# Transforming Health: The Need for an Innovation Ecosystem

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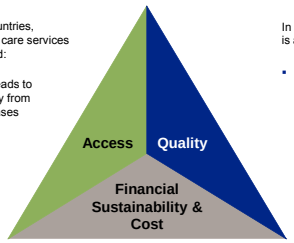
INSTITUTE OF MEDICINE OF THE NATIONAL ACADEMIES Advising the nation • Improving health

## Access, Quality and Affordability

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

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

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## US Delivery system and payment transformation

| *Current State* | *Future State* |
|---|---|
| **Producer-Centered** | **People-Centered** |
| **Volume Driven** | **Outcomes Driven** |
| **Fragmented Care** | **Coordinated Care** |
| **FFS Payment Systems** | **New Payment Systems and Policies** |
| **Unsustainable** | ▪ Value-based purchasing<br>▪ ACOs, Shared Savings<br>▪ Episode-based payments<br>▪ Medical Homes and care mgmt<br>▪ 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

*Slide from Patrick Conway, Deputy Administrator for Innovation and Quality & CMS Chief Medical Officer* 4

## 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*
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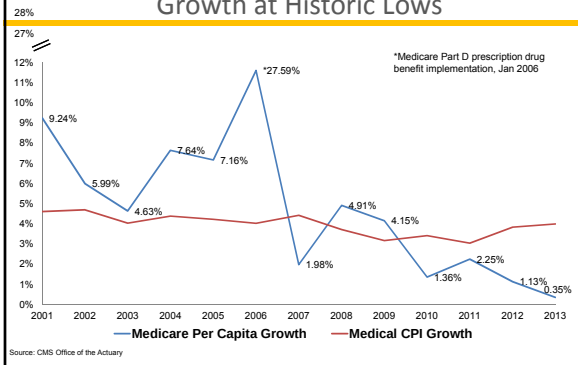
## Increasing Coverage

**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**

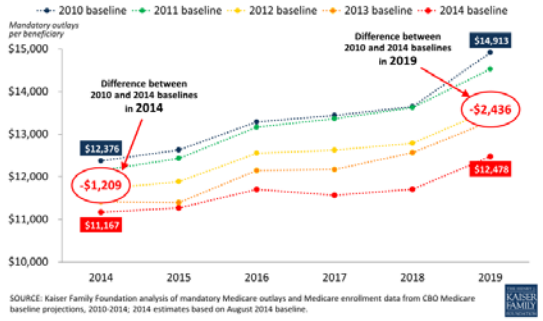
## Results: Medicare Per Capita Spending Growth at Historic Lows




Source: CMS Office of the Actuary

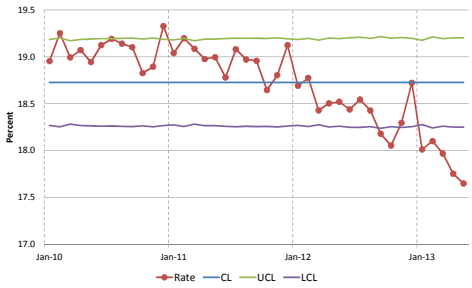
*From Patrick Conway, Deputy Administrator for Innovation and Quality & CMS Chief Medical Officer*

**Medicare spending is expected to be $1,200 lower per beneficiary in 2014 than was projected in 2010, and $2,400 lower in 2019**




SOURCE: Kaiser Family Foundation analysis of mandatory Medicare outlays and Medicare enrollment data from CBO Medicare baseline projections, 2010-2014; 2014 estimates based on August 2014 baseline.

## Medicare All Cause, 30 Day Hospital Readmission Rate




Source: Office of Information Products and Data Analytics, CMS

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

## 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)

| Ventilator-Associated Pneumonia (VAP) | Early Elective Delivery (EED) | Obstetric Trauma Rate (OB) | Venous thromboembolic complications (VTE) | Falls and Trauma | Pressure Ulcers |
|---|---|---|---|---|---|
| 55.3% ↓ | 52.3% ↓ | 12.3% ↓ | 12.0% ↓ | 11.2% ↓ | 11.2% ↓ |

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

## 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

CMS Center for Medicare & Medicaid Innovation Budget Overview

(Dollars in millions)

