Welcome:
Health Systems – The Next Generation

Pinar Keskinocak, PhD
Health Systems: The Next Generation

Tweet about Today’s event!
#GT_HealthSystems, #HSNG17 or #TechHSNG
## Organizers

<table>
<thead>
<tr>
<th>Turgay Ayer</th>
<th>Mark Braunstein</th>
<th>Jon Duke</th>
<th>Sherry Farrugia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Director of the Medical Decision-Making, Center for Health and Humanitarian Systems</td>
<td>Professor of Practice, College of Computing</td>
<td>Director, Health Analytics and Informatics, College of Computing</td>
<td>Managing Director, Health Research Partnerships, Institute for People and Technology</td>
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<thead>
<tr>
<th>Pinar Keskinocak</th>
<th>Julie Swann</th>
<th>Margaret Wagner-Dahl</th>
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<tbody>
<tr>
<td>Director, Center for Health and Humanitarian Systems</td>
<td>Affiliate, Center for Health and Humanitarian Systems</td>
<td>Associate Vice President for Health IT, Enterprise Innovation Institute</td>
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Special Thanks to...

- Georgia Tech Staff
  - Joscelyn Cooper
  - Andy Halebian

- Panelists and Moderators
- Other Volunteers
- Participants
World’s Most Challenging Problems

- Food
- Water
- Shelter
- Education
- Health
- Energy
- Environment
- ...

http://www.un.org/millenniumgoals/
US Leads in Per Capita Health Spending


Average spending on health per capita ($US PPP)

Total expenditures on health as percent of GDP

Note: PPP = purchasing power parity—an estimate of the exchange rate required to equalize the purchasing power of different currencies, given the prices of goods and services in the countries concerned.
Source: OECD Health Data 2010 (Oct. 2010).

Source: Squires. Commonwealth Fund. 2011
U.S. HEALTH CARE RANKS LAST AMONG WEALTHY COUNTRIES

A recent international study compared 11 nations on health care quality, access, efficiency, and equity, as well as indicators of healthy lives such as infant mortality.

Overall Health Care Ranking

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<th>Country</th>
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<td>Switzerland</td>
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<td>Sweden</td>
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<td>The Netherlands</td>
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Aging Population and Care Needs

Elderly Adults As a Share of the U.S. Population, 2000 to 2050

Source: Congressional Budget Office tabulations based on population projections reported in The 2012 Long-Term Budget Outlook (June 2012), www.cbo.gov/publication/43288.

Note: Members of the baby-boom generation (people born between 1946 and 1964) started turning 65 in 2011 and will turn 85 beginning in 2031.

Representative timeline of a patient’s experiences in the U.S. health care system

Source: http://www.nationalacademies.org/hmd/~/media/Files/Activity%20Files/Quality/LearningHealthCare/Release%20Slides.pdf
Disparities in Access to Care

Figure 6

Disparities in Access to Care for Selected Groups

Percent of access measures for which groups experienced worse, same, or better access to care:

- Poor vs. High Income: 89% worse, 11% better
- Hispanic vs. White: 63% worse, 16% better
- AI/AN vs. White: 62% worse, 38% better
- Black vs. White: 32% worse, 64% better
- Asian vs. White: 17% worse, 44% better
- 65+ vs. 18-44: 9% worse, 73% better

NOTES: AI/AN = American Indian or Alaska Native.

Disparities based on income

The Richest American Men Live 15 Years Longer than the Poorest 1 Percent

The challenges underlying the disparities in the use of clinical preventive services are complex and reach beyond the traditional health care arena of patient-provider interactions. Combining forces of the public health infrastructure, aging services network, community-based organizations, and linking to health systems affords a real opportunity to make a difference.

CDC Report: Enhancing the Use of Clinical Preventive Services Among Older Adults (CPS): Closing the Gap
How to transform health systems from reactive to proactive to better meet the human needs

Facilitate dialogue across organizations & sectors to:
  – Articulate challenges and successes
  – Identify opportunities for new practices, research, or technology solutions
  – Improve the education for tomorrow’s leaders in health systems
Better Health Care and Lower Costs through **Systems Engineering**

“Systems engineering has been widely used in other industries, such as manufacturing and aviation, to improve efficiency, reliability, productivity, quality, and safety of systems. It has begun to be used to good effect in health care … United States would benefit from more widespread adoption.”

“The benefits of systems engineering can be realized at the community level … engaging public and private community entities in improving the delivery of care and/or promoting health can enhance the quality of care and the health of communities.”

