Transforming Health: The Need for an Innovation Ecosystem

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In developing countries, access to health care services is severely limited:
- Poor access leads to higher mortality from treatable diseases

In all countries, quality is an enduring challenge:
- Basic standards of medical care a challenge in many developing countries

Access, Quality and Affordability

In developed countries, the cost of delivering health care is unsustainable:
- Unsustainable for countries with national healthcare coverage
- Cost of care is catastrophic for families in countries without strong insurance coverage

US Delivery system and payment transformation

**Current State**
- Producer-Centered
- Volume Driven
- Fragmented Care
- FFS Payment Systems
- Unsustainable

**Future State**
- People-Centered
- Outcomes Driven
- Coordinated Care
- New Payment Systems and Policies
  - Value-based purchasing
  - ACOs, Shared Savings
  - Episode-based payments
  - Medical Homes and care mgmt
  - Data Transparency

Modified from Patrick Conway, Deputy Administrator for Innovation and Quality & CMS Chief Medical Officer
Value-Based Purchasing

- Hospital
  - Value-based purchasing, readmissions, healthcare acquired conditions, EHR Incentive Program and Inpatient Quality Reporting
- Physician/clinician
  - Physician value-based modifier, physician quality reporting system, EHR incentive program
  - End stage renal disease bundle and quality incentive program

Health systems: Care delivery reform

- Care redesign – care continuum
- Importance of information systems-connected EHR, clinical decisions, clinical work flows, finances, patient & community engagement, health intelligence & innovation
- Integration of care delivery & population health
- Shared incentives & risks (hospitals, specialists, GP, patients ..)
- Innovation as driver

Early Results

- Cost growth leveling off - actuaries and multiple studies indicated partially due to "delivery system changes"
  - But cost and quality still variable
  - Moving the needle on some national metrics, e.g.,
    - Readmissions
    - Line Infections
- Increasing value-based payment and accountable care models
- Expanding coverage with insurance marketplaces

From Patrick Conway, Deputy Administrator for Innovation and Quality & CMS Chief Medical Officer

Slide from Patrick Conway, Deputy Administrator for Innovation and Quality & CMS Chief Medical Officer
Increasing Coverage

9 million: Net number of Americans with no prior insurance who were newly insured between Sept 2013 and April 2014 (Of the 40.7 million uninsured in 2013: 14.5 million gained coverage; 5.2 million lost coverage)

8 million: Number of people covered through state and federal marketplace

Results: Medicare Per Capita Spending Growth at Historic Lows

Source: CMS Office of the Actuary

From Patrick Conway, Deputy Administrator for Innovation and Quality & CMS Chief Medical Officer

Medicare spending is expected to be $1,200 lower per beneficiary in 2014 than was projected in 2010, and $2,400 lower in 2019
Hospital Acquired Condition (HAC) Rates Show Improvement

- 2010 – 2012: Preliminary data show a 9% reduction in HACs across all measures
- Represents 15K lives saved, 520K injuries, infections, and adverse events avoided, and over $4 billion in cost savings
- Many areas of harm dropping dramatically (2010 to 2013 for these leading indicators)

<table>
<thead>
<tr>
<th>Measure</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
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</thead>
<tbody>
<tr>
<td>Ventilator-Associated Pneumonia (VAP)</td>
<td>55.3%</td>
<td>52.3%</td>
<td>12.3%</td>
<td>12.0%</td>
<td>11.2%</td>
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<tr>
<td>Early Elective Delivery (EED)</td>
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<td>Obstetric Trauma Rate (OB)</td>
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<tr>
<td>Venous thromboembolic complications (VTE)</td>
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<tr>
<td>Falls and Trauma</td>
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<tr>
<td>Pressure Ulcers</td>
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CMS Innovation Center

Launched in 2010
Established by section 1115A of the Social Security Act (as added by section 3021 of the Affordable Care Act)
Tests “innovative payment and service delivery models to reduce program expenditures ...while preserving or enhancing the quality of care”
Enhanced authority to expand innovations and end unsuccessful projects

<table>
<thead>
<tr>
<th>Medicare &amp; Medicaid Innovation Budget</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovation projects</td>
<td>88K</td>
<td>1.2K</td>
<td>1.2K</td>
<td>1.1K</td>
<td></td>
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<tr>
<td>Investment projects</td>
<td>3K</td>
<td>3K</td>
<td>3K</td>
<td>3K</td>
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<tr>
<td>Internal vs. external</td>
<td></td>
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<tr>
<td>Total innovation center obligations</td>
<td>91K</td>
<td>1.5K</td>
<td>1.5K</td>
<td>1.5K</td>
<td>1.5K</td>
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Source: HHS.gov
CMS Innovations Portfolio

- Accountable Care Organizations (ACOs)
- Primary Care Transformation
- Bundled Payment for Care Improvement
- Capacity to Spread Innovation
- Health Care Innovation Awards
- State Innovation Models Initiative
- Initiatives Focused on the Medicaid Population
- Medicare-Medicaid Enrollees

Modified from Patrick Conway, Deputy Administrator for Innovation and Quality & CMS Chief Medical Officer.

