The Importance of Predictive Modeling and Analytics for Health Care Reform and System Transformation

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We're facing the greatest change in US health care in 45 years
Yes, the ACA legislation is a bit complex

"It's a reminder of what we can do when we all work together."
Will Health IT and analytics solve our health care problems?

"This is where the idea for the new EHR starts getting a little complicated."
During this session I will:

• Describe key facets of US healthcare reform and their potential intersections with the predictive modeling (PM) / risk adjustment (RA) domains.

• Discuss the impact of clinical analytics within Accountable Care Organizations (ACOs), Patient Centered Medical Homes (PCMHs) and other “transformed” delivery systems.

• Explore how RA/PM will interface with health IT and e-health.

• Suggest how PM / RA / clinical analytics could (and should) play key roles within the various streams of reform and transformation.

• Explore potential implications of health care reform for the PM / RA fields.

• Identify possible future issues and challenges facing the field.
Before We get Started: Some Working Definitions

**Healthcare Information Technology (HIT)**
The application of electronic health records (EHRs), IT and other “e-health” digital technologies to the delivery and management of health care.

**Healthcare Analytics**
The leveraging of electronically available health care data to enable actions that improve health system effectiveness, efficiency or equity.
Working Definitions – Cont.

*Risk adjustment*

Taking health status / risk into consideration for healthcare finance, payment, provider performance assessment and patient outcome monitoring.

*Predictive modeling (PM)*

Prospective (or concurrent) application of risk measures and statistical technique to identify “high risk” individuals who would likely benefit from care management interventions.
The Alphabet Soup of Health Reform

• ACA -- Affordable Care Act - formerly PPACA
• ACO – Accountable Care Organizations (aka Medicare shared savings program – MSSP)
• HIE (1) -- Health Insurance Exchange -- aka HIX
• HIE (2) -- Health Information Exchange -- aka regional health information organizations (RHIOs or HIOs)
• PCMH – patient centered medical home (aka primary care medical home)
• Meaningful Use (MU) – Office of the National Coordinator (ONC) for HIT / Center for Medicare/Medicaid Services (CMS) pay for performance (P4P) program to expand EHR use (aka HITECH)
• IDS – Integrated Delivery System (aka IDN)
• MCO- Managed Care Organization (aka private health plan)
Health Reform in a Nutshell

- Insurance Market Reform
- Subsidies for Purchase of Insurance
- Delivery System Transformation
- Equity
- Quality
- Efficiency
Reform (HITECH / MU) is leading to a rapid digitalization of health care

Figure 1. Percentage of office-based physicians with electronic medical records/electronic health records (EMRs/EHRs): United States, 2001–2009 and preliminary 2010

Source: NCHS/CDC 2011
The ACA’s Expected Effects on US Insurance Coverage (Projected 2019)

**Without Law**
- Employer 48%
- Medicare 17%
- Medicaid & CHIP 10%
- Nongroup & Other 9%
- Uninsured 16%

**With Law**
- Employer 47%
- Medicare 17%
- Medicaid & CHIP 15%
- Exchanges 7%
- Nongroup & Other 7%
- Uninsured 7%

*Source: Congressional Budget Office’s 3/20/2010*
How PM / RA will be applied to covering the uninsured

• Premium adjustments to account for varying risk within plans comprising health insurance exchanges (HIE).

• As part of Medicaid expansion (Most Medicaid states use risk adjusted capitation.)

• To help private plan actuaries better manage within the new rating environment.

• To regulate / monitor small group / individual market outside of exchange.
Why there will likely be adverse selection within the HIE and outside the exchange

• The ACA mandates that “risk” rating be based only on:
  ➢ 3 to 1 age rating “bands” (and not gender)
  ➢ Family composition, geographic region, smoking status (1.5 to 1)

• Consumers with different levels of medical need and differing levels of federal subsidy will often have multiple choices between:
  ➢ alternative plans within the exchange
  ➢ alternative benefit packages (the “metallic” levels)
  ➢ between plans inside and outside the exchange
Risk adjustment will be essential for HIEs given impact of even modest selection bias across contracting health plans.

Average % over and under-payment for 25 simulated health plans of 50,000 members each with varying levels of enrollee risk.