“… the need for the United States to build a health-care workforce that has the necessary “know-how,” … systems engineering concepts should be embedded in education and training for a wide variety of people involved in health care, from clinicians to administrators to public-health officials.”

Source: White House PCAST Report
https://www.whitehouse.gov/blog/2014/05/29/new-pcast-report-says-systems-engineering-can-improve-health-care
Systems Engineering Approach

- **Current state analysis**
  - Identify the **symptoms** for “problem” areas
  - **Measure/quantify** the magnitude of the problems/symptoms
  - Identify potential **root causes** of the problems (bottlenecks)

- **Roadmap towards an improved state**
  - **Design interventions** for improvements in the system, or **redesign** the system
  - **Evaluate** the **potential impact** of proposed changes
    - Cost of care: Staff and resources efficiency and utilization
    - Quality of care: Treatment outcomes, medical errors, infection rates, patient satisfaction
    - Access to care: Patient volume trends, communities served

METHODS: Statistics, simulation, optimization, queuing models, ..

- **Assess the impact of proposed changes** after implementation
Fix when it breaks
Fragmented care

Systems
engineering

Promoting Health & Wellbeing
Challenge to You

• **DATA**
  • Facts
  • Past Experiences

• **INFORMATION**
  • Trends
  • Successful strategies

• **KNOWLEDGE**
  • Best Practices
  • Causations & Predictions
  • Gap analysis
  • Opportunities for improvement

• **DECISIONS**
  • Engineer better systems
  • Reduce gaps
  • Decrease cost
  • Improve outcomes

• **What knowledge can I take away for myself and/or my colleagues?**

• **What action can I take?**

• **What action can I ask others to take?**
MISSION

Make a positive “impact” through improved health & humanitarian systems worldwide

info@chhs.gatech.edu

@CHHSGatech
Health Systems: The Next Generation

Tweet about Today’s event!
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Panel
Technology, Data, and Analytics for Efficient and Effective Health Systems

Julie Hollberg, MD
Denise Hines
Lucienne Ide, MD PhD
Julie Hollberg MD
Chief Medical Information Officer, Emory Healthcare
Associate Professor, Emory University School of Medicine
Population health 101
Emory’s journey toward creating value

Julie Hollberg, MD
Chief Medical Information Officer,
Emory Healthcare &
Associate Professor of Medicine,
Emory University School of Medicine
How do you remain financially viable AND increase quality?

“What if we don’t change at all ... and something magical just happens?”
How do you remain financially viable AND increase quality?

Using Payment Models to Improve Value: A Journey from Inaccuracy to Precision
Population Health Management
Population Management at Emory

Hi Risk 5%
Rising-Risk 20%
At-Risk 40%
Healthy Patients 35%

Care Coordination for Medically Complex / Vulnerable Patients
Patient Centered Medical Home (PCMH): Population Health Training
Care Episode Re-design & Targeted Interventions
Analytics & IT Infrastructure supporting Population Health
Narrowing Population Management to an individual Patient’s Experience

Mr. Lee
- 46 yr-old male
- Has seen multiple Emory Physicians in last 3 years
- Insurance: BCBS EHN Shared Savings Attributed member

Dr. Smith
- Emory PCP
- GPR = PCP
- 2 visit in last 2 years

Dr. Jones
- EHN PCP (Private)
- 2 visits in last 2 years

Dr. Moore
- Non-EHN Cardiologist
- 2 visit in last 2 years

- EUH Inpatient stay Jan 2016
- Non-Emory ED Visit Dec 2015
Narrowing Population Management to an individual Patient’s Experience

Mr. Lee

- 46 yr-old male
- Type 2 diabetes, hypertension, obesity
- Multiple social stressors

- Has Mr. Lee received all of standard care elements diabetic patients need to receive each year?
- Is his blood pressure under control? Who is responsible for that? How to avoid re-ordering tests since he’s cared for my multiple providers?
- When is he coming into see a physician next? Who is responsible for coordinating that care? Will someone reach out to him?
EHN HealthIntent Data Input

- Registry workflow in Powerchart
  - Workflow for 2 use cases in Powerworks, third in Web portal

- Evaluation for Registries & Measures
- Patients are Attributed to Physicians
  - Physicians are Linked with Orgs

Data is normalized in HealthIntent

Data enters HealthIntent from EHRs & Claims

EHC-Powerchart

EHC-Powerworks and EHN Private Practice
https://emory.registries.healthintent.com