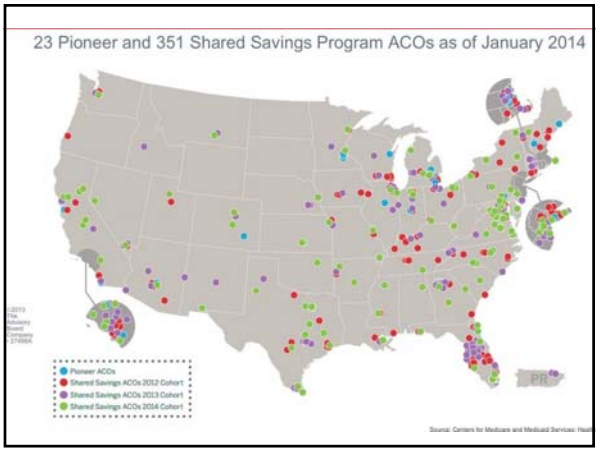
| Obligations and Outlays | 2013 | 2014 | 2015 | 2015 +/- 2014 |
|---|---|---|---|---|
| Innovation Activities | 856 | 1,424 | 1,306 | -118 |
| Innovation Supports | 38 | 105 | 105 | — |
| Administrative Expenses | 39 | 109 | 111 | +3 |
| Total, Innovation Center Obligations | 953 | 1,637 | 1,522 | -115 |
| Total, Outlays | 856 | 1,054 | 1,444 | +390 |

*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* 13 **13**




## 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%[1]
  - Improved patient experience in 6 out of 7 measures
  - Medicare shared savings ACOs also improved quality and patient experience for almost all measures

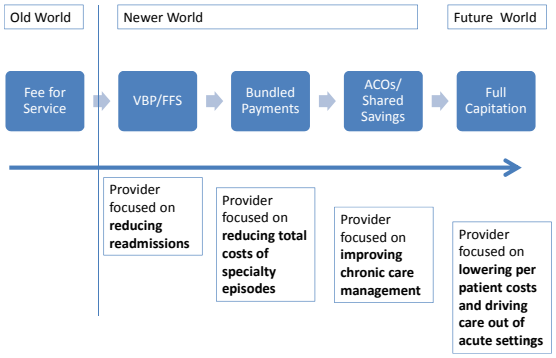
*Source: Patrick Conway, Deputy Administrator for Innovation and Quality & CMS Chief Medical Officer*

## 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

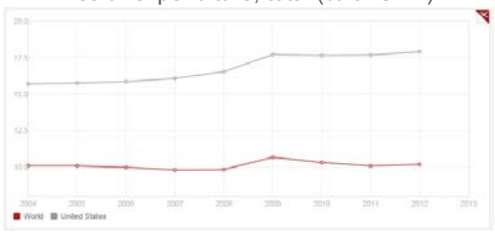
- Two showed significantly lower spending growth compared to their geographically separate market (Worcester, MA) but not their local markets:
  - $27.66 per beneficiary per month lower and $38.51 per beneficiary per month lower.
- Another reduced spending growth relative to its local market and geographically distinct market (Worcester, MA)
  - $74.50 per beneficiary per month lower.

## US model of risk bearing payment initiatives




## 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

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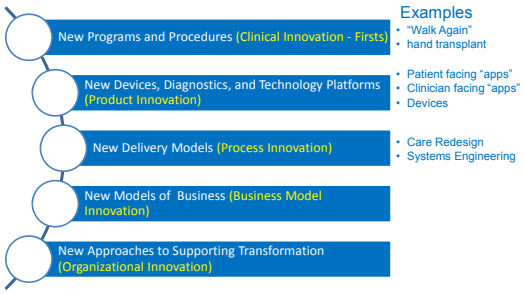
## The health innovation spectrum

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## 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

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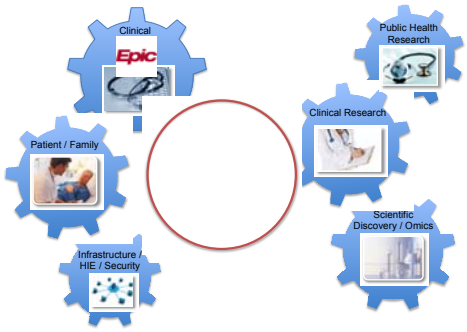
## Technology Innovations