From papers in progress – Johns Hopkins University.
ACA Regulations for Using Risk Adjustment, Risk Corridors and Reinsurance Provisions within HIEs

- **All Health Insurance Issuers and Third Party Administrators**
  - Proportional to Market Share
  - Transitional Reinsurance Program (State) 2014-2016
  - Percentage of Higher Cost Claims
  - Individual Market Plans Covering Individuals who Incur High Expenditures

- **Individual and Small Group Exchange Market Plans with Allowable Costs <97% Target Amount**
  - Proportional to Savings
  - Risk Corridors (HHS) 2014-2016
  - Proportional to Excess
  - Individual and Small Group Exchange Market Plans with Allowable Costs >103% Target Amount

- **Individual and Small Group Market Plans with Healthier Than Average Enrollees**
  - TBD
  - Risk Adjustment (State/HHS) 2014-ongoing (HCCs, ACGs, CDPS, etc.)
  - TBD
  - Individual and Small Group Market Plans with Sicker Than Average Enrollees

**Source:** Authors’ analysis of Sections 1341-3 of the Patient Protection and Affordable Care Act of 2010. From Weiner et al Paper in Final Revision Health Affairs.
The ACA’s risk adjustment provisions for HIEs

• ACA calls for 3-phase approach to risk adjustment:
  - Temporary reinsurance
  - Temporary risk corridors
  - Ongoing diagnosis based risk adjustment  (Feds will provide version of CMS HCCs, States can also use ACGs, CDPs or other well tested systems). Will also apply to non HIE small/individual market plans.

• Other regulations to limit product differentiation/selection:
  - Standardized benefit packages
  - Regulation of MLRs
  - Mandatory coverage of certain preventative health services
The Road to “Accountable Care”
Transforming Health Care Organizations Will Require Several Paradigm Shifts

<table>
<thead>
<tr>
<th>CURRENT</th>
<th>TRANSFORMED</th>
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<tbody>
<tr>
<td>Fragmented Care</td>
<td>Coordinated /Integrated Care</td>
</tr>
<tr>
<td>Provider Centric</td>
<td>Patient / Population Focused</td>
</tr>
<tr>
<td>Payment for Volume / Units</td>
<td>Payment for Value / Outcome</td>
</tr>
<tr>
<td>Individual Facility Focused</td>
<td>Care System Focused</td>
</tr>
<tr>
<td>Disease oriented / Acute Illness</td>
<td>Wellness / Chronic co-morbidities</td>
</tr>
<tr>
<td>Limited Basis for Clinical Action</td>
<td>Evidence-Based Care / Learning Organiz.</td>
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ACOs are a consortia of “accountable” providers with the legal/administrative structure to receive and distribute incentive payments to participating providers and to help integrate/coordinate care. ACOs are part of ACA and focus on patients insured by the Federal Medicare program. They also build on the PCMH model and make use of the decades of lessons from large “Integrated Delivery Systems.”

Source: Premier Healthcare Alliance
CMS’s Vision of an Advanced Medical Home

- Integrate E-prescribing and COES
- Advance Chronic Disease Mgmt
- Patient Registry Databases
- EHR/HIE Connected
- Public Health Bio Surveillance Connected
- Two way Quality Reporting
- Electronic Eligibility System Interface
- E-Clinical Decision Support
- Electronic Patient Access and Communication

Source: CMS
Understanding and adjusting for co-morbidities will be key to managing outcomes and resources within ACOs and PCMHs.

<table>
<thead>
<tr>
<th># Chronic Co-morbidities</th>
<th>% Pop.</th>
<th>Relative Cost (Per Pt.)</th>
<th>Est. % of Total Medicare Costs</th>
<th>Avg. # Unique MDs/Yr.</th>
<th>Avg. # Filled Rx / Yr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5+</td>
<td>20%</td>
<td>3.2</td>
<td>66%</td>
<td>13.8</td>
<td>49</td>
</tr>
<tr>
<td>3-4</td>
<td>27%</td>
<td>.9</td>
<td>23%</td>
<td>7.3</td>
<td>26</td>
</tr>
<tr>
<td>0-2</td>
<td>53%</td>
<td>.1</td>
<td>11%</td>
<td>3.0</td>
<td>11</td>
</tr>
</tbody>
</table>

Data Source: G. Anderson et. al., Johns Hopkins Univ. (Derived from Medicare claims and beneficiary surveys.)
The applications of predictive modeling / risk adjustment within ACOs & PCMHs will include:

- Financing, Payment, Planning
  - Allocation of budgets
  - Service targets
- Provider Performance Assessment
  - Profiling / Reporting
  - Pay-for-Performance
- Quality
  - Quality improvement
  - Quality monitoring / “Dashboard”

- Care Management
  - Identification of high risk patients
    - Disease management
    - Case management
  - Population health monitoring
- Research and Evaluation
  - Effectiveness Research
  - Impact of interventions
Case Study: Using analytics to monitor achievement of “coordination” (and impact on $) within an ACO

Cost of care (year 1 and 2) for high morbidity persons by achievement of “coordination” in year 1

Coordination levels measured by Johns Hopkins ACG Version 9.0.