HEALTHE REGISTRIES

HEALTHE CARE

HEALTHE ANALYTICS

HEALTH INTENT

BCBS/AETNA- Paid Claims for Shared Savings Lives
EHC- Pre-adjudicated claim
SOURCE: EHC Data Warehouse

EMORY HEALTHCARE
Cerner Ambulatory Care
Powerchart/Powerworks
SOURCE: Millennium and ASP
Domain A- Discreet Data Crawl

EHN PRIVATE PRACTICE
Allscripts/Athena/Cerner/eClinicalWorks/GE/Greenway
SOURCE: HIE-CCD Data

PAYER/CLAIM DATA

EHR

EHR

EMORY HEALTHCARE

EMORY HEALTHCARE NETWORK
Disease Registry Use Cases: 1 clinical approaches to population management

REGISTRY FUNCTIONALITY
- Identifies patients with specified conditions
- Tracks care plans for each specified condition

Pre-Visit Planning
- Care team identifies future apts
- Registry identifies gaps to be closed for those patients
- Teams plan for gap closure

Visit Decision Support
- Registry reviewed upon visit
- Open gaps closed by team

Registry Outreach
- Registry reviewed by condition
- Team plans outreach for those with gaps in care

Mr. Lee
Disease Registries: HealtheRegistries

**Disease Registries**
- Diabetes
- IVD/CAD
- Asthma
- Heart Failure
- Hyperlipidemia
- Hypertension
- COPD
- Depression
- Atrial Fibrillation
- Chronic Kidney Disease
- Hepatitis C
- Leukemia
- Breast Cancer
- Prostate Cancer
- Back Pain
- MDS

**Wellness**
- Adult wellness
- Senior Wellness
- Pediatric Wellness
- Maternity

**Decision Support & Outreach**

**Patient-specific Gaps in Care**

**Practice & Physician specific Score cards**

*EMORY HEALTHCARE NETWORK*
Attribution Logic: Which Patients are “Mine”?

1. Hard attribution: Primary Care Physician declared by physician
   - Patient Registration → Millennium → Powerworks
   - Tiebreaker: Most recent visit

2. Soft Attribution: Visit-based attribution
   - Limitation for Soft attribution: All outpatient encounters are classified as “TEC_Visit”
   - E&M CPT Codes from Billing (Centricity) & Adjudicated Claims (Payers)
     - At least 2 visits in past 2 years
     - Tiebreaker: Most recent visit

3. Hard attribution: Payer Enrollment files
   - Ensures that ALL shared savings patients have attribution
Other Pop Health Efforts: HealtheCare Supports Care Coordination

**PREDICT HIGH RISK**
- Analytics
- Hospitalization
- Repeated ED visits
- Direct Referral

**Standardized screening assessment**

**Risk stratification**

**Structured follow up**

**Oversight of Medically Complex & Clinically Vulnerable**
EHN Care Coordinator Program

- 3.5% Highest Complexity with Average Risk Score of 5.5
- Centralized Multidisciplinary Team covering At Risk Lives

Reduced ED Use by 15 visits/Month
Reduced Hospital Use by 7 Adm/Month
In 1,800 Patient Pilot
HealtheCare: Care Coordination Workflow Support

Previous State:
- Multiple data sources
- Manual assignment
- Access database for workflow and productivity
- EMR for clinical documentation

HealtheCare:
- Data Sources integrated
- Automated risk stratification & Assignment
- Workflow support
- Panel Management
Denise Hines

Executive Director, Georgia Health Information Network
Better Connections, Better Care.

GaHIN Overview
Denise Hines, DHA, PMP, FHIMSS
Executive Director, GaHIN
Mission:
To facilitate a statewide health information network for Georgia that is trusted and valued by all stakeholders; works to improve health care coordination and reduces costs; and establishes a solid foundation for long-term financial sustainability.

Vision:
To create a healthier Georgia through the use and exchange of electronic health information to improve patient-centered health care, increase efficiencies and improve the health of the state’s entire population.

