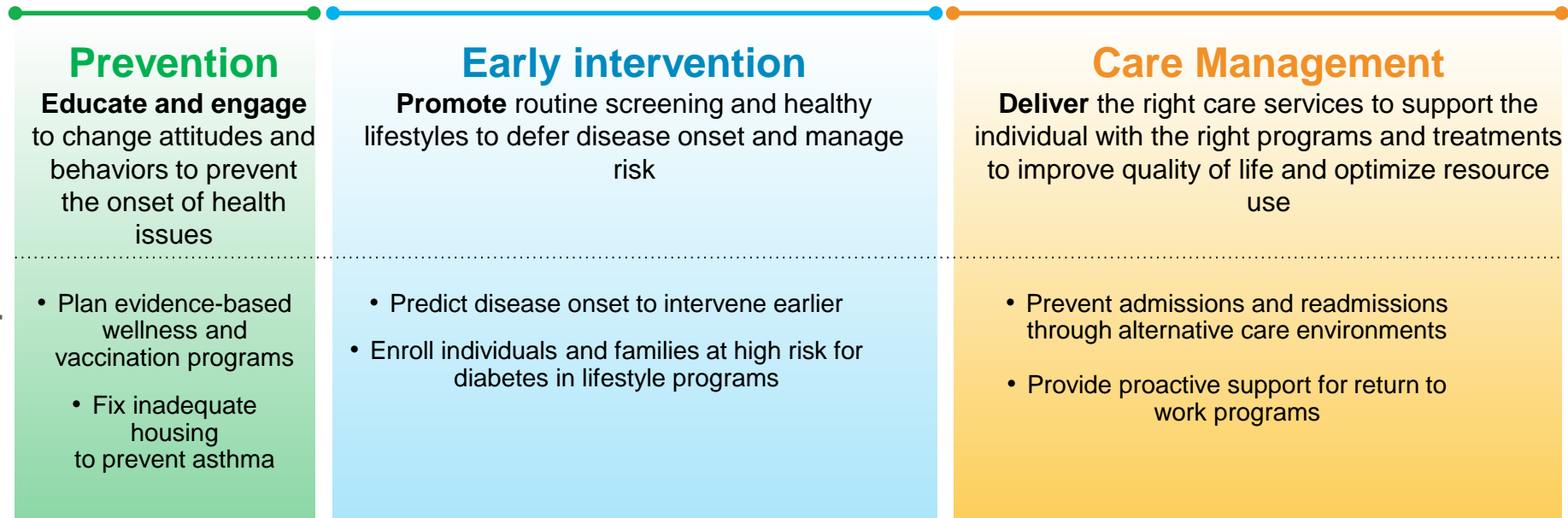
- Preventative care
- Optimize outcomes and costs
- Risk stratify population
- Provide evidence-based care per national guidelines

Apply new insights from **social and clinical analysis** to inform care protocols and drive better outcomes

Segment populations by risk profiles



Inform care approaches with evidence



Examples

Applying Big Data & Analytics to *Population Health Management*

Population Health Management

Improve outcomes on chronically ill populations of patients

- Reduce treatment variability and gaps in care
- Reduce hospital readmissions
- Improve patient compliance
- Improve quality performance
- Coordinate care across providers

50% improvement choosing correct treatment, reducing side effect complications

Reduced preventable hospital acquired conditions by 40% over 3 years

Improved quality scores from 92% to 99%

Estimated \$8-12 M savings per year through efficiencies and readmission avoidance

\$9.1B reduction in costs over 5 year time frame across the collaborative

Reduced re-admissions by 20% in accordance with quality requirements

Population Health Analytics Requirements

Understand / Reduce Total Cost of Care

- Comparison to market performance
- Distribution of costs within clinically equivalent episodes
- Provider practice pattern variation
- Identify areas of opportunity that cross continuum of care

Stratify Populations According to Program Objectives

- High Risk for Future Cost
- High Risk for Future Event
- High Risk for Future Adverse Outcome
- Readmission Prevention
- High Frequency ED Users

Understand / Improve Quality of Care & Patient Experience

- Comparison to market performance
- Provider / Care Team performance variation
- Identify areas of opportunity

Measure Program Effectiveness

- Performance of Intervention population vs. Control
- Cost of Intervention vs. Benefit to Population
- Impact of Intervention on Patient Outcome

Watson helping oncologists treat cancer patients

COGNITIVE COMPUTING: ASK – DISCOVER- DECIDE

Business problem:

- Need better individualized cancer treatment plans

Solution:

- Suggestions to help inform oncologists' decisions based on 600K+ pieces of evidence and 2M pages of text from 42 publications
- Analyzes patient data against thousands of historical cases and trained through 5000+ Memorial Sloan-Kettering MD and analyst hours
- Evolves with the fast-changing field

