Population Health Management Systems
What are they and how can they help public health?

August 18, 1:00 p.m. – 2:30 p.m. EDT
Presented by the Public Health Informatics Working Group
Webinar sponsored by RTI International and Epidemico

Speakers:
J. Marc Overhage MD, PhD, Chief Clinical Informatics Officer, Siemens Health Services
Larry Nicklas, Director of Product Management, Caradigm
Qi Li MD, MBA, Director of Product Innovation, Intersystems Corporation

Moderated by:
John W. Loonsk MD FACMI, CMIO CGI and the Center for Population Health IT at the Johns Hopkins Bloomberg School of Public Health
Electronic Health Records

HITECH has “defined” Electronic Health Records (EHRs) through national attention and funding

– Applications and modules supporting providers in the provision of care

– Less about the health record itself and more about the applications

– Less about populations and more about individual patients and episodes of care

– Almost all HIT attention has been focused on these EHRs, and other HIT is largely “seen” through this EHR “lens”
“Population health”
- A broad, generally inclusive term
- Kindig et al: “the health outcomes of a group of individuals, including the distribution of such outcomes within the group”
- Energy and momentum in clinical care for “population health management” from the ACA and new payment methodologies

“Public health”
- One population it needs to consider is that of its jurisdiction
- Is also a perspective and a funding orientation
- Is associated with health departments and some federal agencies
- Does work outside and inside of clinical care
Population Health Management Systems

• Early in evolution
• Some are free standing applications and some are add-on modules
• Population health management activities include:
  – Aggregating patient data, defining sub-populations, identifying care gaps, predicting conditions, targeting prevention, stratifying risk, engaging patients, managing care, measuring outcomes
• Population health management system functions include:
  – Hot spotting / surveillance from EHRs, case management, patient communications, analytics and segmentation, cost analysis, reporting
• Opportunities for public health to leverage common HIT capabilities?
  – Parallels for chronic diseases, specialty registries, and infectious diseases?
QUESTIONS?
Various Care Models are Evolving with Different Degrees of Risk

Five Major Ramifications for Providers:

- Reimbursement will be reduced and take different forms
- Will have to prove quality, efficiency and costs-effectiveness
- Must “holistically” manage a patient’s care
- Must understand and manage the populations they serve
- Must engage patients
The Challenge Grows

Organizations taking on risk arrangements and needs to proactively manage the care and wellness of its patient population by:

- Supporting care team efficiencies with evidence-based processes
- Engaging patients (and their families) to take the necessary steps to improve their health
- Achieving positive, cost-effective outcomes
- And your organization needs to accomplish all of this across an ecosystem with multiple IT systems
Essential Elements

- Aggregate and normalize data from disparate EHRs to identify care needs of patients and populations
- Automate evidence-based care protocols with embedded workflow management technology to help coordinate care team activities
- Provide nearly seamless connectivity between information systems, as well as between patients and their care team members, through preferred communication channels
- Monitor and measure care processes to help improve quality outcomes and minimize costs for patients and their care teams
Care Management Process

Define Population

Identify and Action Care Gaps

Stratify Risks

Engage Patients

Manage Care

Measure Outcomes

Care Management Process:
Define Population

Group individuals into meaningful populations based on reliable, near-time data

- CEP engine classifies in near-time
- May differ based on payer
- Aggregate and normalize patient information
  - Clinical data
  - Claims data
Care Management Process:
Identify and Action Care Gaps

Transforms the care manager role and immediately focuses attention on those patients requiring interventions

- Assign evidence-based longitudinal care plans
- Identify care gaps
  - Compare process to evidence-based care plans
- Initiate actionable interventions
  - Workflow management
  - Assign to the most cost-effective care team member to perform the necessary service
- Automated when appropriate
Evidence-based Content

- Evidence-based content
  - Focus on Level 1a evidence
- Helps remove individual provider variation
- Prioritized by The National Quality Forum’s (NQF) High Impact Conditions
- Preventive care recommendations from the U.S. Preventive Care Task Force (USPCTF):

  **Manage Wellness**
  - Follow-up Comorbidity Management
  - Medication Adherence
  - Patient Self-management

  **Manage Chronic Conditions**
  - Acute Myocardial Infarction
  - Asthma
  - Atrial Fibrillation
  - Congestive Heart Failure
  - Chronic Obstructive Pulmonary Disease
  - Coronary Artery Disease