Purpose:
To close the patient information gap across care settings by electronically connecting disparate systems and data sources to support improved quality of care, better health outcomes and reductions in cost.
GaHIN Products and Services

DirectTrust

GEORGIA DIRECT
Simple, Secure Patient Information Exchange

GEORGIA CONNECTED CARE
Connecting Healthcare & Building a Healthy Georgia
Basic Data Exchange
Free email messaging service to securely send patient health information to other authorized healthcare professionals

- Nearly 500,00 transactions in 2016
- 4,891 registered providers
- 321 member organizations
- 328,740 transactions in 2017 (August 2017)
Robust Integrated Patient Search (Query)

Providers can use their EHR to quickly access patient health data from hospitals, physician practices, state health systems and much more

- ~8,944 connected providers
- Nearly 700,000 queries in 2016
- 542,398 queries in 2017 (July 2017)
- 27,544,174 demographic records in GaHIN’s Master Patient Index
Connected Organizations

State Agencies
• GA Medicaid/Department of Community Health (DCH)
• GA Department of Public Health (DPH)
• GA Division of Families and Children Services (DFCS)
• GA Department of Juvenile Justice (DJJ)
• GA Department of Behavioral Health and Developmental Disabilities (DBHDD)

Care Management Organizations
• Amerigroup (with HIE)
• CareSource
• Peach State
• WellCare

Health Systems/Hospitals
• Children’s Healthcare of Atlanta (Epic)
• Emory Healthcare (Cerner)
• Grady Health System (Epic)
• Gwinnett Health System (RelayHealth)

Regional HIEs
• Georgia Health Connect (GaHC) (Liaison)
• GRACHIE/Chatham HealthLink (Cerner)
• HealtheConnection (Cerner)
• HealHIE Georgia (Azalea)

Specialty Connections
• Atlanta Gastroenterology Associates (Greenway)
• DaVita Healthcare Partners (eHealth Exchange)
• Georgia Partnership for Telehealth (Azalea)

National Exchange
• Alabama (AOHR)
• East Tennessee HIE (etHIN)
• South Carolina Health Information Exchange (SCHIEx)
• Texas (HIETexas)
• Veterans Health Administration
GaHIN Value-Added Products and Services

• Medical image exchange
• Laboratory results delivery
• Medication fill history
• Public health registries
• Directed Exchange/Secure Messaging Provider Directory
• Care Plan Exchange
• Event/Encounter Notification (ADTs)
Project Highlights

• Care Plan Exchange & ADT Care Alerts
• School-Based Health Clinics in Rural Communities
• Georgia Justice Information Sharing Initiatives
• Georgia Prescription Drug Monitoring Program
• GeorgiaDirect Outreach/Use Cases:
  – Long-Term Care, EMS, Pharmacies, Behavioral Health, FQHCs, Public Health District Offices, Community Health Organizations, Health systems, Dentists, Dialysis & Asthma clinics, VA Claims Processing
QUESTIONS??

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Sign up for our eNewsletter!
Lucienne Ide, MD PhD

Healthcare Innovator & CEO, Rimidi Inc.
Dr. Lucienne Ide, MD, PhD
28% of Medicare Beneficiaries have diabetes

- High blood pressure: 58%
- High cholesterol: 45%
- Ischemic heart disease: 31%
- Arthritis: 29%
- Diabetes: 28%
- Heart failure: 16%
- Chronic kidney disease: 15%

Two-thirds have multiple chronic conditions.
“Population Health Doesn’t Change Clinical Management”
From One-Size-Fits-All to Precision Medicine

One-size-fit-all Medicine

From

Stratified Medicine

To

Precision Medicine

Patients are grouped by:

- Disease Subtypes
- Risk Profiles
- Demographics
- Socio-economic
- Clinical Features
- Biomarker
- Molecular sub-populations

Individual patient level:

- Genomics and Omics
- Lifestyle
- Preferences
- Health History
- Medical Records
- Compliance
- Exogenous Factors

Companion Diagnostic (CDx) Biomarker

Therapy (Rx + Dx – CDx)

Each Patient Benefits From Individualized Treatment

Precision medicine ensures delivery of the right intervention to the right patient at the right time.

Frost and Sullivan
Aggregate - Analyze – Advise, but How?

- Clinical
- Wearables
- Demographic
- Claims
- Genomics
- Efficacy
Bringing precision medicine into clinical workflow

Cerner PowerChart
Research Rapid Fire Presentations

Munmun De Choudhury, PhD
Shatakshee Dhongde, PhD
Margarita Gonzalez
Jennifer Singh, PhD
Turgay Ayer, PhD
Munmun De Choudhury, PhD

Assistant Professor, School of Interactive Computing
Georgia Institute of Technology
Defining the Next Era of Mental Health Research and Practice with Social Media

Munmun De Choudhury
Assistant Professor
School of Interactive Computing + GVU Center, Georgia Tech
Georgia Tech Health Systems Workshop | September 22, 2017
Age-standardized disability-adjusted life year (DALY) rates of unipolar depressive disorders by country (per 100,000 inhabitants) [Wikipedia]
Social Media Derived Behavioral and Affective Markers Predict Postpartum Changes