- *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

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## Connecting with the innovation ecosystem

Accelerators and start-ups


Industry

Google, GE, Epic

Innovation Centers

Kaiser Permanente, UCLA

Local community

Durham and Raleigh have an increasingly entrepreneurial IT community

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)

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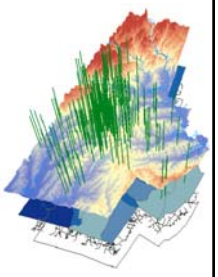
## Geographic Information System (GIS)

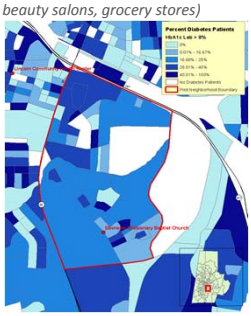
- A set of tools for managing, visualizing, exploring, querying, editing, and analysing information linked to geographic locations.
- Displays data as maps, tables, and charts so that health systems and communities are enabled to jointly view data.
- The use of GIS Mapping supports work to monitor population health, develop new care models, improve priority setting and decision making, and tailor public health interventions.

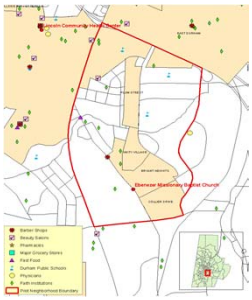


Used with permission of Dr. Robert Califf

## 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

## IPIHD's global network of innovators



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## A few of our innovators

**NH Narayana Health** — Health for all. All for health.

- 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**

- **Vaatsalya**'s network of 17 low-cost rural hospitals serve approximately 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.

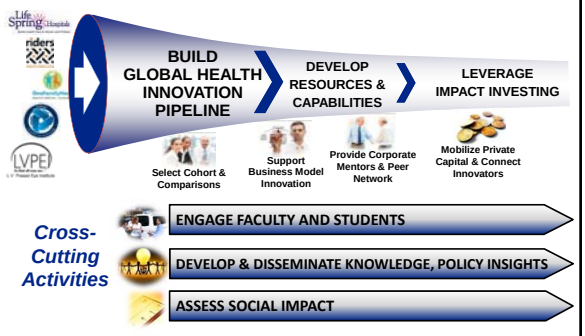
**LVPEI** — L V Prasad Eye Institute

- **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 workers to screen the community and referring more complicated cases up to comprehensive care centers.

**Life Spring Hospitals** — Quality Health Care for Women and Children

- **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

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## Categories of Innovation

| Business Model Innovation | Process Innovation | Technology Innovation |
|---|---|---|
| Deployment of fundamentally new models of care that are fit for the evolving dynamics in healthcare. | Creating efficiencies in delivery of healthcare by reallocating specific tasks or workflows to ensure that all inputs are being leveraged to maximize throughput. | Technologies that are used disruptively (ranging from frugal innovations in limited resource settings to digital technologies in this "big data" revolution). |
| OneFamilyHealth | NH Health, Aravind, LV Prasad | ClickMedix, Medicall Home |

## 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-skill' 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

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## 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

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## 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**

**Innovation management**


Source: A.T. Kearney, Innovation Management: Strategies for Success and Leadership 2008

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## 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

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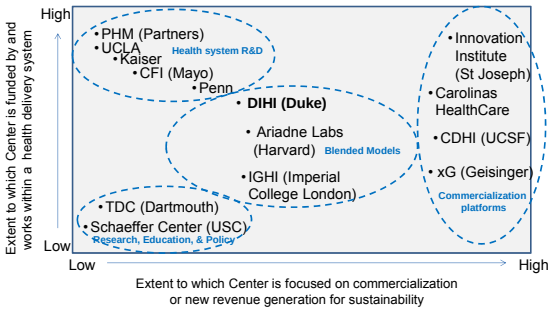
## Rise of health innovation centers : Emerging landscape