  - Surveillance and Early Detection
  - U.S. Preventive Care Task Force Preventive Care (all ages)
  - Diabetes Mellitus, Type 2
  - Hypertension
  - Major Depression
  - Osteoarthritis
  - Osteoporosis
  - Stroke
Assign to the most cost effective care team member

<table>
<thead>
<tr>
<th>Risk Level</th>
<th>PHM Strategy</th>
<th>Resource Utilization</th>
<th>Targeted Sub-population</th>
<th>Goal</th>
<th>Care Team Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Primary Prevention</td>
<td>Low</td>
<td>Healthy with no known chronic disease</td>
<td>Prevent the onset of disease</td>
<td>Patient</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Healthy but showing warning signs of potential health risks</td>
<td></td>
<td>Patient</td>
</tr>
<tr>
<td>Moderate</td>
<td>Secondary Prevention</td>
<td>Moderate</td>
<td>Has chronic disease. Is managing it well. Meeting their desired goals</td>
<td>Treat disease and prevent complications</td>
<td>Patient + non-clinical care coordinator</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Not in control of his/her Disease; but has not developed complications</td>
<td></td>
<td>Patient + health coach</td>
</tr>
<tr>
<td>High</td>
<td>Tertiary Prevention</td>
<td>High</td>
<td>Chronic disease has progressed; Clinical status unstable; developed new conditions and/or significant complications;</td>
<td>Treat the late or final stages of a disease and minimize disability</td>
<td>Care Managers, Physicians; Extenders</td>
</tr>
<tr>
<td></td>
<td>Catastrophic</td>
<td>Extremely High</td>
<td>Severe illness /condition and potentially significant risk; Intensive long term needs; Highly complex treatment; Under direct care of multiple providers</td>
<td>Ranges from restoring health to palliative care and hospice</td>
<td>Care Managers, Physicians; Extenders</td>
</tr>
</tbody>
</table>
The primary purpose of risk stratification is:
• Identify those patients who are most likely to benefit from Care Management Resources
• To support prioritization of care management activities and interventions

Traditional risk stratification strategy utilizes historical claim data which includes costs, diagnosis and utilization information
• Defines risk based on a single point in time
  • Remember: 30 percent of patients, who generate the highest costs in a given year, were not in a high risk category a year earlier
• Often misses emerging risk or identifies patients who have “normalized” or regressed to the mean
• Many care management tools provide “lists” of high risk patients with a specific numerical risk value with no actionable information for care management.

Current risk stratification strategy:
• Patient risk is dynamic state changing with the patient’s status. Care Management reflects that dynamic state by using ongoing data from the EMR that is updated to reflect the dynamic state.
• Care Management integrates risk stratification using the BPM technology. It enables risk and patient needs to be what drives the effective use of valuable care management resources
Empower patients (and/or their caregivers) to be active participants of their care team

- Preferred communication method
  - Phone call, text, e-mail, letter, etc.
- Patient Portal
  - Appointment scheduling and reminders
  - Secure e-mail exchange
  - Test results
  - Consultations
  - Medical history
  - Educational materials

Patients actively engaged as a care team member—and proactive about their health—can have better quality outcomes
Care Management Process: Manage Care

Identify care needs and address them cost effectively

- Evidence-based chronic condition content drives longitudinal care plan
- Wellness Factors
- Workflow management system monitors, notifies, and escalates
  - Care Manager
  - Care Team
  - Patient (person)
- Facilitates care team transformation
  - Automated redistribution of workload
  - Care team members utilized at highest level of their scope of practice/license
Monitor to help improve patient, population, and care delivery organization quality and financial outcomes

- Analyze care processes and clinical outcomes
  - Individual patient
  - Population level
  - Utilization, quality, cost
- Dashboards and reports
  - patient, population, care delivery organization
  - Based on regulatory and ACO quality metric requirements
- Customizable reports
Population Health Management Framework and Fit within a Health System

Larry Nicklas – Population Health Product Strategy

18 Aug 2014
Four Key Capabilities for Success

Population Health

Data Control
Make information accessible where and when you need it.

Healthcare Analytics
Generate insights and drive better decisions.

Care Coordination and Management
Drive improved outcomes for patient populations.

Wellness and Patient Engagement
Promote healthier lifestyles for your patients.