376 users (new mothers); 40,426 posts between March 2011 and July 2012

(De Choudhury, Counts, Horvitz, CSCW 2013)
Social Media Language Predicts Prevalence of Depression in the U.S.

\[ y = 0.082x + 3.08 \]
\[ R^2 = 0.6435 \]
Patterns of Mental Health Discourse on Social Media Predict Future Suicidal Ideation

<table>
<thead>
<tr>
<th>Term</th>
<th>Percentage Increase</th>
<th>Term</th>
<th>Percentage Increase</th>
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<tbody>
<tr>
<td>depression</td>
<td>+30%</td>
<td>differences</td>
<td>-57%</td>
</tr>
<tr>
<td>useless</td>
<td>+51%</td>
<td>always a</td>
<td>-56%</td>
</tr>
<tr>
<td>suicidal</td>
<td>+34%</td>
<td>be working</td>
<td>-56%</td>
</tr>
<tr>
<td>medicine</td>
<td>+52%</td>
<td>keep your</td>
<td>-56%</td>
</tr>
<tr>
<td>locked</td>
<td>+51%</td>
<td>preferred</td>
<td>-56%</td>
</tr>
<tr>
<td>no friends</td>
<td>+51%</td>
<td>awesome I</td>
<td>-56%</td>
</tr>
<tr>
<td>loneliness</td>
<td>+50%</td>
<td>and enjoy</td>
<td>-55%</td>
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<tr>
<td>alone I</td>
<td>+34%</td>
<td>it work</td>
<td>-55%</td>
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(De Choudhury, Kiciman, Dredze, Coppersmith, Kumar CHI 2016)
Campus Social Media Activity Reveals Patterns of Stress Following Crisis Events

12 universities; 12 incidents over 5 years (2012-2016); 113,337 posts
Future: A Participatory, Proactive Model of Mental Healthcare with Social Media

Acknowledgments: National Institutes of Health, IARPA, United Nations Foundation, Microsoft, Yahoo!, Facebook, Samsung
Shatakshee Dhongde, PhD

Associate Professor

Provost Teaching Learning Fellow, School of Economics
Georgia Institute of Technology
Poverty, Deprivation and Health Disparities in the U.S.

Dr. Shatakshee Dhongde
Associate Professor of Economics,
Georgia Institute of Technology
Multidimensional Deprivation

• Several drawbacks of the official Poverty estimates published by the U.S. Census Bureau.

• Propose a **Multidimensional Deprivation Index** (MDI)

• Axiomatic Approach to MDI

• MDI identifies overlapping deprivations experienced in **six** different dimensions of well-being.

• **Health, Education, Standard of Living, Economic Security, Social Connections and Housing Quality**

• Compile data from the American Community Survey (ACS).

• Largest U.S. household survey with 3 million individual records each year.

• **Great Recession: 2008-2015**
Use MDI measure Health Disparities

- Data on about 1 million elderly adults from the 2011 wave of the ACS.
- Health outcomes: i) difficulty with independent living, and ii) vision or hearing difficulty
- Health care: health insurance coverage
- Health determinants: education and income poverty.
Relevant Body of Research

• Dhongde S. and Haveman R. (2017) “Multi-Dimensional Deprivation in the U.S.” *Social Indicators Research*


Margarita Gonzalez

Branch Chief of the Policy and Usability Branch (PUB)
Information and Communications Lab (ICL) at GTRI
Georgia Institute of Technology
The Army Family Web Portal and the Next Generation of Homefront Readiness

Principal Investigators:
Margarita Gonzalez and Sheila Isbell
GTRI-ICL

September 2017
Army Families (ARFAM) Program

Summary:
GTRI has been tasked by the U.S. Army to modernize and enhance a suite of 10 information systems used by 14 Army Community Service programs responsible for the delivery of clinical and non-clinical social services to service members and their families.

Challenge:
Translate these system and take them to the cloud.

