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

- Increasing prevalence and cost of chronic diseases
- Growing costs for new, revolutionary technologies and treatments
- New market entrants and new approaches to health and care delivery increase complexity and competition
- Empowered consumers expect better value, quality, and outcomes
- Changing demographics and lifestyles drive associated costs
- 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.

**Examples of healthcare access issues**

- **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

**Changes in healthcare spend per capita, 2000-2004**

**Hospitalizations with at least one adverse event (%)**

- **Australia**: 51.0% Preventable 10.6%
- **Canada**: 36.7% Preventable 6.8%
- **Denmark**: 40.4% Preventable 9.0%
- **France**: 41.7% Preventable 15.4%
- **New Zealand**: 37.1% Preventable 12.9%
- **Spain**: 42.8% Preventable 9.3%
- **U.K.**: 47.9% Preventable 10.8%
- **U.S. (UT/CO)**: 3.2% Preventable not measured
- **U.S. (NY)**: 3.7% Preventable not measured

**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).

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

Coordinated and personalized care

Retrospective to Prospective to Predictive Analytics for Care Management

Collaboration and Automation

Integration / Interoperability

Information compliance, availability and security

EMRs, Images, Records, Forms Lifecycle Management

Health Integration Framework

Smarter Computing

Health and Economic Value Outcomes
Agenda

• Healthcare Industry Dynamics
• Responding to the Challenges

➢ IBM’s Smarter Healthcare Solutions
The Journey to Healthcare Transformation

Health Information Capture

Integrated Health Information

Care Team Collaboration & Patient Engagement

Actionable Clinical and Business Insights

Evidence-based Decision Support & Personalized Care

Clinical & Administrative HIT

HC Entities

Ambulatory Facilities

Data Exchange Within an Enterprise

Customizable User Interface

Clinical & Patient Specific Knowledge

Patient-Centric Experience

Evidence- Based Best Practices

Outcomes Monitoring & Reporting

Team Intelligence

Improve Care Quality & Outcomes

Curb Costs

Evidence-based Decision Support & Personalized Care

Interoperability

Coordinated Care Management

Connected Care

Personalized Care

Maturity Over Time

Digital Hospital

eHealth

Care Coordination/ Telehealth

Watson/ Analytics

IBM Internal Use Only
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 measurable 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

1. Management of Care Opportunities
   - Identification of (and interventions related to) patient-specific gaps in care

2. Care Planning
   - Development and implementation of care plans with support for the patient, family and care givers

3. Shared Care / Referrals Management
   - Coordination and communication among providers

4. Transitional Care Management
   - Coordination at the time of transition from one care setting to another

5. Therapeutic Compliance
   - Analyzing and monitoring a patient's use of pharmaceuticals and diagnostic devices

Information about each patient
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.
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
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 than 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

<table>
<thead>
<tr>
<th>Predictor Analysis</th>
<th>% Encounters Structured Data</th>
<th>% Encounters Unstructured Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ejection Fraction (LVEF)</td>
<td>2%</td>
<td>74%</td>
</tr>
<tr>
<td>Smoking Indicator</td>
<td>35% (65% Accurate)</td>
<td>81% (95% Accurate)</td>
</tr>
<tr>
<td>Living Arrangements</td>
<td>&lt;1%</td>
<td>73% (100% Accurate)</td>
</tr>
<tr>
<td>Drug and Alcohol Abuse</td>
<td>16%</td>
<td>81%</td>
</tr>
<tr>
<td>Assisted Living</td>
<td>0%</td>
<td>13%</td>
</tr>
</tbody>
</table>

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

57% decrease in documenting Tasks

69% decrease in documenting ADL

82% decrease in documenting Vital Signs

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