Digital Transformation of Healthcare –

Towards Quality and Efficiency Improvements

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Agenda

- **Healthcare Industry Dynamics**
- Responding to the Challenges
- IBM's Smarter Healthcare Solutions

Global market trends challenging the healthcare industry

Industry challenges and opportunities

Increasing prevalence and cost of chronic diseases

Empowered consumers expect better value, quality, and outcomes

Growing costs for new, revolutionary technologies and treatments

Changing demographics and lifestyles drive associated costs

New market entrants and new approaches to health and care delivery increase complexity and competition

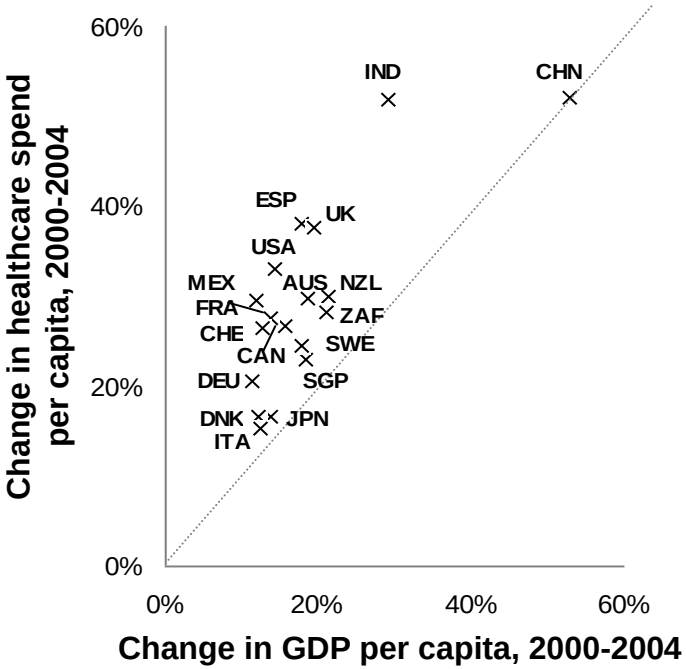
Globalization of healthcare - Shifting from local to regional to national and international contexts

Primary Care and Nursing shortages demand workforce productivity and efficiency

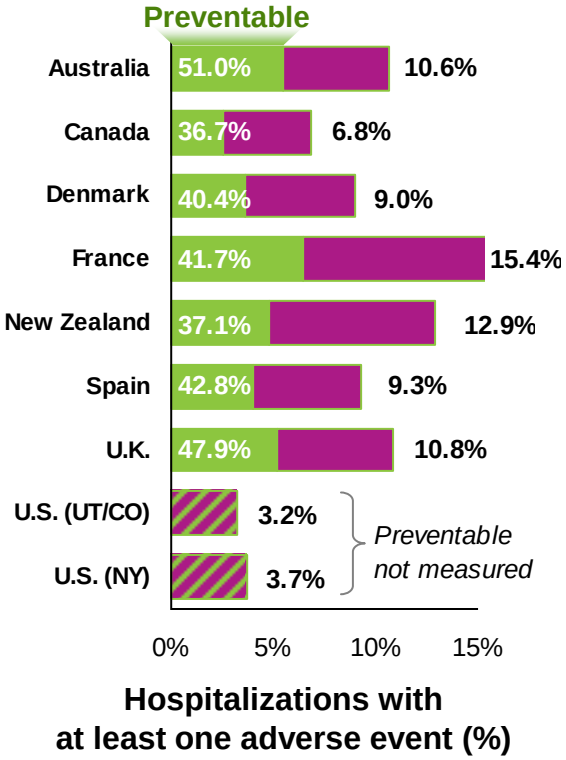
Source: IBM "Redefining Value and Success in Healthcare: Charting the path to the future" January 2012

Healthcare systems struggling to address increasing costs, inconsistent quality and/or inaccessible care.

Growth in healthcare expenditures[1]
(Healthcare spend vs. GDP, per capita)



Occurrence of adverse events at hospitals[2,3,4]
(Percentage of total and preventable)



Examples of healthcare access issues[5]
(Select countries)

- **Canada:** 36% wait 6+ days or longer for Dr. appointment (vs. 10% AUS, 3% NZL, 15% UK, 23% US)
- **China:** major part of rural population cannot afford professional care
- **Denmark:** Govt pledges to cap wait time to 2 months for all treatments
- **Japan:** Long waits at popular hospitals, consult times getting shorter
- **U.K.:** More than 40K Britons wait more than a year just for diagnosis
- **U.S.:** 47M uninsured, 15M underinsured

Note: (2) An adverse event is defined as "an unintended injury or complication which results in disability, death or prolongation of hospital stay, and is caused by health care management rather than the patient's disease"; (3) despite attempts to minimize inter-study differences, some variation may be explained by methodologies (Marang-van de Mheen, 2007)
Source: (1) WHO (2007); (4) AUS: Thomas (2000), CAN: Baker (2000), DNK: Schioler (2001), FRA: Michel (2004), NZL: Davis (2002), ESP: ENEAS (2006), UK: Vincent (2001), US (NY): , US (UT/CO): ; (5) CAN: , CHN: , DNK: , GER: , JPN: , UK: , US: U.S. Census Bureau (2007) and Schoen (2005)

Agenda

- Healthcare Industry Dynamics
- ➢ **Responding to the Challenges**
- IBM's Smarter Healthcare Solutions

To drive value and success in healthcare, organizations are working to:

BUILD SUSTAINABLE HEALTHCARE SYSTEMS

Build an efficient, flexible organization that proactively manages cost and regulatory requirements and enables greater transparency and accountability.

