From the dugout to the bleachers: Enriching Predictive Analytics with Social Determinants

HFMA Lone Star Spring Conference

Pieces Technologies, Inc.
May 12, 2016

Paul Ceverha
EVP of Client Services
Agenda

- About Us
- Complexities of Predictive Modeling
- A Holistic Approach
- Healthy Communities Model
- Questions
Who we are

Pieces Technologies, Inc.

We provide integrated monitoring, prediction, workflow optimization, and organizational learning services and software for hospitals, health systems, and community based organizations.

Our Mission
To advance health at every decision.

Our Vision
A world where every life can reach its full potential.

piecestech.com
Scientific Grants and Publications

$45M Grants & 21 Peer-Reviewed Publications

Commercial Partners
Complexities of Predictive Modeling in Health Care

The Legal and Ethical Concerns That Arise From Using Complex Predictive Analytics in Health Care

Implementing Electronic Health Care Predictive Analytics: Considerations and Challenges

Abstract: Predictive analytics, or the use of electronic algorithms to forecast future events in real time, makes it possible to harness the power of data to anticipate care needs, enhance stewardship, and ensure quality of care. However, the legal and ethical issues associated with predictive analytics can be daunting. This article provides an overview of some of the legal and ethical concerns that arise from using complex predictive analytics in health care.

Abstract: The use of predictive modeling for real-time clinical decision making is increasingly recognized as a way to achieve the Triple Aim of improving outcomes, enhancing patients' experiences, and reducing health care costs. The development and validation of predictive models require careful consideration of the underlying data, the potential impacts of the models, and the ethical implications of using these models in practice.
1. Interventions for highest risk patients: what do you do? what can you do?
2. Considering clinical vs. social risk
3. Explanation vs. Prediction
4. Non-healthcare data sources
5. Changing EMR data models
6. Changing health systems, populations and biomedical knowledge base
7. Ethics of increasing machine intelligence in medicine
A different view of decision support...

Preventing adverse events by optimizing:

- Holistic data consumption including social determinants
- Identification and prediction
- Intervention guidance
- Rapid learning & performance improvement
How to accommodate adverse events of various lifecycles?

Patient Quality and Safety Events
- Cardio-Pulmonary Arrest
- Sepsis and Non-POA sepsis
- Surgical complications
- Surgical failure to rescue
- Unplanned returns to ED
- Falls
- CAUTI

Readmissions

Population Health
- Pediatric Asthma
- Chronic Kidney Disease
- Oncology
- Diabetes outpatient care
- COPD
- End of Life Care

Custom Care Models
Admission

ID

Risk

List

Orders

Monitor

Discharge

Monitor

30 Days

90 Days

Evaluation & Improvement

Pieces™
Decision Support

Pieces™
EMR
Finding patterns via supervised learning
Using Natural Language Processing to identify:
* Homelessness, substance abuse, behavioral health issues, social support, address changes, personal chaos, social support.*
However..

Population health is often impacted by social determinants outside of a health system’s walls.
The role of social determinants in health. How do we identify them in real-time?

**According to McGinnis et al., 2002**

From: “Leveraging the Social Determinants of Health: What Works?”
Yale Global Health Leadership Institute, BCBS Foundation MA, June 2015
Explanatory Modeling: Avoidable Hospitalizations

Graph showing the relationship between Clinical Determinant Risk and Social Determinant Risk.
Intervention and Monitoring within workflow

Match the intervention to the risk. This is the hardest problem.
Matching Resources in the Community for Health-Related Social Needs

<table>
<thead>
<tr>
<th>Core Needs</th>
<th>Supplemental Needs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing Instability</td>
<td>Family &amp; Social Supports</td>
</tr>
<tr>
<td>Utility Needs</td>
<td>Education</td>
</tr>
<tr>
<td>Food Insecurity</td>
<td>Employment &amp; Income</td>
</tr>
<tr>
<td>Interpersonal Violence</td>
<td>Health Behaviors</td>
</tr>
<tr>
<td>Transportation</td>
<td></td>
</tr>
</tbody>
</table>

Proprietary and Confidential © 2016 Pieces Technologies Inc.
Rapid learning and performance improvement

• A Pieces™ guided physician consultation service to support health systems in their quality improvement activities (Monitoring, Analysis, Feedback).