Enabling organizations to identify, take on and manage risk

Increasing quality of care by connecting analytics and care management

Providing transparency between care management, wellness and utilization programs

Activating patients to participate in their own care
### Why you need more than an EMR

One example of where a single patient’s data resides

<table>
<thead>
<tr>
<th>Applications and Analytics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Platform</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Metropolitan Medical Center</th>
<th>Labs</th>
<th>Payers</th>
<th>Government</th>
<th>Patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>• In-patient EMR</td>
<td>• Orders</td>
<td>• Claims</td>
<td>• CMS</td>
<td>• Self-report</td>
</tr>
<tr>
<td>• Practice Mgmt.</td>
<td>• Pathology</td>
<td>• Demographics</td>
<td>• Quality</td>
<td>• Device</td>
</tr>
<tr>
<td>• Clinical trials</td>
<td>• Radiology</td>
<td>• Benefits</td>
<td>• Public health</td>
<td>• Messages</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Community Hospital</th>
<th>Independent Health Facility</th>
<th>Pharmacy / PBM</th>
<th>Specialty Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>• PACS</td>
<td>• Clinical</td>
<td>• RX</td>
<td>• EMR</td>
</tr>
<tr>
<td>• HIS</td>
<td>• Administrative</td>
<td>• Claims</td>
<td>• Practice Mgmt</td>
</tr>
<tr>
<td>• Revenue Cycle</td>
<td>• Financial</td>
<td></td>
<td>• Referrals</td>
</tr>
<tr>
<td>• Scheduling</td>
<td></td>
<td></td>
<td>• Orders</td>
</tr>
<tr>
<td>• Care Plans</td>
<td></td>
<td></td>
<td>• Pathology</td>
</tr>
</tbody>
</table>

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Why moving beyond the EHR is needed for pop health

Basic premise:
The EHR is an essential input to a pop health strategy – but lacks key data, analytics, and workflow enablement tools to succeed.

Success will be achieved by those that embrace the 4 pillars of population health: data control, analytics, care coordination and management, and patient engagement and wellness.
Questions?
Population Health Management
Lesson Learned from Our Customers

Qi Li, MD, MBA
Director of Product Innovation
Topics

• Use EMR data in a region to support chronic disease management
• Engage care team with cross enterprise intelligent alerts
Patients change…Populations change
Diabetic Population Risk Stratification

The program, like other pay-for-performance initiatives, pays incentives to physicians who practice best standards of diabetes care. The program encourages individuals with diabetes to see these physicians to improve their quality of life and avoid the long-term complications of the disease. In the process, physicians are rewarded for providing high-quality care, individuals with diabetes are healthier, and employers save money. A recent actuarial analysis of the program by Towers Perrin reports an estimated savings of $1,059 per individual if blood pressure, Hemoglobin A1C, and LDL control measures are met. By saving lives and saving money, this Bridges to Excellence module should be the minimum standard of diabetic care throughout the country.

Indicators of intermediate outcomes of care (control of blood pressure, A1C, and LDL cholesterol) were also among the original DQIP measures and have been included in most subsequent diabetes quality measurement sets. Unlike simple process measures, adequate control of these risk factors is related to improved clinical outcomes including cardiovascular events, microvascular complications, and mortality. Assuming that safe,
Rhode Island is the U.S healthcare system in miniature

- **1,050,000** Patient Population
- **4,055** Providers
- **12** Hospitals
- **400** Practices
- **84** LTC Facilities
- **40** Large Employers with > 1,000 employees
- **3** Insurers plus Medicaid
Driving Pay-For-Outcomes

Performance on Clinical Quality Targets

RI Beacon Community All Cause Hospital Utilization Rates
FIGURE 5. Percentage of diabetic patients, in each of 26 reporting Beacon Practices, attaining the targeted outcome for HbA1c Poor Control (>9%). Values for the randomly blinded Practices are arranged in ascending order (for this measure, the target is to reduce the % of patients with Poor Control of HbA1c). The purple line indicates the Beacon Target for this measure, and the black line indicates the aggregate value among all practices reporting on this measure. Note the considerable variation in values among the practices.
**Individual Practice Data - 3Q 2012 Practice “A”**

Based on Data Reported to ONC on 10/15/2012

Released 11/06/2012

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**% of Patients Attaining Targeted Outcomes - Practice "A" Aggregate**

- **Beacon Target**
- **Beacon Aggregate**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Beacon Target</th>
<th>Beacon Aggregate</th>
</tr>
</thead>
<tbody>
<tr>
<td>DM A1c Poor Control (&gt;9%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DM BP Good Control (&lt;130/80)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DM LDL Good Control (&lt;100 mg/dL)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression Screen</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tobacco Cessation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**FIGURE “A1”**. Percentage of patients in your practice attaining the targeted outcomes in each of the Beacon Clinical Quality Measures for the 3Q2012 reporting period. The pink bars indicate the Target Value for that measure, and the black bars indicate the Beacon Aggregate. Column colors indicate level of Target attainment.