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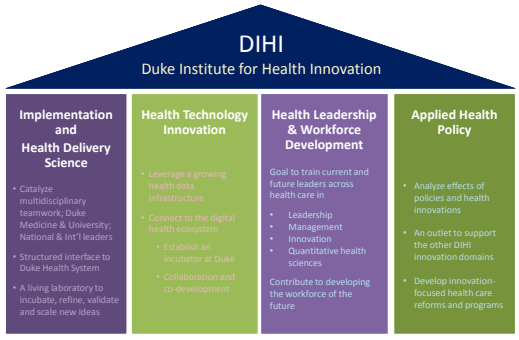
## DIHI domains of innovation

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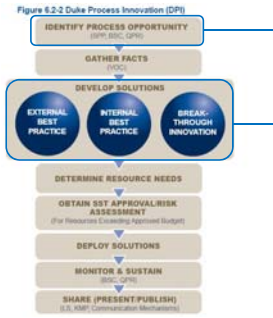
## Plugging in to the Process Innovation Framework




**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)**

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## 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

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## 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

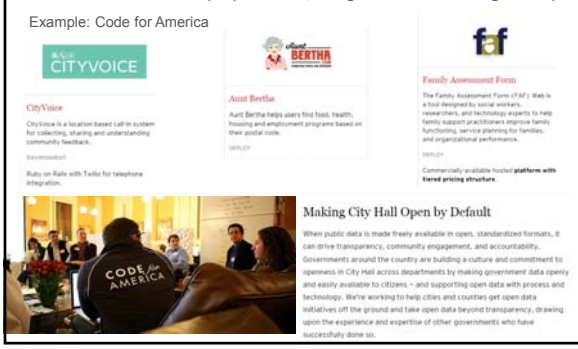
## Formalize support for innovation

Protect time | Hire innovation officers | Dedicate space and money

## Make information accessible

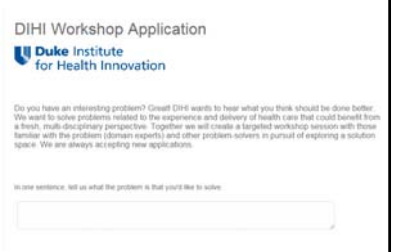
Once information is in the people's hands, change will arise from the ground up.

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-Off Acquired by St. Jude Medical

Lead the Way, September 2014

Cleveland Clinic spin-off company CardioMEMs, Inc. closed its previously announced acquisition by St. Jude Medical on May 30, 2014, two days after receiving FDA approval for its CardioMEMS™ HF System. The $375 million acquisition consideration was for the 81% of the company that St. Jude did not already own, subsequent to a $60 million investment in 2010. The technology, which utilizes a MEMS-based, wireless monitoring sensor, is the first of its kind to measure heart pressure to support pharmacological management of patients suffering from Congestive Heart Failure (CHF).

cardiomems

The technology was developed at Cleveland Clinic over ten years ago by Jay Yadav, MD and Mark Allen, PhD, a professor at Georgia Tech University. While always targeting applications for CHF, the technology was first used to sense "leaks" when an endovascular graft was implanted during surgery for patients with an abdominal aortic aneurism (AAA). Once proof of concept was established with AAA application, CardioMEMS advanced to its primary objective - to give physicians a tool to

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

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

## 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 BLEICHER
DAVID BLUMENTHAL
BRUCE G. BODAKEN
PAUL CHEW
HELEN DARLING
SUSAN DEVORE
JUDITH FAULKNER
JOSEPH F. FIFER
PATRICIA A. GABOW
ATUL GAWANDE
GARY L. GOTTLIEB
JAMES A. GUEST
JAMES HEYWOOD
RALPH I. HORWITZ
PAUL HUDSON
BRENT C. JAMES
CRAIG A. JONES
GARY KAPLAN
DARRELL G. KIRCH
RICHARD E. KUNTZ
RICHARD C. LARSON
PETER LONG
JAMES L. MADARA
MARY D. NAYLOR
WILLIAM D. NOVELLI
SAM R. NUSSBAUM
JONATHAN B. PERLIN
RICHARD PLATT
RICHAEL ROSENBLATT
JOHN W. ROWE
LEONARD D. SCHAEFFER
JOE V. SELBY
MARK D. SMITH
GLENN D. STEELE
JENNIFER TAUBERT
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 informatics
Engineer better medicines
Reverse-engineer the brain
Prevent nuclear terror
Secure cyberspace
Enhance virtual reality
Advance personalized learning
Engineer the tools of scientific discovery