Year-1 coordination markers include: count of unique MDs, presence of PCP, presence of “majority source.” Analysis based on 418,000 health plan enrollees in 2005/06. This analysis is case-mix adjusted and includes only persons identified in (Yr-1) as being “high morbidity” based on ACGs.
Case Study: Using Predictive Models to Identify Patients at Risk for Future Hospitalization

Scores Based on ACG Version 9.0 Hospitalization Prediction Risk Model - This is for a Medicaid Cohort enrolled in private health plans. See K.Lemke et al Medical Care in Press
Electronic Health Records, “Meaningful Use” and the move to EHR-based PM ("e-PM")
The phases of “Meaningful Use”
Risk adjustment will be key for stage 2 and 3

2009
2011
2013
2015

HIT-Enabled Transformed Health Care

HITECH Policies

Stage 1- 2011
Meaningful Use Criteria
(Capture/share data - structure)

Stage 2- 2013
Meaningful Use Criteria
(Advanced care processes with decision support)

Stage 3- 2015
Meaningful Use Criteria (Improved Outcomes)
Stage 1 (2011) Meaningful Use Measure Highlights (for Hospitals)

### 24 Objectives of Meaningful Use

1. CPOE for Medications
2. Drug-drug/drug-allergy checks
3. Record demographics
4. Structured problem list
5. Structured medication list
6. Structured medication allergy list
7. Record and chart changes in vital signs
8. Record smoking status
9. 1 clinical decision support rule
10. Report clinical quality measures
11. Electronic health info to patients
12. Electronic copy of discharge instructions
13. Exchange key clinical information (capability)
14. Protect electronic health information
15. Drug-formulary checks
16. Record advanced directives
17. Incorporate structured clinical-lab data
18. Generate patient lists by condition
19. Identify patient-specific education resources
20. Medication reconciliation
21. Summary care record transitioned or referred patients
22. Submit data to immunization registries
23. Submit lab results to public health
24. Submit syndromic surveillance data

### 19 Objectives Required in Stage 1

1. CPOE for Medications
2. Drug-drug/drug-allergy checks
3. Record demographics
4. Structured problem list
5. Structured medication list
6. Structured medication allergy list
7. Record and chart changes in vital signs
8. Record smoking status
9. 1 clinical decision support rule
10. Report clinical quality measures
11. Electronic health info to patients
12. Electronic copy of discharge instructions
13. Exchange key clinical information (capability)
14. Protect electronic health information
15. Option 1
16. Option 2
17. Option 3
18. Option 4
19. Public Health reporting option

**14 Core Objectives Required of All Hospitals**

Choose 5 from Menu Set

Choose at least 1 Public Health Option
A State Health Information Exchange (HIE/HIO) – A PM/RA Service Bureau?
How PM / RA could be applied to HIT / EHRs

- As reform leads to eventual adoption of EHR / HIT, there will be numerous opportunities for care supported by electronic PM/RA techniques.

  - Health Information Exchanges / RHIOs will link both claims and EHRs and may become PM/RA clearinghouse for all digital data.

  - Integration of population level PM with patient level “clinical decision support systems” (CDS). What I term “e-PM”

  - Next generation of PM tools will need to use information derived from EHRs and patient- centered personal health records (PHRs)
HIT Enabled Healthcare – Clinical HIT support - 1
PHR
Personal Health Record

CPOE
Computerized Provider Order Entry

CDS
Clinical Decision Support

EHR
Electronic Health Record

MCOs & ACOs

Biometrics / e-health

Providers

Web Portal

PM
Patient

Population

HIT Enabled Healthcare – Population Based PM - 2
“e-PM” = the Integration of current CDSS / PM
Some Next Steps, Implications and Challenges
Some future challenges for the PM / RA field related to health reform

• Need to continue to fully integrate PM / RA into potentially reformed clinical and fiscal operations.

• New paradigms will likely be needed for the way actuaries / health plans manage risk.

• PM and RA may be used more frequently for equity / quality enhancement to increase service use.

• Transparency and interoperability of PM / RA methods will likely need to increase.
Some future areas of reform-related PM / RA research and development

• Application of PM / RA tools to improving care among previously uninsured.

• Improving current adjusters using risk information from EHRs and other digital sources.

• Given weakness of cost controls in the ACA, increase in approaches for furthering PM’s impact on clinician practices and patient outcomes in order to bend the curve.

• Operational integration of PM with digital clinical decision support (CDS.)
You Are Cordially Invited to our Bi-Annual Global Conference at Johns Hopkins.

Learn about the latest developments in risk adjustment and predictive modeling, regardless of which methodology your use.

Marriot Waterfront Hotel
Baltimore, May 6-9 2012

More information at www.acg.jhsph.edu
More Information

• Information on health reform
  http://healthreform.kff.org/

• CMS - HIE Risk Adjustment

• Information on ACOs
  https://xteam.brookings.edu/bdacoIn/Pages/home.aspx

• Information on PCMH
  http://www.transformed.com/

• Information on ACG risk adjustment / predictive modeling:
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