COLLABORATE TO IMPROVE CARE AND OUTCOMES

Improve the quality and efficiency of care while cultivating patient centricity through engagement and health and care personalization.

INCREASE ACCESS TO HEALTHCARE

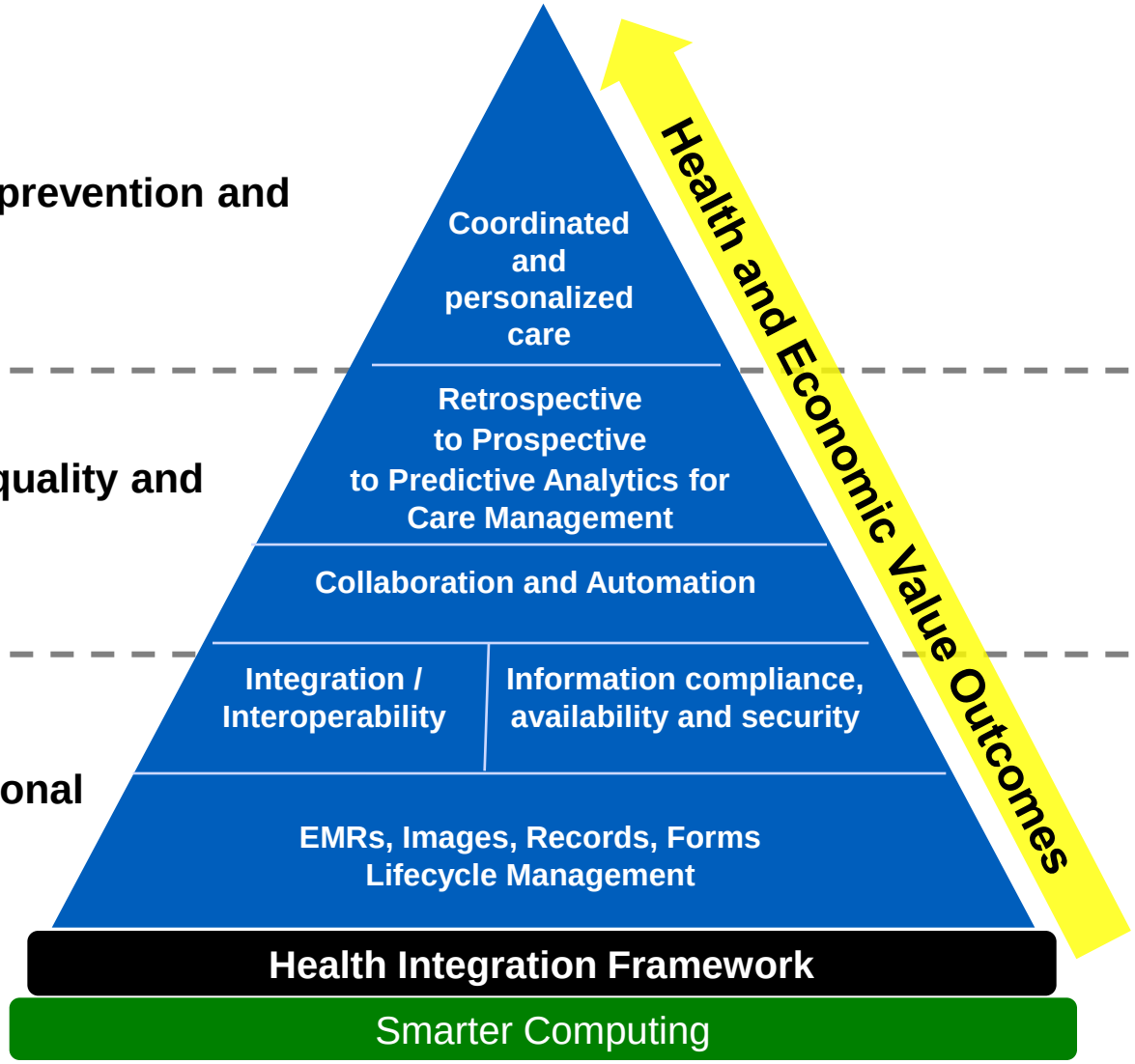
Reduce disparities in access and compel individuals to become advocates for their own health.