• Reporting augmented by semi-automated chart review process powered by custom natural language processing (NLP) and machine learning

• Recommendations for customized process improvement strategies
Using NLP and data modeling to understand what can be improved.
Our Products: Advancing health decisions and community connections

Health System Decision Support

- Pieces™
- Decision Support

End-to-End analytics:
- real-time
- NLP-based
- multiple time scales
- explanatory vs. predictive

Healthier Communities

- Pieces™
- Iris

Electronic record system for CBOs that address social determinants of health
Community Based Organizations (CBO) address these social determinants of health.

- Crisis and Emergency
- Food
- Housing and Utilities
- Health and Hospice
- Human Trafficking
- Jobs and Support
- Legal
- Special Needs
- Youth Counseling
- Seniors
..but CBOs are fragmented, technology scarce, and disconnected from health systems.
Pieces™ Iris

A complete electronic record system for Community Based Organizations for any size and scope.
Pieces™ Iris sharing

Connecting all Community Partners.

Pieces™ Iris™

Behavioral Health Facilities

Local Health Information Exchanges
Accountable Health Communities Model Announced

The Department of Health and Human Services today announced a new funding opportunity of up to $157 million to test whether screening beneficiaries for health-related social needs and associated referrals to and navigation of community-based services will improve quality and affordability in Medicare and Medicaid.

The five-year program, called the Accountable Health Communities (AHC) Model, is a Centers for Medicare & Medicaid Services (CMS) Innovation Center model to focus on the health-related social needs of Medicare and Medicaid beneficiaries, including building alignment between clinical and community-based services at the local level.

The Accountable Health Communities Model will support up to 44 bridge organizations, through cooperative agreements, which will deploy a common, comprehensive screening assessment for health-related social needs among all Medicare and Medicaid beneficiaries accessing care at participating clinical delivery sites. The model will test three scalable approaches to addressing health-related social needs and linking clinical and community services – community referral, community service navigation, and community service alignment.

Please save the dates for webinars on the AHC Model application process:
- Thursday, January 21, 2016 from 2:00 – 3:30pm EST | [Registration is now open](http://example.com)
- Wednesday, January 27, 2016 from 3:00 – 4:30pm EST | [Registration is now open](http://example.com)

For more information on the AHC Model and upcoming webinars, please visit the [Accountable Health Communities Model web page](http://example.com).

Centers for Medicare & Medicaid Services (CMS) has sent this [Innovations.cms.gov](http://Innovations.cms.gov) Center for Medicare and Medicaid Innovation (CMMI) Update. To contact Centers for Medicare & Medicaid Services (CMS) go to our [contact us page](http://example.com).
MDHA Board voted to adopt Pieces Iris™ & Plexus™ for case management.

North Texas Food Bank programs (654 Impacted Programs)
NTFB Partner Agencies (316 Pieces Iris™ Implementations)
MDHA Projects (28-47 Pieces Iris™ Implementations)
What people are saying

“We’re investing in Pieces Iris™ to build a healthier North Texas.”

Jan Pruitt, President and CEO, North Texas Food Bank

“Pieces Tech enables us to initiate earlier interventions in children with chronic diseases such as pediatric asthma & diabetes.”

Christopher J. Durovich, President and CEO, Children’s Health

“A uniquely integrated approach to address chronic illness, poverty, and homelessness in our community.”

Ron Anderson, Late president and CEO, Parkland Health Hospital System
Sustainability: Corporate Innovation.
Thank You

For additional information, please contact:

Paul Ceverha
EVP of Client Services
paul.ceverha@piecestech.com
214.616.2432