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**INTERSYSTEMS**
**FIGURE “A-T1”.** Percentage of patients in your practice attaining the targeted outcomes in each of the Beacon Clinical Quality Measures for the 2Q2011-3Q2012 reporting periods (from left to right). The pink bars indicate the Target Value for that measure. Column colors indicate level of Target attainment. *Improvement Rate*, located below each measure, represents the rate of change across the quarters (as percentage points).
FIGURE “A-P1”. Percentage of patients among providers at Site 9 attaining the targeted outcomes in each of the Beacon Quality Measures for the 1Q2013 reporting period. The pink bars indicate the Target Value for that measure and the black bars indicate the Beacon Aggregate. Column colors indicate level of Target attainment.
<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aspirin</strong></td>
<td>People at increased risk of cardiovascular disease who are taking aspirin</td>
<td>47%</td>
</tr>
<tr>
<td><strong>Blood pressure</strong></td>
<td>People with hypertension who have adequately controlled blood pressure</td>
<td>46%</td>
</tr>
<tr>
<td><strong>Cholesterol</strong></td>
<td>People with high cholesterol who are effectively managed</td>
<td>33%</td>
</tr>
<tr>
<td><strong>Smoking</strong></td>
<td>People trying to quit smoking who get help</td>
<td>23%</td>
</tr>
</tbody>
</table>
Hypertension Patients in a Regional HIE

**Measure:** Hypertension Control

**Technical Specifications:**
This measure is for patients with hypertension seen during the reporting period. The performance period for this measure is 12 months. This measure may be reported by clinicians who perform the quality actions described in the measure based on the services provided and the measure-specific denominator coding.

**DENOMINATOR:**
Patients aged 18 through 85 years with the diagnosis of hypertension

**Denominator Criteria (Eligible Cases):**
Patients aged 18 through 85 years on date of encounter

AND

**Diagnosis for hypertension (ICD-9-CM):** 401.0, 401.1, 401.9

**Diagnosis for hypertension (ICD-10-CM) [REFERENCE ONLY/Not Reportable]:** I10

AND

**Patient encounter during reporting period (CPT or HCPCS):** 99201, 99202, 99203, 99204, 99205, 99211, 99212, 99213, 99214, 99215, G0402

AND NOT

Currently pregnant
Diagnosed with end stage-renal disease
Receiving treatment for end stage-renal disease

**NUMERATOR:**
Patients whose most recent blood pressure $<$ 140/90 mmHg
<table>
<thead>
<tr>
<th>Measure 1: Diagnosed Hypertension</th>
<th>Numerator</th>
<th>Denominator</th>
<th>Measure %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients with Diagnosis from Problem Lists</td>
<td>6,981</td>
<td>40,879</td>
<td>17.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measure 2: Hypertension Control</th>
<th>Numerator</th>
<th>Denominator</th>
<th>Measure %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients with Diagnosis from Problem Lists</td>
<td>2,199</td>
<td>6,981</td>
<td>31.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measure 3: Undiagnosed Hypertension</th>
<th>Numerator</th>
<th>Denominator</th>
<th>Measure %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients with Diagnosis from Problem Lists</td>
<td>1</td>
<td>22,787</td>
<td>0.0</td>
</tr>
</tbody>
</table>
### Table 9. Hypertension Control Measure by Age and Gender (Patients with Diagnosis from Problem Lists)

<table>
<thead>
<tr>
<th>Patient Group</th>
<th>Numerator</th>
<th>Denominator</th>
<th>Hypertension Control %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female, 18-34 yrs</td>
<td>19</td>
<td>53</td>
<td>35.9</td>
</tr>
<tr>
<td>Female, 35-44 yrs</td>
<td>73</td>
<td>159</td>
<td>45.9</td>
</tr>
<tr>
<td>Female, 45-54 yrs</td>
<td>215</td>
<td>490</td>
<td>43.9</td>
</tr>
<tr>
<td>Female, 55-64 yrs</td>
<td>337</td>
<td>947</td>
<td>35.6</td>
</tr>
<tr>
<td>Female, 65-74 yrs</td>
<td>391</td>
<td>1049</td>
<td>37.3</td>
</tr>
<tr>
<td>Female, 75-85 yrs</td>
<td>435</td>
<td>1423</td>
<td>30.6</td>
</tr>
<tr>
<td>Male, 18-34 yrs</td>
<td>11</td>
<td>36</td>
<td>30.6</td>
</tr>
<tr>
<td>Male, 35-44 yrs</td>
<td>33</td>
<td>140</td>
<td>23.6</td>
</tr>
<tr>
<td>Male, 45-54 yrs</td>
<td>82</td>
<td>360</td>
<td>22.8</td>
</tr>
<tr>
<td>Male, 55-64 yrs</td>
<td>164</td>
<td>637</td>
<td>25.8</td>
</tr>
<tr>
<td>Male, 65-74 yrs</td>
<td>191</td>
<td>748</td>
<td>25.5</td>
</tr>
<tr>
<td>Male, 75-85 yrs</td>
<td>247</td>
<td>938</td>
<td>26.3</td>
</tr>
</tbody>
</table>
Table 10. Hypertension Control Measure by Race (Patients with Diagnosis from Problem Lists)