Evolution of healthcare solutions

Collaborate for prevention and wellness

Achieve better quality and outcomes

Improve operational effectiveness



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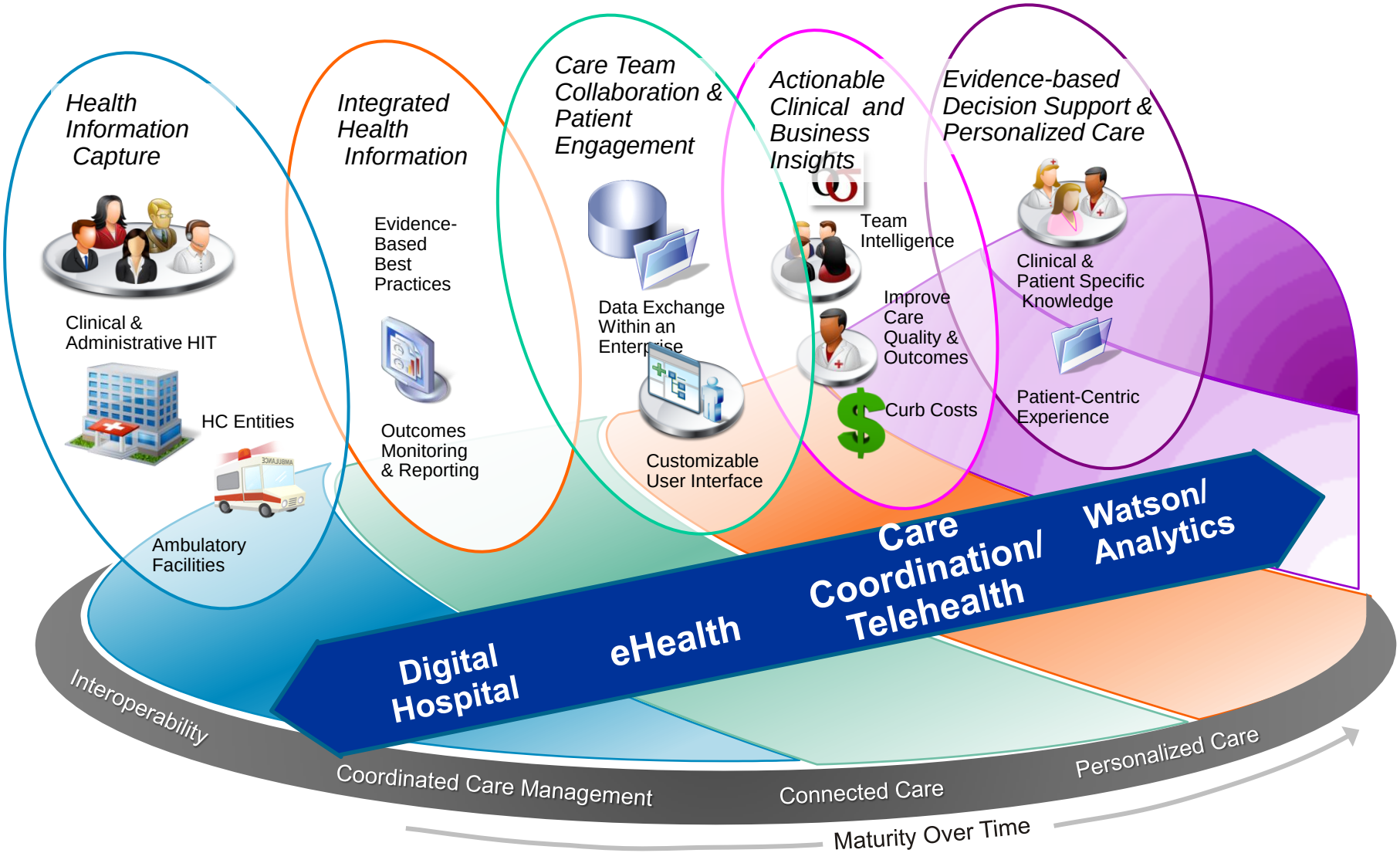
- Responding to the Challenges
- **IBM's Smarter Healthcare Solutions**