23 Pioneer and 351 Shared Savings Program ACOs as of January 2014

CMMI testing new models

ACOs, Year Two Results:

- Pioneer and Medicare Shared Savings ACO Programs program savings of $372 million
- Majority of ACOs in both programs generated savings
- Improved quality and patient experience on almost all measures:
  - Pioneer ACOs improved in 28 out of 33 quality measures with mean improvement from 70.8% to 84.0%.
  - Improved patient experience in 6 out of 7 measures
  - Medicare shared savings ACOs also improved quality and patient experience for almost all measures

Source: Patrick Conway, Deputy Administrator for Innovation and Quality & CMS Chief Medical Officer.
Massachusetts—A Leader in Pioneer ACO Model Program

Atrius Health | Beth Israel Deaconess Physician Organization | Mount Auburn Cambridge Independent Practice Association (MACIPA) | Partners Healthcare Steward Health Care System

- Two showed significantly lower spending growth compared to their geographically separate market (Worcester, MA) but not their local markets:
  - $27.66 per beneficiary per month lower and $38.51 per beneficiary per month lower.

- Another reduced spending growth relative to its local market and geographically distinct market (Worcester, MA)
  - $74.50 per beneficiary per month lower.

US model of risk bearing payment initiatives

<table>
<thead>
<tr>
<th>Old World</th>
<th>Newer World</th>
<th>Future World</th>
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<tbody>
<tr>
<td>Fee for Service</td>
<td>VBRYFFS</td>
<td>Bundled Payments</td>
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Provider focused on reducing readmissions
Provider focused on reducing total costs of specialty episodes
Provider focused on improving chronic care management
Provider focused on lowering per patient costs and driving care out of acute settings

High cost

Health expenditure, total (% of GDP)

17.9% of GDP in 2013

Source: World Bank
Health Disparities

- Black adults: at least 50% more likely to die of heart disease or stroke prematurely than white counterparts
- Infant mortality rate for blacks: more than double the rate for non-Hispanic whites.

Source: CDC Health Disparities and Inequalities Report - US 2013

Innovation is key to transforming healthcare & health

- Status quo or incremental changes will not be adequate to meet growing challenges, locally or globally
- Transformative innovation is needed to drive fundamental changes
  - Prevention & wellness
  - New models of care
  - Disruptive technologies
  - Modernize education and workforce development
- Systems that embrace and support innovation will be best positioned to achieve population health

The health innovation spectrum

Examples
- "Walk Again" 
- Hand transplant
- Patient facing "apps"
- Clinician facing "apps"
- Devices
- Care Redesign 
- Systems Engineering

Examples
- New Programs and Procedures (Clinical Innovation - First)
- New Devices, Diagnostics, and Technology Platforms (Product Innovation)
- New Delivery Models (Process Innovation)
- New Models of Business (Business Model Innovation)
- New Approaches to Supporting Transformation (Organizational Innovation)
Models of Care innovation

- Task shifting- PA, Nursing practice eg Kaiser, UK NHS
- Management of complex chronically ill patients- MGH Tim Ferris
- Patient Centered Medical Homes- care management- Duke, Mass PCMH
- Business model- Iora Health
- CVS minute Clinics
- Patients Like Me
- CMMI Awards- VALUEOPTIONS,VINFEN CORP

Connecting our ecosystem through technology

Technology Innovations

- EHR to drive a learning healthcare system
  - Must aggregate the information rich environment which includes clinical, administrative, claims, and research data; leverage this data, and use it to inform clinical decision making.
- Telemedicine
- Remote monitoring of high risk patients
- mHealth
- Sensing technologies
- Digital technologies
  - Google Contacts
- Geospatial Mapping
Building a Learning Health System

Connecting with the innovation ecosystem

Accelerators and start-ups
Industry
Local community
Innovation Centers

Test / evaluate ideas
Co-develop new ideas
Commercialize Duke ideas

Duke
Perceived strengths & assets
• Breadth and depth of clinical expertise
• Creative and research-minded to imagine new ideas and use cases
• Practical knowledge of workflow
• A living laboratory to test
• A neutral facilitator
• Data (Duke and national data marts)
• Global, multi-site clinical research networks (DCRI)

Geographic Information System (GIS)

• A set of tools for managing, visualizing, exploring, querying, editing, and analysing information linked to geographic locations.

