Opening Session

Retsef Levi

J. Spencer Standish (1945) Professor of Management; Professor of Operations Management; Co-Director of the Leaders for Global Operations Program, MIT Sloan School of Management
MIT SLOAN INITIATIVE FOR HEALTH SYSTEMS INNOVATION (HSI)

RETSEF LEVI
J. SPENCER STANDISH (1945) PROFESSOR OF OPERATIONS MANAGEMENT

INNOVATING HEALTH SYSTEMS – DIGITAL HEALTH TRANSFORMATIONS

Cambridge, MA, November 2017
Example: Heart Failure (HF) Patients

“Clinical syndrome that can result from any structural or functional cardiac disorder that impairs the ability of the ventricle to fill with or eject blood.”

- **HF is an epidemic** (900,000 new patients per year in the US and more than 2.5% of the US population by 2030)!

- **HF patients consume A LOT of resources** (1 million annual hospitalizations and projected annual cost by 2030 is $70 billion which is $244/person in the US)
Policy makers and payers focus on 30-day readmission reduction (national rate is 25%) by imposing penalties on hospitals:

- **Response**: Hospital-based programs (e.g., transition clinics) with (some) visible success (temporarily?)

**MIT Sloan research (with a team at a large Boston hospital):**

- 30-day readmissions account for about 10% of total Heart Failure hospitalization days
- Over 50-72% of HF patients admitted to the hospital did not have an outpatient appointment during the prior two weeks

**Poor outpatient access and lack of systematic health management**
Futuristic System to Manage Heart Failure (and Other Chronic Conditions)

**Prevention:**
Who is at risk? How to reduce risk?

**Identification & Initiation:**
What patients need treatment and how it can be **personalized**?
Who should provide the care (MDs, nurses, coaches, patients….)

**Systems and process design**

**Decision support tools and risk models**

**Monitoring & Escalation:**
Is the patient on the right/planned path?
How to intervene in case patient is not on path?
Current Hospital-Based Systems

Prevention:
Who is at risk? How to reduce risk?

System and process design

Identification & Initiation:
Generic care protocols provided mostly by MDs

Decision support tools and risk models

Monitoring & Escalation:
Is the patient on the right/planned path?
How to intervene in case patient is not on path?
**Pay for Performance (P4P)**

**Rationale:**
Pay for value (quality & efficiency) rather than volume

**Expectation:** Change payment schemes and systems change and performance will follow

*Dominant paradigm driving policies, but with only partial success*

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**Design for Performance (D4P)**

**Rationale:**
System change is hard and financial incentives are important but not sufficient

**Expectation:** Redesign the system to perform for value and then pay for it

*Flipping the mindset to primarily focus on quality measurement, cost-effectiveness evaluation and system design innovation*
Health System Innovation (HSI) Initiative

Integrate Disciplines!

Transform Health Systems!

Industry-based research!

Cost-effectiveness evaluation models & incentives

Personalized medicine and health management & system optimization

Data & Analytics

Organization design & Operations

Finance & Economics

Technology, Science & Innovation

System care design & coordination

Redefining care team roles & processes

Integrating digital technology into new health management workflows

Integrate Disciplines!
EXAMPLES OF CURRENT IMPACT
1. Social Determinants of Health: Healthy Food (Doyle, Levi & Perakis)
2. Evaluating Effectiveness of Social Interventions: Healthcare Hotspotting (Doyle)
3. Personalized Medicine: Diabetes Treatment (Bertsimas)
4. Personalized Medicine: Early Diagnosis of Cancer (Farias)
5. Analytics & Operations Research: Optimizing Patient Flow (Levi)
6. Operations of Kidney Allocation (Bertsimas, Farias, Trichakis)
7. Drug Discovery Innovation Financing (Lo)
8. Telemedicine-based Models for Hypertension Management (Doyle & Levi)
9. Reforming Primary Care Practices (Kellogg, Levi)
10. Reforming Behavioral Health in the US Military (Carroll, Kochan & Quaadgras)
11. Workforce Management: Long-term Care (Osterman)
PERSONALIZED MEDICINE:

EARLY DIAGNOSIS OF CANCER

Professor Vivek Farias
Joint work with Andrew Li (MIT) & Center for Nano-Medicine, Harvard Medical School
New Proteomic Liquid Biopsy Diagnosis Technique

Diverse Reagents that multiplex proteins in the patient blood

Patient Level Observation
How to De-Noise Sparse Data?

Only 10% of proteins are found in a single patient!
## Remarkable Predictive Power

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COLLABORATION WITH COMMUNITY CARE COOPERATIVE (C3)

Professor Joseph Doyle, Economics
Professor Retsef Levi, Operations Management
Dr. Anne Quaadgras, HSI Director
C3 is an innovative community-based Accountable Care Organization (ACO):

- 15 community health clinics, 120K+ underserved patients with high needs and cost (http://c3aco.org/)
- Participating in the Massachusetts Medicaid Accountable Care Organization program
- Behavioral health and long term support services are key to effective care

Research collaboration goal:

- Leveraging analytics and design for performance to co-develop new systems & decision support tools to develop and enable a sustainable community-based ACO

Potential impact:

- National scalability of a new community-based ACO model
Challenges to Transform into the Future

- **Personalization = Medicine & Science meet Big Data**
  How to leverage analytics at scale via practical risk models?

  **Panel:** Machine Learning in Surgery and Cancer (Dimitris Bertsimas, MIT Sloan)

  **Keynote:** Dusty Majumdar, IBM Watson Health

- **Monitoring & Escalation = Home & Outpatient Team-Based Engagement**
  How to use technology and redesign the workforce & processes

  **Panel:** Digital Innovations & Long Term Care Workforce (Paul Osterman, MIT Sloan)

  **Panel:** Emerging Digital Health Innovations (Eran Broshey, Tailwind Capital)
Challenges to Transform into the Future

- **Prevention** = Manage socioeconomic and behavioral determinants
  
  *What are cost-effective interventions that affect patient behavior?*

- **Remove Barriers** = Incentivize New System Designs via Policies & Practices
  
  *What should be measured? Models to evaluate cost-effectiveness? Internal incentives?*

**Panel:** State Models and the Potential for Digital Innovations to Transform Population Health (Retsef Levi, MIT Sloan)

**Keynote:** Don Mordecai, Mental Health and Wellness, Kaiser Permanente