The Journey to Healthcare Transformation

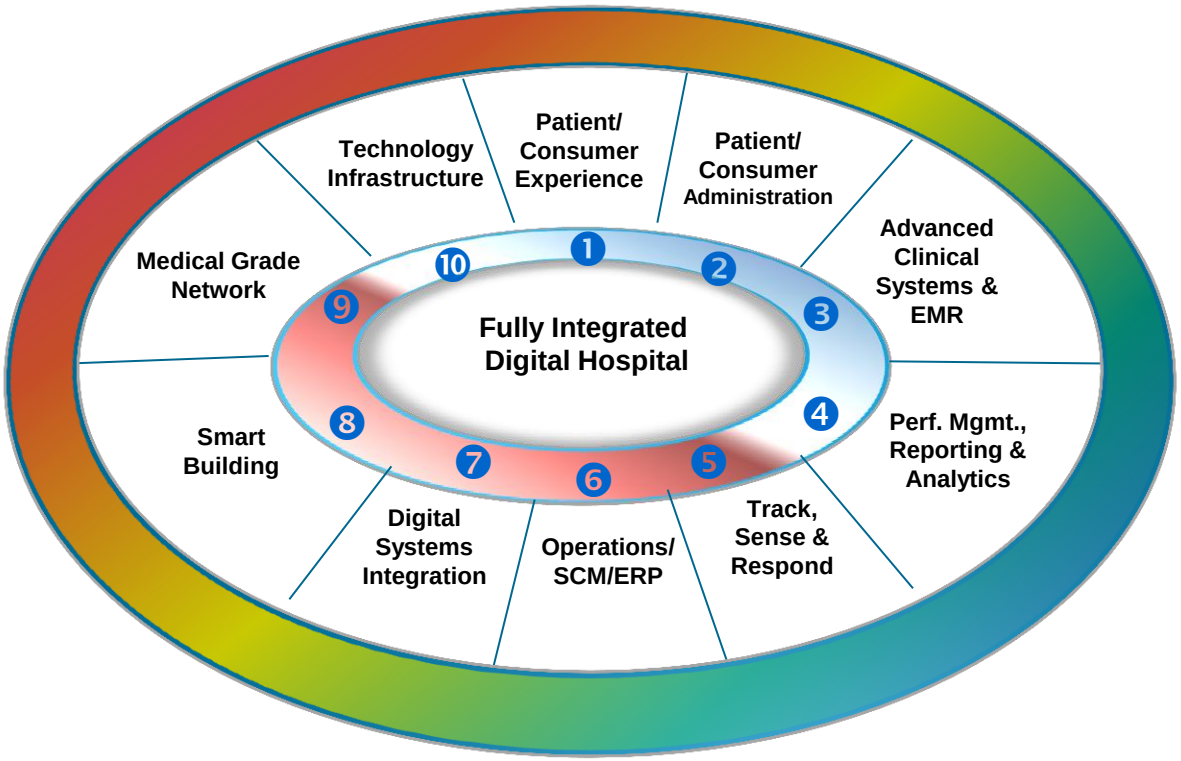


IBM's Smarter Healthcare Solutions

Solutions for

- Digital Hospitals
- eHealth
- Care Coordination and Telehealth
- Healthcare Analytics and IBM Watson

IBM's Digital Hospital solutions bring together clinical, administrative and building solutions for benefit of patients and caregivers



Hallmarks of a Digital Hospital

- seamless **integration** across technologies
- **real-time,** standards based digital information
- **collaboration** environment across the enterprise
- **analytics based insights** into performance KPIs
- **patient centered** enterprise marked by **efficient, safe, and high quality care**

" Digital Hospitals move twice as many patients through with a higher level of Care and Safety with the same size hospital and staff "

What is eHealth?

- **Definition: eHealth is electronic communication and IT in the health sector**
  - *"The interaction between patients and health-service providers, institution-to-institution transmission of data, or peer-to peer communication between patients and/or health professionals"*

- **Objectives**
  - Drive interoperability and integration of systems, data and care processes
  - Enable a Patient Centric Health System, with the following characteristics
    - Patients needs are understood and anticipated
    - Targeted services are provided to patients
    - Patients are inspired to be proactive
    - Looks from the patient's point of view outward
    - Enhances a Patient's experience at every touch point

eHealth: Basic Technology Components

Hospital Based Information Systems

- Pharmacy Information System (PIS)
- Clinical Information System (CIS)
- Laboratory Information System (LIS)
- Radiology Information System (RIS)
- Picture Archiving Communication System (PACS)

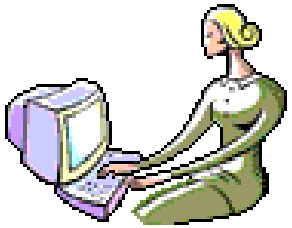
Physician Office Based Systems

- Physician Office System (POS)
- Electronic Patient Record (EPR)

Government or Regional Systems

Disease Surveillance and Modeling

Fraud and Abuse Management System (FAMS)



National Infrastructure

- Health Information Access Layer (HIAL)
- Data Standards
- Client Registries
- Provider Registries
- Electronic Health Record (EHR)