<table>
<thead>
<tr>
<th>Patients</th>
<th>Numerator</th>
<th>Denominator</th>
<th>Hypertension Control %</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Patients</td>
<td>2198</td>
<td>6980</td>
<td>31.5</td>
</tr>
<tr>
<td>White</td>
<td>1530</td>
<td>4832</td>
<td>31.7</td>
</tr>
<tr>
<td>Black</td>
<td>190</td>
<td>637</td>
<td>29.8</td>
</tr>
<tr>
<td>Asian American</td>
<td>35</td>
<td>108</td>
<td>32.4</td>
</tr>
</tbody>
</table>
Most Data from EMR CCD Extracts are Unusable

Percentage of Practices Contributing BP Readings that can be Attributed to Encounters

<table>
<thead>
<tr>
<th>Practice Sites</th>
<th>EMR</th>
<th>BP Readings Count in 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td></td>
<td>6525</td>
</tr>
<tr>
<td>#2 - #18</td>
<td></td>
<td>5849</td>
</tr>
<tr>
<td>#19 - #20</td>
<td></td>
<td>5112</td>
</tr>
<tr>
<td>#21</td>
<td></td>
<td>516</td>
</tr>
<tr>
<td>#22-62</td>
<td></td>
<td>106</td>
</tr>
<tr>
<td>#63-64</td>
<td></td>
<td>90</td>
</tr>
<tr>
<td>#65-66</td>
<td></td>
<td>55</td>
</tr>
<tr>
<td>#67</td>
<td></td>
<td>24</td>
</tr>
<tr>
<td>#68</td>
<td></td>
<td>21</td>
</tr>
<tr>
<td>#69-85</td>
<td></td>
<td>18</td>
</tr>
<tr>
<td>#86</td>
<td></td>
<td>18</td>
</tr>
<tr>
<td>#87</td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>#88</td>
<td></td>
<td>14</td>
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<tr>
<td>#89</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>#90</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Measure</td>
<td>Numerator</td>
<td>Denominator</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-----------</td>
<td>-------------</td>
</tr>
<tr>
<td><strong>Measure 1: Diagnosed Hypertension</strong></td>
<td>400</td>
<td>3027</td>
</tr>
<tr>
<td>Observation from FQHC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Measure 2: Hypertension Control</strong></td>
<td>242</td>
<td>400</td>
</tr>
<tr>
<td>Observation from FQHC</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Measure 3: Undiagnosed Hypertension</strong></td>
<td>5</td>
<td>1760</td>
</tr>
<tr>
<td>Observation from FQHC</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
A primary care provider needs to coordinate care with **229 physicians and 117 different practices** to care for an entire panel of patients.

Ann Intern Med. 2009 Feb 17;150(4):236-42
Target High Risk Population

**Women & Infants Hospital:**
- NICU infants enrolled in CurrentCare at birth
- Hospital Alert when baby shows up in ED
- NICU team proactively reaches out to avoid admission and coordinate post-release care

**Kent Hospital:**
- High-risk cardiac patients
- Hospital Alert when patient shows up in ED
- Cardiac team proactively reaches out to help stabilize the patient and to establish post-release care

**Gateway Healthcare, Inc.:**
- Behavioral Health
- Hospital Alert when patient shows up in psychiatric hospital or ED
- Behavioral health care team intervenes to re-establish/adjust course of mental health treatment
15% Reduction in Readmission Rates
Home Monitoring to Further Reduce Readmission

• Deliver right information to the right provider at the right time
Notification/Subscription Model and Rules Editor
Remember to Close the Loop
Summary

- Taking data from EMR for PHM is not easy
- Cross enterprise intelligent alerts are useful for care team

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