Applying risk prediction to social service referrals

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DISCLOSURES

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Joshua Vest is a founder partner in Uppstroms and a has provided consulting services to the New York eHealth Collaborative.
Social determinants, social factors, and social needs

**Determinants**
The conditions in which people are born, grow, live, work, and age. Shaped by the distribution of money, power and resources.

**Factors**
Nonclinical, economic, contextual, and psychosocial characteristics that are associated with poor health.

**Needs**
Immediate needs facing individuals.
Social factors and needs
Nonclinical, economic, contextual, and psychosocial characteristics

- **90%** High school graduates
  Higher education is associated with higher paying jobs which is associated with better health outcomes. Individuals with lower educational attainment have higher rates of poor health behaviors like smoking.

- **45%** Children are low income
  Children in poorer families tend to have poorer health outcomes than children in wealthier families. Children in lower income families have higher rates of asthma, injuries, and obesity.

- **12.5%** Food insecure households
  Food insecure individuals are disproportionately affected by diabetes and high blood pressure. Food insecurity is associated with depression, anxiety and other behavioral health issues.

www.nccp.org/publications/pub_1074.html
Increasing income associated with longer life expectancy

- ...men in the bottom 1% of the income distribution at the age of 40 years in the US have life expectancies similar to the mean life expectancy for 40-year-old men in Sudan and Pakistan...

- The 10-year gap in life expectancy between women in the top 1% and bottom 1% of the US income distribution is equivalent to the decrement in longevity from lifetime smoking.
Challenges due to social factors

Unmet social needs drive costs >10%

Social needs drive utilization 2X

Social needs are common >50%


dx.doi.org/10.1016/j.ijmedinf.2017.09.008
doi.org/10.1370/afm.2275
Why worry about AI? Why not just ask patients?

Numerous survey screening tools exist, but…

**RESPONSE BIASES**
Some patients (likely those at highest risk) may not respond to the most sensitive questions or ones they think are unrelated to health care needs.

**HOW TO SCORE**
Survey screening tools collect questions on need but they don’t indicate to providers what to do.

**WORKFLOWS**
EHRs largely do not support social data collection, health systems utilize multiple & varying surveys are in use at the same time.

**ALREADY HAVE LOTS OF DATA**
Demographics, Behaviors, Diagnoses, Referral histories.
Effectively and efficiently address patients’ social needs

Improve patient health and wellbeing

Proactive instead of reactive approach to social needs
Project objectives

- Improve patient health and wellbeing
- Effectively and efficiently address patients’ social needs
- Proactive instead of reactive approach to social needs
Using machine learning approaches to predict referral needs

- EHR Diagnosis & Utilization
- Environmental & Social Health Context
- Neighborhood Health Context
- Statewide Health & Behavior Data

- Dietician
- Behavioral Health
- Patient Navigation
- Medical/Legal Partnership
- Social Workers
Referrals to social services

SOCIAL WORKERS
- Increasingly employed by health systems
- Connect patients to community resources
- Coordinate care
- Counsel patients about personal issues

doi: 10.2105/AJPH.2017.304034

DIETITIANS
- Education
- Weight loss
- Better control for diabetic patients
- Support patients with CVD

doi: 10.1016/j.jand.2017.06.364

BEHAVIORAL HEALTH
- Improvements in functioning, depression, & anxiety
- Increase engagement in care
- Increased patient satisfaction

Prediction performance

- Behavioral health
- Social work
- Dietician services

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<thead>
<tr>
<th>Metric</th>
<th>Behavioral health</th>
<th>Social work</th>
<th>Dietician services</th>
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<tbody>
<tr>
<td>Sensitivity</td>
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<td>Specificity</td>
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<td>F1-score (PPV)</td>
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<td>Area under the ROC curve</td>
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Getting results within provider workflows
Impact of risk prediction for referrals

65% increase in social work referrals when risk scoring went live at primary care clinics

48% increase in odds that referred patients will keep their appointments
Key takeaways

- Social factors are a critical part of care delivery
- Assuring fit with workflow & actionable
- Nontraditional AI targets
- Evaluate impact

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