eHealth: helping institutions/governments deliver eHealth transformation

Determining…

…a national blueprint, eHealth strategy and high-level architecture

Delivering…

…an effective Program Management Office focused on ROI and measureable results

Defining…

…healthcare standards and an implementation roadmap

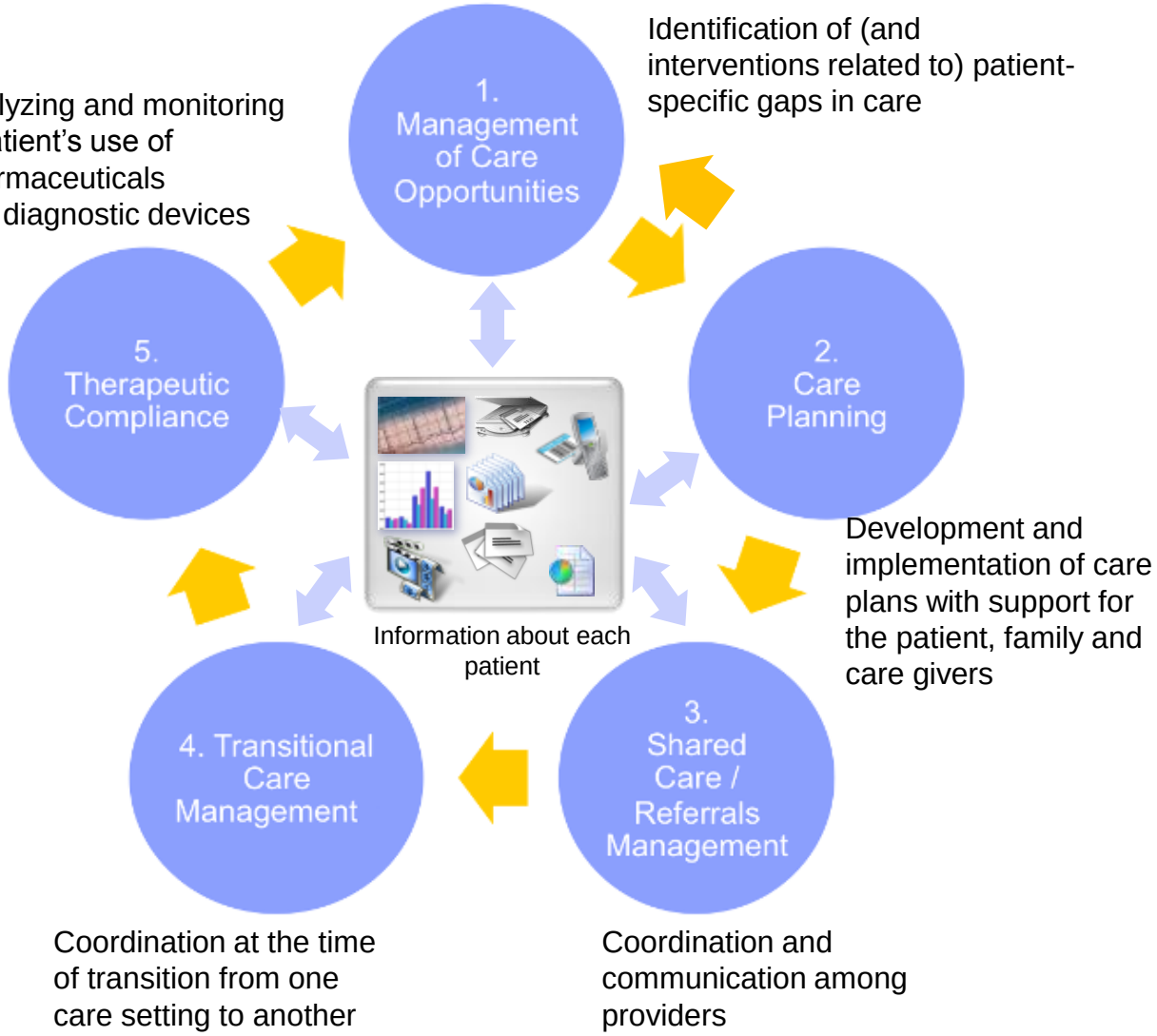
Implementing…

…eHealth technologies including information management, patient-centric services and analytics solutions

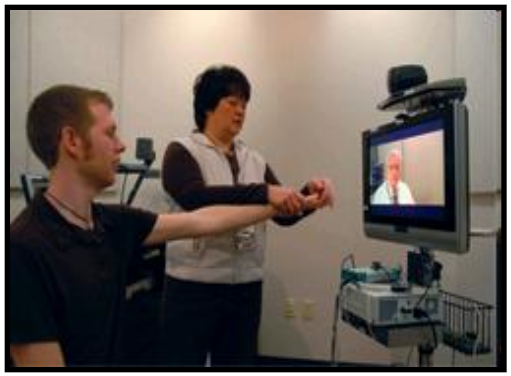
Providing…

…healthcare transformation, change management and eHealth adoption services

Care Coordination: IBM solutions with capabilities in processes, big data, integration and analytics



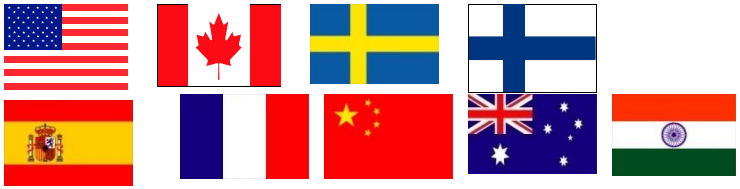
Telehealth transforms how patients and professionals experience healthcare



- **Telehealth is the delivery of health care services where the patient and provider are not co-located**

- **Telehealth employs a variety of technologies including:**
  - Live videoconferencing
  - Remote monitoring
  - Scheduling, referral, billing
  - Body plasters, robotics and sensors

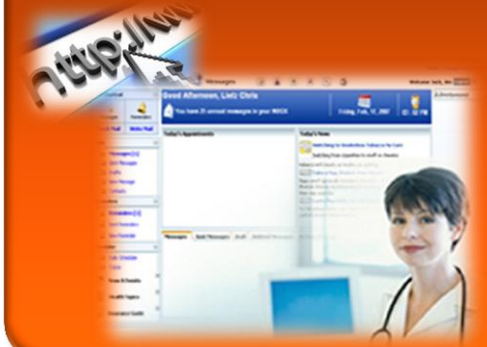
- **Telehealth gains greater acceptance and support**
  - Over 1/3 of patients are willing to consultation remotely
  - Over 60% of global governments see the potential benefits of telehealth approaches
  - Countries are piloting and expanding telehealth services



1. Telemedicine Toolkit for a Better Deployment and Use of Telehealth, European Coordination Committee of the Radiological, Electromedical and Healthcare IT Industry; March 2010

Telehealth solutions can drive greater efficiencies and quality while expanding access