• Displays data as maps, tables, and charts so that health systems and communities are enabled to jointly view data.

• The use of GIS Mapping supports work to monitor population health, develop new care models, improve priority setting and decision making, and tailor public health interventions.
Durham County, North Carolina

Geographic data of patients with Diabetes linked to clinics, pharmacies, and potential community resources (barber shops, beauty salons, grocery stores)

Health systems:
Data needed for population health

- Need for an operational health information exchange throughout the community of providers.
- This exchange would include clinical data that is collected from medical records and claims-based data, as well as clinical data collected from other sources:
  - mobile technologies
  - genomic technologies
  - patient-reported outcomes
  - geospatial (GIS) mapping
- All of these together will provide all providers with large amounts of clinical data, behavioral and psychosocial data that can be used to stratify patients, identify care gaps, measure outcomes, and properly engage with our patients.

Innovation will come from everywhere
A few of our innovators

• At NH, clinical processes such as task shifting are designed to maximize efficiency and quality. Lean operating models decrease costs, allowing for rapid growth while serving all income segments.

• NH has 6,000 beds in 18 hospitals, across 13 locations in India. Now expanding into Grand Cayman and Malaysia.

• Vaatsalya’s network of 17 low-cost rural hospitals serve 400,000 out-patients that addresses between 60% and 70% of the local population’s healthcare needs.

• The model cuts costs and increases patient volume by specializing in the most demanded services and standardizing replication procedures. By this, they offer services at one-fifth the price of comparable services at government hospitals.

• LV Prasad has driven operational efficiency through lean processes and standardization of care delivery.

• Developed a hub-and-spoke system using primary care vision centers and community health care workers to screen the community and referring more complicated cases up to comprehensive eye care centers.

• Life Spring offers low-cost maternal and child services in peri-urban India focused on “quality at a low and transparent price.”

• Success is due to high throughput, high asset utilization, “no frills” set-up and service specialization. Does deliveries at ¼ the standard fees of comparable clinics.
SEAD supports global health innovations through collaborations across Duke and beyond

Categories of Innovation

<table>
<thead>
<tr>
<th>Business Model Innovation</th>
<th>Process Innovation</th>
<th>Technology Innovation</th>
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<tbody>
<tr>
<td>Deployment of fundamentally new models of care that are fit for the evolving dynamics in healthcare.</td>
<td>Creating efficiencies in delivery of healthcare by reallocating specific tasks or workflows to ensure that all inputs are being leveraged to maximize throughput.</td>
<td>Technologies that are used disruptively ranging from frugal innovations in limited resource settings to digital technologies in this &quot;big data&quot; revolution.</td>
</tr>
<tr>
<td>OneFamilyHealth</td>
<td>NH Health, Aravind, LV Prasad</td>
<td>ClickMedix, Medicall Home</td>
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Lessons from IPIHD

- Get close to the patient and follow their established behavior patterns
  - Lower distribution costs
  - Improve adherence to clinical protocols
- Reinvent the delivery model by using proven technologies disruptively
  - Extend access to remote areas
  - Increase standardization
  - Drive labor productivity
- Confront professional assumptions and "right-skills" the workforce
  - Reduce labor costs
  - Overcome labor constraints
- Standardize operating procedures wherever possible
  - Eliminate waste
  - Improve labor and asset utilization
  - Raise quality
- Borrow someone else's assets
  - Utilize existing networks of people or fixed infrastructure
  - Reduce capital investment and operating costs
- Open new revenue streams across sectors
  - Share costs
  - Capture additional revenues
  - Enable cross-subsidization

SOURCE: McKinsey analysis
Import Innovation

- Learn from external/global innovations and apply lessons learned back into the local/national context ("reverse innovation")
- Embrace solutions “not invented here” – source innovations globally and integrate them into our care delivery system

How can we drive change from within?
Enable everyone to be an innovator.

To achieve this, healthcare organizations require:

1) A mechanism to build and nurture an innovation culture & ecosystem, and

2) A mechanism to support the innovative process

Health Systems as Living Laboratories

- Bring together faculty, staff, students, and trainees across the institution to develop and implement new solutions to address pressing health problems
  - Health systems engineering
  - Organizational and business model innovation
  - Novel technology development/implementation
  - New workforce development models
  - Population health

- Identify and address challenges to development of “learning health system”
  - Governance, organizational structure, funds flow model, bandwidth, space, core capabilities, culture

- Address local pressing needs while also developing generalizable knowledge for broader dissemination

Rise of health innovation centers: Emerging landscape

DIHI domains of innovation
Plugging in to the Process Innovation Framework

How can DUHS best articulate and communicate high-priority problems requiring innovation?

How can DUHS best build on existing efforts and capabilities for developing creative solutions?

