The next generation of health care information technology

John Glaser, Ph.D.
Senior Vice President

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The business model of health care is undergoing major change

- Reactive sick care
- Fragmented, niche care
- Reward for volume
- Clinician-centric

- Proactive health management
- Cross-continuum care system
- Reward for quality, safety & efficiency
- Patient / consumer-centric
This change is largely driven by reimbursement reform.

<table>
<thead>
<tr>
<th>Medicare quality measures</th>
<th>Alternative payment models</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>2016</td>
</tr>
<tr>
<td>85%</td>
<td>30%</td>
</tr>
<tr>
<td>90%</td>
<td></td>
</tr>
</tbody>
</table>

Table:

- **Medicare quality measures**
  - 2016: 85%
  - 2018: 90%

- **Alternative payment models**
  - 2016: 30%
  - 2018: 50%
  - Next Gen ACO: 85-100%

Diagram:

- **Medicare quality measures**
  - 2016: 85%
  - 2018: 90%

- **Alternative payment models**
  - 2016: 30%
  - 2018: 50%
  - Next Gen ACO: 85-100%

- **Provider accountability**
  - Patient-centered medical home
  - Accountable care organization

- **Total cost**
  - Full risk
  - Partial risk, shared savings
  - Episodic bundling
  - Pay for performance
  - Fee for service
Business model changes are consequential: the Uber effect
Three major leaps in IT over the last 25 years

Business use of the World Wide Web

Social network sites worldwide ranked by number of active users (in millions, as of Jan. 2017)

- Facebook: 1,871
- WhatsApp: 1,000
- Instagram: 600
- Twitter: 317

Consumer adoption of mobile devices
The third leap – intelligence – is already prevalent in our everyday lives

- Smart navigation
- Smart homes
- Smart cars
- Smart services
Pursuing the next generation of health care intelligence

- Data extraction
  - NLP
  - Image
  - Video

- Cognitive interaction
  - Provider
  - Consumer

- Operational process modeling

- Clinical models
  - Prediction
  - Process
Business model changes & IT leaps leverage each other
Managing populations will lead to a new class of HIT
The range of data collected will expand significantly

**Sociodemographic**
- e.g., sexual orientation, education, employment, financial resource strain

**Psychological**
- e.g., health literacy, stress, negative mood, psychological assets

**Behavioral**
- e.g., dietary patterns, physical activity, tobacco exposure, alcohol use

**Individual level social relationships & living conditions**

**Neighborhood & communities**
Population health spectrum: super utilizers
## Re-classification of discharge locations

<table>
<thead>
<tr>
<th>Discharge Locations</th>
<th>Actual (Historic)</th>
<th>Model recommends higher level</th>
<th>Model recommends lower level</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home</td>
<td>67.1%</td>
<td></td>
<td></td>
<td>66.4%</td>
</tr>
<tr>
<td>Home Health</td>
<td>13.2%</td>
<td></td>
<td></td>
<td>15.5%</td>
</tr>
<tr>
<td>SNF</td>
<td>14.7%</td>
<td>11%</td>
<td>19%</td>
<td>14.2%</td>
</tr>
<tr>
<td>Rehab</td>
<td>2.4%</td>
<td></td>
<td></td>
<td>1.6%</td>
</tr>
<tr>
<td>LTAC</td>
<td>2.6%</td>
<td></td>
<td></td>
<td>2.3%</td>
</tr>
</tbody>
</table>
Follow-up visits can significantly reduce readmission risk.

Most appropriate time for a follow-up visit is two days after discharge; not effective after two weeks.

Patients with readmission risk score of ~65 benefit most from two-day follow-up visit.
Note: effect of follow-up visit diminishes as you move further from 65 (higher or lower)

Likelihood of follow-up visit within two days diminishes if it is not scheduled while patient is still in the hospital.
Machine generated documentation

Historical and contemporary patient data + Socio-demographics

EHR

Lights On Network

Physician / system interaction metrics

Audio*
- Verbal interactions
- Speech to clinical concepts

3D sensor**
- Physical interactions
- Face time

Quantifying encounter to derive:
- E&M CPT code
- ICD-10 codes
- Activity-based costing

* Sentiment analysis, etc. may offer further refinement to the models in the future

** Biometric characterization may prevent fraud and feature recognition could support sentiment analysis
Exam room sensor data

In-room sensors

- 3D visuals with “skeletal points”
- Temporal audio data
- Clinical concepts

Outputs
Providing a dynamic plan for health

- **Clinic**
  - Clinic
- **17**
  - REMINDER: Appointment
- **Community care manager**
  - ADD: New health goal
  - MESSAGE: Pollen alert
- **Family**
  - ADD: Diagnosis
  - MESSAGE: Pollen alert
- **Physician**
  - ALERT: High blood pressure
- **EHR**
  - ADD: Diagnosis

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Federated research and analysis using deep learning

- **Other deep learning clients**
- **“Private” data sources** (registries, studies, EHR / payor data)
- **Federal research networks** (PCDRI CDRNs / Sentinel)

**Federated directory service**

- **Research workbench services**
  - Question tool
  - Directory explorer
  - Workbench
  - Project explorer
  - Modular program
  - Others

**Model adaptor services**

- Health Facts®
- Others
- PCDRI CDM
- OMOP CDM
- i2b2

**Researchers’ virtual private network**

- Project researchers
Telehealth use will accelerate

Fitness
Personal health
Clinical
Advanced interventions

American Telemedicine Association, 2015
Consumers are engaged in more than a series of transactions

Competing on Customer Journeys

by David C. Edelman and Marc Singer

FROM THE NOVEMBER 2015 ISSUE
Usability remains a major issue

Electronic Health Records (EHR, EMR)

AMA demands EHR overhaul, calls them 'poorly designed and implemented'

Latest study confirms typing and clicking consume more than half the workday for doctors.
How do we “solve” usability?

- Advance payment reform
- Improve use of user-centered design methods
- Leverage advances in technology
- Continuously review and tune clinical and operational processes
- Learn from others
<table>
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<tr>
<th>Robert A. Stringer, General Foods</th>
<th>Fritz Biermeier, Red Owl Stores, Inc.</th>
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<tr>
<td>K. Marvin Everts, Jr. Stokley Van Camp</td>
<td>Alan Haberman, First National Stores, Inc</td>
</tr>
<tr>
<td>William J. Hollis, American Can Company</td>
<td>Arthur D. Juceam, Lehn &amp; Fink Products</td>
</tr>
<tr>
<td>Robert R Koenig, Super Valu Stores, Inc</td>
<td>Curt Kornblau, Super Market Institute</td>
</tr>
<tr>
<td>Robert F. Lee, Johnson &amp; Johnson</td>
<td>Donald P. Lloyd, Associated Food Stores, Inc.</td>
</tr>
<tr>
<td>Thomas P. Nelson, General Mills, Inc</td>
<td>William E. Oddy, Jewel Food Stores</td>
</tr>
<tr>
<td>John L. Strube, Kroger Company</td>
<td>Wilbur Stump, Stump's Enterprises, Inc.</td>
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How do we “solve” interoperability?

- Meaningful provider incentives to be efficient & effective across a continuum of care
- Collaboration & leadership by those who have incentives
- Vendor openness & interoperability
- Standards development
- Transparency of industry progress
Questions?