Online Portals



- Information and tools to help citizens manage their own health and wellness

Care/Disease Management

- Proactive management of chronic diseases to reduce treatment costs

Remote Patient Monitoring

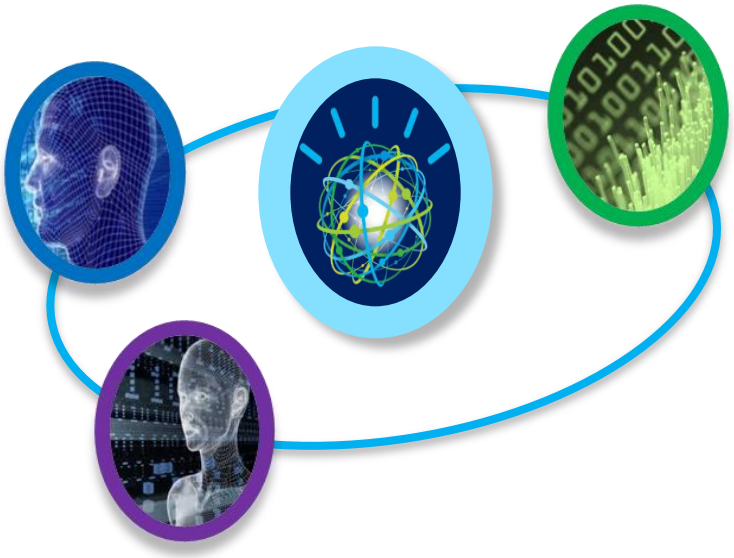
- Measure and report conditions to medical specialists to reduce acute care episodes

Telemedicine

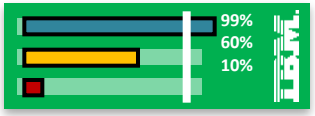
- Address the shortage of qualified personnel and better serve patients

Analytics: IBM Watson technology represents a new class of industry analytical solutions

1 Understands natural language and human speech



2 Generates and evaluates hypothesis for better outcomes

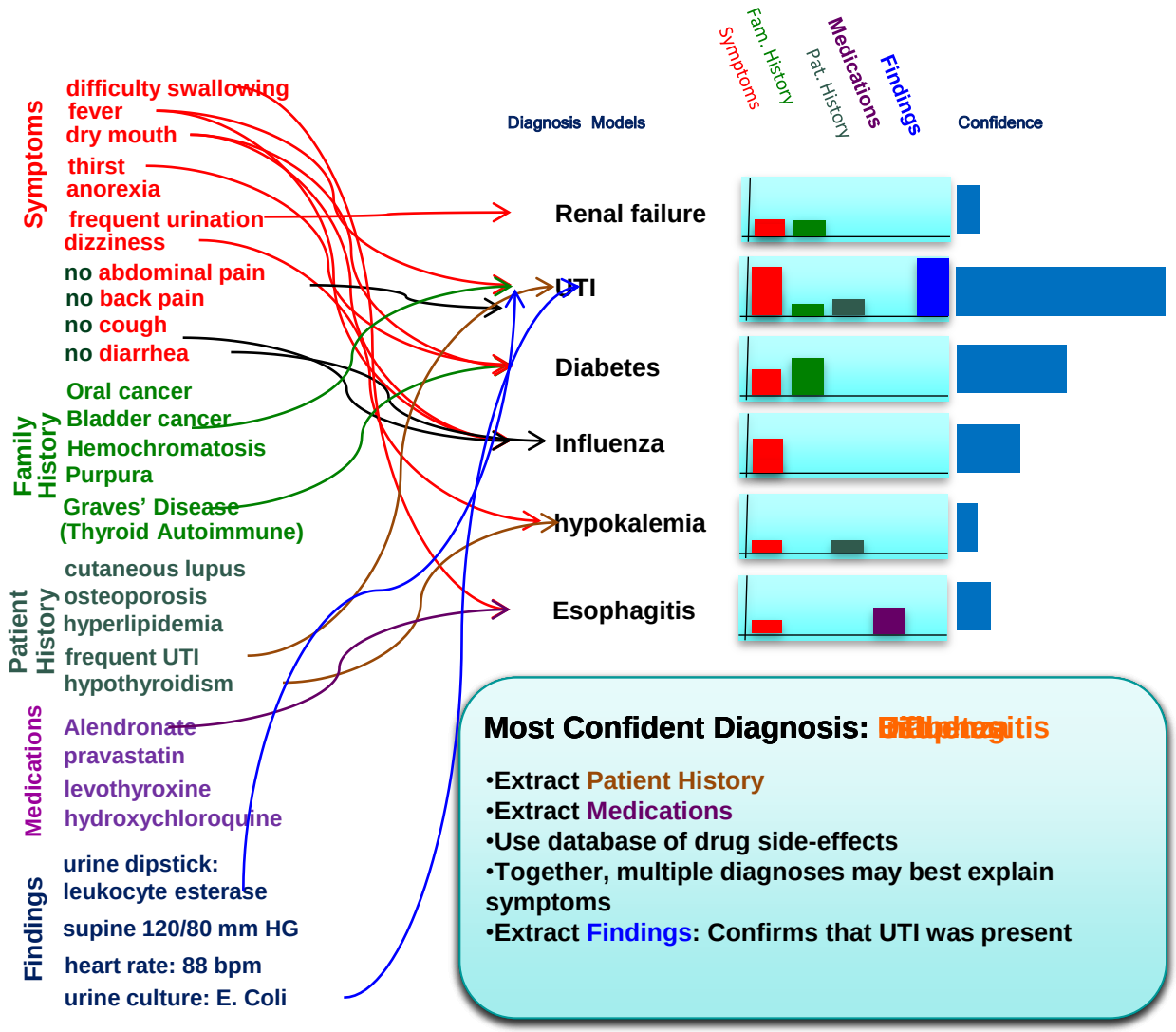


3 Adapts and Learns from user selections and responses

… built on a massively parallel probabilistic evidence-based architecture optimized on Power7