Approach:
Socio-technical approach
14 User Groups (ACS Programs)

**MEDCOM:**
“Treatment Side”

- Family Advocacy Program (FAP):
  - NPSP
  - DAVA
  - EFMP

**IMCOM:**
“Prevention Side”

- Financial Readiness
- Employment Readiness
- Relocation Readiness
- Other Programs:
  - MoDep/MRT
  - AFAP
  - AVC
  - I&R

- Soldier and Family Assistance Centers (SFAC)
- Survivor Outreach Services (SOS)
Socio-Technical Requirements

- **STS**: Organization + HCI(s) → Enterprise Requirements
- **HCI**: Person + IT(s) → User Requirements
- **IT**: Software + device(s) → Functional Requirements
- **Technology**: Any Device → Technical Requirements

**Levels of Complexity**

**Types of Requirements**
Translation Priorities

Data:
• Improve data integrity
• Eliminate data duplication
• Standardize data

Ecosystem:
• Cloud hosted
• Open-source architecture
• Managed software services

ULTIMATE GOAL→ Establish the foundation for a sustainable, data-driven enterprise that enables the integration and innovation of social services that support Soldier and Army Family Readiness.
Next Steps

FY18:
• Complete translation of all 10 applications
• Complete data migration for all translated applications
• Deployment and Transition

FY19:
• Focus on creative reporting and “lean” analytics
• Inclusion of new data (process/outcome metrics)
• Explore applicability of DoA model to other branches of service
Jennifer Singh, PhD

Associate Professor of Sociology in the School of History & Sociology
Georgia Institute of Technology
Autism Disparities: Assessing Quality of Care and Structural Barriers to Diagnosis and Service

Jennifer S. Singh, MPH, PhD
Health Systems: The Next Generation

September 22, 2017
Autism Spectrum Disorder Disparities

- White children 30% more likely to be identified with ASD compared to Black children; 50% more likely than Hispanic (CDC 2016)
- Age at diagnosis (e.g., Mandell et al. 2002)
- Access to intervention and services (e.g., Liptak et al. 2008)
- Representation in special education (e.g., Boswell et al. 2014)
Autism Clinic Hughes Spalding CHOA

- Established in 2002
- 90% rely on Medicaid or uninsured
- Interdisciplinary team
- 3 days/month
- 15-20 patients
Aim 1: Measure the quality of care at the Children’s Hughes Spalding Autism Clinic

Aim 2: Assess the impact the Autism Clinic has had on children who have received services

Aim 3: Identify barriers to autism diagnosis and services for low-income, minority and/or underserved children and their families
Mixed Method Approach

- Caregiver Quality of Care Survey (N=60)
  - Extensive demographics – 25 questions
  - 3 levels of quality of care
  - Overall satisfaction
- In-depth interviews
  - Caregiver experiences before, during, and after autism diagnosis
  - Clinic Staff
- Clinic Observation
  - 1 year (3 days a month)
Structural Inequalities

- **Parent and Family Factors**
  - Transportation, lack of flexible employment, limited financial resources, single parent

- **Community Knowledge/Resources**
  - Lack of awareness/information on autism
  - Lack of social support, stigma

- **Healthcare and Educational Systems**
  - Lack of trained professionals
  - Limited services: outside of Metro Atlanta, special education, and Medicaid
Acknowledgements

- Caregivers who participated in study
- Collaborator: Dr. Leslie Rubin, MD
- Autism Clinic at Hughes Spalding
- Funding: Center for Pediatric Research (Georgia Tech and CHOA)
- Garrett Bunyak (Graduate Student)
Panel
End-to-End Health Systems: from Treatment to Management to Prevention to Wellness

Mohammed K. Ali, MD MSc MBA
Jean C. O’Connor, JD DrPH FACHE
James W. Curran, MD MPH
Turgay Ayer, PhD
Research Director for Medical Decision-Making, Center for Health and Humanitarian Systems George Family Foundation
Assistant Professor, H. Milton Stewart School of Industrial & Systems Engineering
Georgia Institute of Technology
The Business of Healthcare Delivery: Physician Integration in Bundled Payments

Turgay Ayer¹, Mehmet Ayvacı², Srinivasan Raghunathan², Jan Vlachy¹

¹ School of Industrial and Systems Engineering, Georgia Institute of Technology
² Naveen Jindal School of Management, University of Texas at Dallas
Incentive Misalignment under Fee-for-Service Model

Hospital Physicians
Intensity of care:

$I$

$I_0$

$0$  $1$

$\$  $\$  $\$  $\$  $\$  $\$  $\$

Best quality
# Level of Physician Integration

<table>
<thead>
<tr>
<th>Aligned Integrated Systems</th>
<th>Multihospital Systems</th>
<th>Rural Hospitals</th>
<th>Stand-Alone Hospitals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Billings Clinic</td>
<td>Advocate Health Care</td>
<td>Andalusia Regional Hospital</td>
<td>Elmhurst Memorial Hospital</td>
</tr>
<tr>
<td>Cleveland Clinic</td>
<td>Baptist Health South Florida</td>
<td>Copper Queen Community Hospital</td>
<td>Enloe Medical Center</td>
</tr>
<tr>
<td>Dean Clinic</td>
<td>BJC HealthCare</td>
<td>Crete Area Medical Center</td>
<td>Holy Spirit Health System</td>
</tr>
<tr>
<td>Geisinger Health System</td>
<td>Bon Secours Health System</td>
<td>Franklin Memorial Hospital</td>
<td>Longmont United Hospital</td>
</tr>
<tr>
<td>Group Health Cooperative</td>
<td>Catholic Health East</td>
<td>New Ulm Medical Center</td>
<td>Platte Valley Medical Center</td>
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<td>Scott &amp; White</td>
<td>CHRISTUS Health</td>
<td>Whitman Hospital and Medical Center</td>
<td>Winona Health</td>
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<td></td>
<td>Nebraska Methodist Health System</td>
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Research Questions & Approach

Questions:
1. What level of physician integration is ideal for bundling?
2. How does bundling interact with costs and quality?

Research Methods:
Game-theoretical modeling & Machine Learning
Main Results

1. Bundling is ideal under moderate physician integration

2. Costs will decrease, but quality may also decrease

3. Competing quality initiatives may hinder bundling
Mohammed K. Ali, MD MSc MBA

Associate Professor, Associate Director, Joint Faculty

Emory University
Ideological and Logistical Complexities of Wellness

Mohammed K. Ali  MD, MSc, MBA
Emory University, Atlanta, GA
Chronic Disease Prevention and Management

aka:  The business of...

behavior change

"Don’t tell me to improve my diet. I ate a carrot once and nothing happened!"

Short-term gains
What we know how to do

INtegrating DEPrEssioN and Diabetes treatmENT study

CARRS Translation Trial
Center for cArdiometabolic Risk Reduction in South Asia

INtegrating DEPrEssioN and Diabetes treatmENT study

FULL NAME | FBG (MG/DL) | A1C (%) | SBP/DBP (MM/HG) | LDL (MG/DL) | PHQ-9
--- | --- | --- | --- | --- | ---
Beyonce Knowles | 150 | 6.8 | 140 | 120 | 150<br>13 Feb, 2015<br>01 Aug, 2014<br>21 Feb, 2015
Mark L Hutcheson | 110 | 11 | 150 | 120 | 140<br>20 Feb, 2015<br>02 Feb, 2015

RANGE | TOTAL PARTICIPANTS | <110 mg/dL | 110-129 mg/dL | ≥130 mg/dL
--- | --- | --- | --- | ---
Baseline Results | 280 | 39.36%<br>Total 108 | 35.71%<br>Total 106 | 33.59%<br>Total 95
Jan 10, 2014 to June 10, 2014 | 135 | 15.5%<br>Total 21 | 60.7%<br>Total 82 | 33.79%<br>Total 32

FIRST LINE THERAPIES
- Start behavioral treatment.
- Initiate treatment with 1 Increment of an SSRI
- If moderate to severe peripheral neuropathy consider initiating treatment with 1 Increment of SNRI
- If smoker and trying to quit consider initiating treatment with 1 Increment of Bupropion

SECOND LINE THERAPIES
- Sorry, no second line therapies found

CONTROL STATUS: | MILD DEPRESSION

FOLLOW-UP
- If initiating new medication, follow-up in 1 week to assess side effects.
- Follow-up in 2 weeks to assess response on PHQ-9 score
What we do (and don’t) know how to do

**SUPPLY**
- Prevention + Care
  1. Providers
  2. Dx and Rx
  3. Information Mx
- Linkage to Specialists

**DEMAND**
- Awareness of risk/disease
- Self-MX
- Family Support

98% of life spent outside health care
Risk in Spouses / Partners

Cunningham et al. *Prev Med* 2017

<table>
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<tr>
<th>Year</th>
<th>Incidence (per 1000 person years)</th>
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<tr>
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<td>KPNC members</td>
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<tr>
<td></td>
<td>Spouses of matched people with incident diabetes</td>
</tr>
<tr>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>2</td>
<td>8.3</td>
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<tr>
<td>3</td>
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<td>32.3</td>
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<td>24.1</td>
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<td>3</td>
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</table>
DEMAND
SUPPLY
Prevention + Care
1. Providers
2. Dx and Rx
3. Information Mx
Linkage to Specialists