IBM WatsonOncology
Developed with Memorial Sloan Kettering

Watson facilitating medical school problem-based learning methods


Business problem:

- Give medical students and doctors easier insight into data to inform their diagnoses and decisions

Solution:

- Intuitive, new user interface to Watson's power revealing chains of evidence to support clinical reasoning
- Analysis of whole EMRs to extract and visually present summarized knowledge with semantic understanding of context
- Cognitive systems in a classroom-based setting
- Watson facilitating medical school problem-based learning methods

IBM Watson
WatsonPaths & EMR Assistant
Developed with Cleveland Clinic



THR - 2014 Davies Award Winner projects 6X return for Clinical BI

\$12M investment → \$73M ROI 5 years

Four use cases:

- Population Health: ACO-33 and P4P
- **Heart & Vascular (H&V) Procedures**
- H&V Care Redesign
- **Referral Management Analysis**

Capabilities:

- **Single data repository, unique patient identifier, data model, self-service reporting**

Results:

- **Quality scores improved from <92% → 99%**
- Expected 10% recovery (\$3.4M/yr) on referral leakage
- **Save \$8-12M/yr through efficiencies & readmission avoidance**

Seton Healthcare Family reduces CHF readmission to improve care

Reduce re-admission

of CHF patient by proactively targeting care management

Identify

patients likely for readmission

Reduce costs

mortality rates, and improved patient quality of life



Business Challenge: Seton Healthcare strives to reduce the occurrence of high cost Congestive Heart Failure (CHF) readmissions by proactively identifying patients likely to be readmitted on an emergent basis.

The Solution: IBM Content and Predictive Analytics for Healthcare solution will help to better target and understand high-risk CHF patients for care management programs by Utilizing natural language processing to extract key elements from unstructured History and Physical, Discharge Summaries, Echocardiogram Reports, and Consult Notes, leveraging predictive models that have demonstrated high positive predictive value against extracted elements of structured and unstructured data, and providing an interface through which providers can intuitively navigate, interpret and take action

Solution Components

- IBM® Content and Predictive Analytics for Healthcare
- IBM Cognos Business Intelligence
- IBM BAO solution services

"IBM Content and Predictive Analytics for Healthcare uses the same type of natural language processing as IBM Watson, enabling us to leverage information in new ways not possible before. We can access an integrated view of relevant clinical and operational information to drive more informed decision making and optimize patient and operational outcomes." - Charles J. Barnett, FACHE, President/Chief Executive Officer, Seton Healthcare Family

What Really Causes Readmissions at Seton

Key Findings

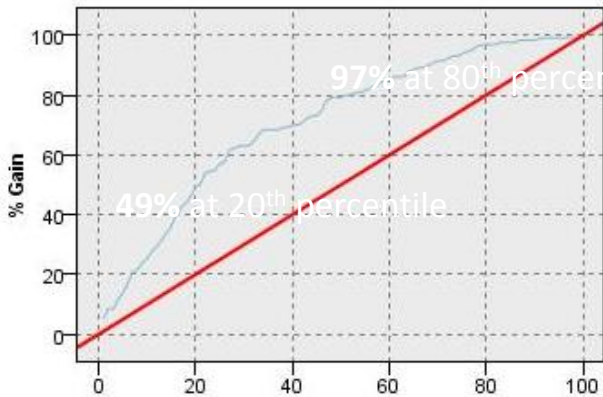


The Data We Thought Would Be Useful ... Wasn't

- 113 candidate predictors from structured and unstructured data sources
- Structured data was less reliable than unstructured data – increased the reliance on unstructured data

New Unexpected Indicators Emerged ... Highly Predictive Model

- 18 accurate indicators or predictors (see next slide)



Predictor Analysis	% Encounters Structured Data	% Encounters Unstructured Data
Ejection Fraction (LVEF)	2%	74%
Living Arrangements	<1%	73% (100% Accurate)

Data that is ACTIONABLE

Population Management

We identified & recommended vaccination for patients at risk for meningitis within hours of the outbreak.

Intervention

The patient's BP and sugar levels spiked, I need to communicate with her and direct her to treatment.

Health Economics

I have evidence that demonstrates a lower total cost of care and better outcomes with a seemingly more expensive drug or treatment.

Customer
Sentiment

Devices,
Monitors

twitter  Google 

Email, Fax

Doctor's EMR
Notes, Dictation

Images

Current
Events



facebook

Care Management

We reduced readmission rates by assigning a care manager to heart patients with no emergency contact on file.

Consumer Engagement

My reports show a decline in satisfaction based on sentiments expressed on our member portals and social networking sites.

Big
Data

For more information
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