Putting the proper pieces together at point of care can be life changing

Her medications were levothyroxine, hydroxychloroquine, pravastatin, and alendronate. The patient was given a prescription for ciprofloxacin for a urinary tract infection and was advised to drink plenty of fluids. On a follow-up visit with her physician 3 days later, her fever had resolved, but she reported continued weakness and dizziness despite drinking a lot of fluids. Her supine blood pressure was 120/80 mm Hg, and her pulse was 88 beats per minute; on standing, her systolic blood pressure was 84 mm Hg, and her pulse was 92 beats per minute. A urine specimen obtained at her initial presentation had been cultured and grew more than 100,000 colonies of *Escherichia coli*, which is sensitive to ciprofloxacin.



In Summary: An Exciting Time of Change ….

- We are going through unprecedented change in the healthcare industry
- It's highlighted by the revolutionary change to the delivery of care, operational processes and the uses of health information technology along with unprecedented government leadership and significant partnerships

THANK YOU

BACK UP

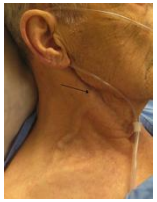
Analytics on unstructured data to reduce CHF readmission and improve care

Challenge

Reducing the occurrence of high cost Congestive Heart Failure (CHF) readmissions

Key Findings

- **Structured data was less reliable** then unstructured data
- **LVEF and Smoking are significant indicators** of CHF but not readmissions
- Unexpected Indicators Emerged … Highly Predictive Model
- 18 top indicators determined from 113 candidate predictors
- New indicators found such as **Jugular Venous Distention**
- **Assisted Living and Drug and Alcohol Abuse** emerged as key predictors (only found in unstructured data)



Smarter Business Outcomes

- Proactively target care management and reduce CHF re-admissions
- Teaming unstructured content with predictive analytics to identify patients likely for re-admission

Predictor Analysis	% Encounters Structured Data	% Encounters Unstructured Data
Ejection Fraction (LVEF)	2%	74%
Smoking Indicator	35% (65% Accurate)	81% (95% Accurate)
Living Arrangements	<1%	73% (100% Accurate)
Drug and Alcohol Abuse	16%	81%
Assisted Living	0%	13%

IBM solution

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

Cleveland Clinic Abu Dhabi (CCAD), Middle East

Region United Arab Emirates, 6 million citizens

- Newly built multi-specialty facility located on Al Sowah Island in Abu Dhabi, 360 beds (scalable to 490).
- Extension of the Cleveland Clinic, Ohio model, providing a spectrum of specialty services. A physician-led medical facility served by U.S. trained and board certified physicians.
- It will offer advanced tertiary medical services in the region; Cardiovascular, Digestive, General Medicine, General Surgery, Head/Neck, Speech, Language, Nephrology, Neurosciences, Ophthalmology, Orthopedics, Pulmonary, and Urology.

Project requirements:

- Master System Integrator to implement 25 systems, design and implement the integration across all hospital IT systems.
- Manage the hospital wide testing and training on the systems ready for hospital opening

IBM solution

- Implementation of the Lawson ERP systems & Agfa RIS/PACS, other financial, administrative and clinical systems.
- Design of the integration solution, working with the EMR team (EPIC).
- Developed a comprehensive testing and training strategy.