Examples:
- Market scanning
- Workshops/Studios
- Targeted RFAs
- A platform to support multi-disciplinary collaboration (industry, universities, hospitals, entrepreneurs, investors, etc)

Developing a docking station for DUHS Innovation

- Office Hours
- Workshops
- Foster grassroots innovative ideas and establish a RFA innovation competition to collect and review ideas on a quarterly basis
- Innovation Fund to help scale successful pilots and support mid-size ideas
- Institution Priority to support larger initiatives including clinical firsts

Focus on democratizing innovation

Articulate the need
Formalize support
Make information accessible
Ask and listen to everyone
Facilitate cooperation, build trust
Teach innovation
Provide testing space
Support commercialization
Take bets on unproven people and ideas
Formalize support for innovation

- Protect time
- Hire innovation officers
- Dedicate space and money

Make information accessible

Once information is in the people’s hands, change will arise from the ground up.

Example: Code for America

Teach innovation

- Workshops
- Bootcamps
- Design-thinking training
- Forums for sharing ideas
Teach innovation

Reforming Education: Need for Innovation

HVCC Curriculum
Medical Informatics
Management & Leadership
GME Report
Interprofessional Education Report

Provide Testing Space

Try often, fail often, learn more, succeed more

Support commercialization

Cleveland Clinic spin-offs acquired by St. Jude Medical

9 Cleveland Clinic spin-offs have been monetized
Take bets on unproven people and ideas

CMMI: The Future

- Moving to a value-based system
- Increasing alternative payment models such as ACOs, bundles, and advanced primary care medical homes
- Need to invest in the tools and capacity for change
- Information to drive change, including transparency of quality and cost
- Clinicians need to engage in transformation and improve health outcomes for patients and efficiency of the system
- IOM is a trusted source to help guide health system transformation

IOM Roundtable on Value & Science-Driven Health Care

Mission

We seek the development of a continuously learning health system, designed to:

- deliver the best evidence at the point of care for collaborative choices of each patient and provider;
- drive the process of real-time discovery as a natural outgrowth of patient care; and
- ensure innovation, quality, safety, and value in health care

ROUNDTABLE CHARTER
Roundtable Innovation Collaboratives

Action affinity groups

- Best Practices (health professions societies)
- Clinical Effectiveness Research (clinical research community)
- Digital Learning (IT developer and user community)
- Evidence Communication (marketing expertise community)
- Systems Engineering (medical, engineering, and CI community)
- Value Incentives (payers and finance policy community)

Domain priorities

Science: real-time, continuous evidence development
Value: incentives and transparency on outcomes and costs
Culture: people and teamwork: one patient, one team

Project approaches

(2014 in progress)

Tools: e.g. shared decision making validation tools; future of clinical research strategy paper; ACO benchmark paper
Policy: e.g. NGA state retreats; LHS strategy framework group; Academic Health System strategy and policy challenges
Leadership: e.g. Executive network on bridging research and practice; Patient & family council leadership network;
Roundtable Members

MARK B. MCCLELLAN (Chair)
RAYMOND J. BAXTER
PAUL BIXEHER
DAVID BLUMENTHAL
BRUCE G. BODAIKEN
PAUL CHEW
HELEN DARLING
SUSAN DEVORE
JOSEPH R. FAULER
RICHARD G. FIFER
PATRICIA A. GABOW
ATUL GAWANDE
GARY L. GOTTLEIB
JAMES A. GUEST
JAMES HEYWOOD
RALPH H. HURWITZ
PAUL HUDSON
BRENT C. JAMES
CRAIG A. JONES
GARY KAPLAN
DARRUS G. KIRCH
RICHARD E. KLEIN
RICHARD C. LARSON
PETER LONG
JAMES L. MADARA
MARY D. NAYLOR
WILLIAM D. NOVELLI
SAM R. NUSBAUM
JONATHAN B. PERLIN
RICHARD PLATT
RICHARD ROSENBAUM
JOHN W. ROWE
LEONARD D. SCHAEFFER
JOE V. SELBY
MARK D. SMITH
GLENN D. STEEL
JENNIFER TALBERT
REED V. TUCKSON
RICHARD J. UMBDENSTOCK
DEBRA B. WHITMAN

Articulate the need

14 Grand Challenges
19 Universities with GC Scholars program | 20 K-12 Partners integrating GC into their curricula

- Make solar energy economical
- Provide energy from fusion
- Develop carbon sequestration methods
- Manage the nitrogen cycle
- Provide access to clean water
- Restore and improve urban infrastructure
- Advance health information
- Engineer better medicines
- Reverse-engineer the brain
- Prevent nuclear terrorism
- Secure cyberspace
- Enhance virtual reality
- Advance personalized learning
- Engineer the tools of scientific discovery