REGULATIONS
PAYERS

DEMAND
Awareness of risk/disease
Self-MX
Family Support

What we do (and don’t) know how to do

2
98% of life spent outside health care

3
People are not (always) rational
Innovative Incentive Models

If you build it…

4 Fear of the nanny state

Self-selection

Socioeconomic

5 If you build it…

http://www.youtube.com/watch?v=RNJl9EEcsoE
Challenges Await …

1. Short-term(ism)
2. How do we incentivize systems & communities to interact?
3. How do we make healthier choices the default?
4. How do we do this without a nanny-state approach?
5. How do we generate (sustained) demand?
6. How do we avoid widening disparities?
Jean C. O’Connor, JD DrPH

Chronic Disease Prevention Director
Georgia Department of Public Health
Health Systems in Georgia: Opportunities for Collaboration with Big and Little “P” Public Health

Jean O’Connor, JD, DrPH, FACHE
Chief Policy Officer
Chronic Disease Prevention Director
U.S. Healthcare Delivery System Evolution

1.0 Episodic, Non-Integrated Care

2.0 Outcome Accountable Care

3.0 Community-Integrated Health

We Protect Lives.
What’s Driving These Changes?

Policy Drivers
- Potential legislation
- Graham-Cassidy Bill
- Major federal laws
- ACA
- MACRA
- State laws and policies
- Quality improvement
- APAC systems
- Medicaid expansion decisions

Workforce Drivers
- Aging workforces
- Inadequate supply of graduates
- Increasing burden of chronic conditions
- Increasing specialization corresponding to need for increasingly technical knowledge

Technology Drivers
- Availability of Electronic Health Records
- Demand for telehealth and use of electronic communications options
- New pharma, devices, and techniques
- Expectations to link claims data and medical records data
Intentionality in System Design is Needed

Payment models that link community and clinical prevention

Structures that integrate health into communities

Systematic approaches to quality improvement across different payor types
Georgia Governmental Public Health System

State Office

- Assessment (Epi)
- Policy Development
- Assurance (More than 100 programs)

Clinical Services/LPHS

We Protect Lives.
Chronic Disease Prevention at DPH

Adolescent and School Health
- Asthma Control Program
- AHYD, Teen Pregnancy Prevention/PREP
- Sexual Violence Prevention
- Youth Tobacco Prevention

Prevention, Screening and Treatment
- Cancer State Aid Program
- Breast and Cervical Cancer Screening
- Health Systems Change/Quality Improvement
  - Diabetes Self-Management and Education
  - Colorectal Cancer Screening
  - Tobacco Quitline

Policy, Systems and Environmental Change
- SNAP-ED
- Tobacco-Free and Smoke-Free Places
- Nutrition, Physical Activity & Weight Status
  - Healthy Community Settings
  - Worksite Wellness
  - Heart Disease Prevention
  - Growing Fit
  - Eat, Move, Talk (Health Equity)

Planning and Partnerships
- District/Community Healthy Places Coordination
- Community Health Workers
- Chronic Disease Council
- Comprehensive Cancer and Control Planning
The “Real” Public Health System

Components of the Public Health System

- Federal Agencies
- STILTs (State, Tribal, Local, and Territorial Health Departments)
- Clinical Care Delivery Systems
- Government Agencies (Other than Public Health)
- Community-Based Organizations
- Educational Institutions
- Media
- Private, Nonprofit Associations
- Private Industry

SOCIAL DETERMINANTS OF HEALTH

- Income
- Education
- Housing
- Transportation
- Race
- Gender
- Access to Care
- Employment
- Age
- Language

We Protect Lives.
## Opportunities for Collaboration

**Payment models that link community and clinical prevention**
- ROI and output analyses
- Analysis and linking of data sets
- Community impact bonds
- Community health record concept

**Structures that integrate health into communities**
- Hospitals as centers of wellness
- School-linked health centers
- Government agencies that adopt healthy place policies
- Designs that support co-location of housing, health services, physical activity opportunities, and healthy food access

**Systematic approaches to quality improvement across different payor types**
- Application of engineering techniques to delivery and prevention systems to promote efficiency
- Centers of excellence in data analytics for claims and clinical data
- Modeling of the predictive power of different measures
The community health record framework. The framework presents a multitiered, multisector model illustrating an iterative, flexible, and participatory process for achieving collaboration and information exchange among health care, public health, and community groups and organizations to aid population health decision making. Abbreviations: CHR, community health record; CH, community health.
Thank you for Attending!

HEALTH SYSTEMS- THE NEXT GENERATION
2017