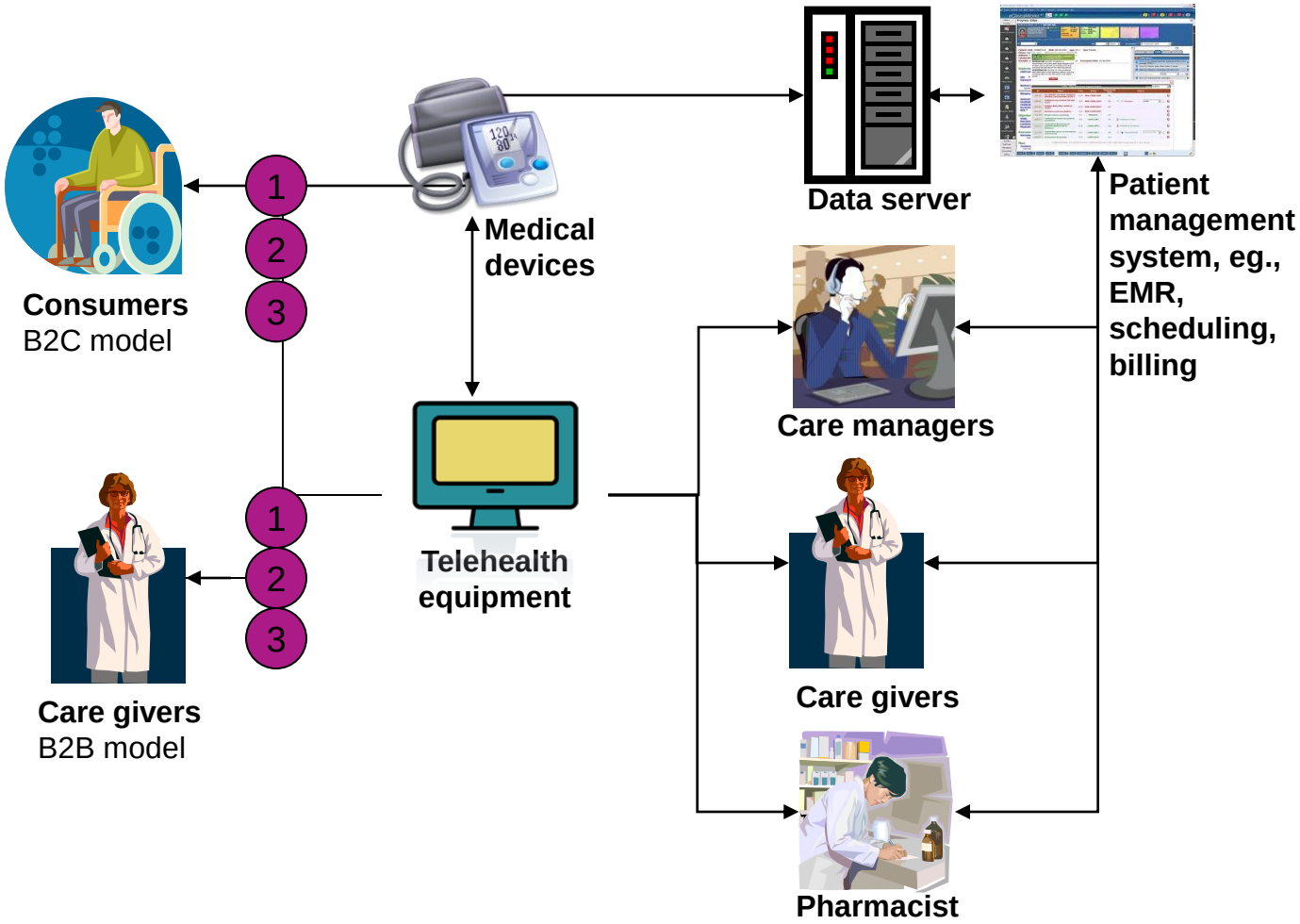
Digital Hospital example: First Hospital of Jilin University, China

- **Province Jilin Changchun City, 1.7M Outpatients / year**
  - The Jilin University Hospital is one of China's most advanced and eco-friendly medical centers and has become a model for new hospitals.
  - A 3,100-bed facility with annual discharge of 64,000 patients.

- **Project requirements:**
  - A large ICT-infrastructure implementation. The new hospital is 10 floors, 170,000 square meter multi-specialty, with a strong requirement to create a sustainable Smarter Building.

- **IBM solution**
  - Project and program management
  - Design and implementation of multiple hospital infrastructure components
  - Multiple delivery areas provided including:
    - Green data center
    - Security, access control & surveillance systems
    - Building automation systems
    - Nurse/Patient Call systems
    - Energy metering

Telehealth includes a variety of services



1 **Education/training**

- Care giver-care giver training
- Care giver - patient training

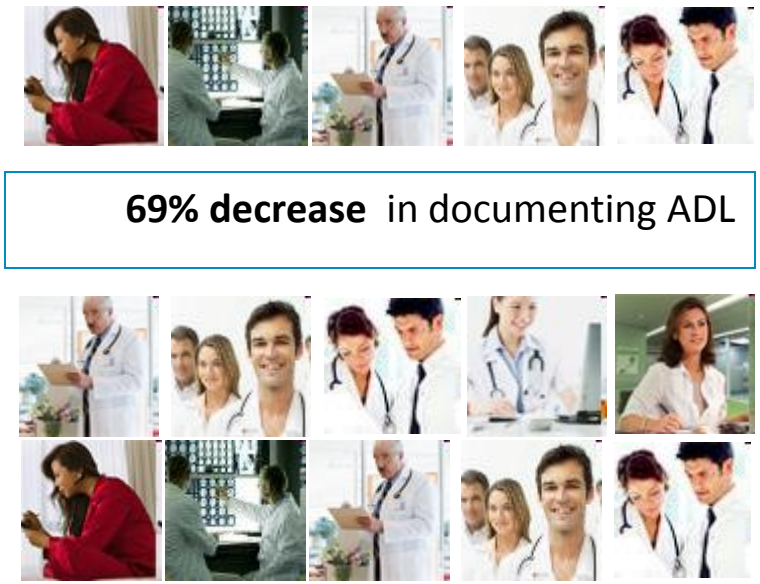
2 **Care delivery**

- Wellness/ prevention
- Diagnostic/ therapeutic
- Patient care management

3 **Orders/payment transaction**

- Patient – care giver/pharmacist orders and payment
- Care giver – pharmacists orders

Digital Hospitals: drive efficiency and quality with measurable results



69% decrease in documenting ADL

50 x reduction in radiology processing, enabling radiologists to provide results in minutes, not hours

57% decrease in documenting Tasks

82% decrease in documenting Vital Signs

Redefining value requires new competencies

Collaboration and Partnering: Creating more patient-centric, coordinated and accountable care requires all service providers share risks and data

Information Proficiency: Ability to access information across the enterprise, correlate cost and quality information and apply insight back into business processes to inform action and change behavior

Personalization of Health: Engaging and empowering the patient to be an active advocate in his/her own health management

Talent Development and Retention: Ability to acquire the talent that will enable an enterprise to move into new business models

Technology Enablement: Technology eliminates current borders of the business by overcoming barriers such as distance, knowledge or practice