Strategies to Achieve Alignment, Collaboration, and Synergy across Delivery and Financing Systems

Improving Population and Clinical Health with Integrated Services and Decision Support

Research-in-Progress Webinar
Wednesday, January 9, 2019
12:00-1:00 pm ET/ 9:00 am-10:00 am PT

Funded by the Robert Wood Johnson Foundation
Welcome: Shana Moore, PhD, MPA
Director of Dissemination and Research Development
RWJF Systems for Action National Coordinating Center
University of Kentucky College of Public Health

Presenter: Joshua Vest, PhD, MPH
Director, Center for Health Policy
Associate Professor, Health Policy & Management
Indiana University Richard M Fairbanks School of Public Health - Indianapolis
Affiliated Scientist, Regenstrief Institute

Commentary: Glen Mays, PhD
Director
RWJF Systems for Action National Coordinating Center
University of Kentucky College of Public Health

Q & A: Moderated by Shana Moore, PhD, MPA
Joshua Vest, PhD, MPH

Director, Center for Health Policy

Associate Professor, Health Policy & Management

Indiana University Richard M Fairbanks School of Public Health - Indianapolis

Affiliated Scientist, Regenstrief Institute
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Improving Population and Clinical Health with Integrated Services and Decision Support

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Investigator, Regenstrief Institute, Inc.

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Acknowledgements

Indiana University

• Paul K Halverson (Co-PI)
• Nir Menachemi
• Shaun Grannis
• Suranga Kasthuriranthne
• ...many, many, others


US policy is moving to make providers accountable for patient health.

Upstream thinking

Focus on prevention

Addressing social determinants
More and more health care organizations are offering non-medical or “wraparound” services to improve patient health.

http://cchci.org/_services/behavioral-health/

www.chelseajewish.org/celebrating-social-work-month/senior-care/

Pplay.google.com
guide.berkeley.edu/undergraduate

dmkelite.com

usf.edu
What roles does these services fulfill?

• These services most directly address: health behaviors, social contexts, and environments
  – These social determinants of health are larger drivers of health than medical care
  – These social determinants can inhibit care delivery
    • Lack of transportation, poor social networks, low education all complicate (or prevent) care
• Clinicians traditionally not trained (and health care system were not organized) to address these issues
  – Requires specialized professionals
Research question:

Does receipt of wraparound services reduce patients’ health care utilization?

Approach:

Measure the association between receipt of wraparound services and utilization outcomes in an 11-year panel of adult patients.
Setting, sample, & measures

Setting:
  • Eskenazi Health FQHCs
  • Expanded wraparound services on co-located basis in 2011

Sample:
  • Adults (≥18) with primary care visits from 2006-2016
    – Had to have ≥1 visit before 2011 & ≥1 visit after 2011

Determinant of interest: receipt of wraparound services (Vest, Grannis, et al IJMI 2017)
  • Any social work, behavioral health, nutrition counseling, respiratory therapy, financial planning, medical-legal partnership, patient navigation, or pharmacist consultation
    – All patients in the study sample received at least one wraparound service during the study period

Outcome:
  • Outcomes: annual hospitalizations; annual ED visits

Measures:
  • Annual risk scores, utilization history, (binary) receipt of wraparound services (time-varying)
  • Chronic conditions and demographic factors (time invariant)
Patient-level fixed-effects Poisson regression models described the association between wraparound services and outcomes.

- Patient-fixed effects controlled for time-invariant factors (e.g. race/ethnicity)
- Time-varying measures included in model (e.g. annual risk scores)
- Year dummies included to adjust for trends
- Robust standard errors to adjust for clustering
- Wraparound services entered as a lagged binary-indicator
  - Association with subsequent year utilization

Robustness checks:
- repeated using fixed-effects negative binomial regression
- propensity-score matched comparison group of patients who did not receive any wraparound services with random-intercept Poisson models
High disease burden reflective of a safety-net population

<table>
<thead>
<tr>
<th>Demographics</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>49.7 (mean)</td>
</tr>
<tr>
<td>Female</td>
<td>71.9</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>18.7</td>
</tr>
<tr>
<td>African American</td>
<td>41.4</td>
</tr>
<tr>
<td>White, non-Hispanic</td>
<td>26.7</td>
</tr>
<tr>
<td>Other/unknown</td>
<td>13.4</td>
</tr>
<tr>
<td>Patient severity</td>
<td></td>
</tr>
<tr>
<td>Resource utilization band</td>
<td>2.54 (mean)</td>
</tr>
<tr>
<td>Diagnoses</td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>65.2</td>
</tr>
<tr>
<td>Asthma</td>
<td>17.8</td>
</tr>
<tr>
<td>Depression</td>
<td>42.3</td>
</tr>
<tr>
<td>Diabetes</td>
<td>43.8</td>
</tr>
<tr>
<td>Substance abuse history</td>
<td>20.7</td>
</tr>
<tr>
<td>Tobacco use history</td>
<td>33.8</td>
</tr>
<tr>
<td>Annual utilization history</td>
<td></td>
</tr>
<tr>
<td>Outpatient visit count</td>
<td>3.42 (mean)</td>
</tr>
<tr>
<td>Specialist visit count</td>
<td>2.86 (mean)</td>
</tr>
<tr>
<td>Emergency department visit count</td>
<td>0.81 (mean)</td>
</tr>
<tr>
<td>Hospitalization count</td>
<td>0.20 (mean)</td>
</tr>
</tbody>
</table>
Dietitians followed by social workers are the most commonly accessed wraparound services.

![Bar chart showing the most commonly accessed wraparound services.](chart.png)
Receipt of any wraparound service was associated with a lower count of hospitalizations in the subsequent year.

<table>
<thead>
<tr>
<th></th>
<th>Hospitalizations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Receipt of any wraparound service in the prior year</strong></td>
<td>-0.07 (-0.12, -0.02)</td>
</tr>
<tr>
<td><strong>Severity score</strong></td>
<td>0.66 (0.63, 0.69)</td>
</tr>
<tr>
<td><strong>Annual number of encounters</strong></td>
<td></td>
</tr>
<tr>
<td>Hospitalizations</td>
<td>--</td>
</tr>
<tr>
<td>ED visits</td>
<td>0.01 (0.00, 0.02)</td>
</tr>
<tr>
<td>Outpatient visits</td>
<td>0.01 (0.01, 0.02)</td>
</tr>
<tr>
<td>Specialty care visits</td>
<td>0.03 (0.03, 0.03)</td>
</tr>
</tbody>
</table>

Patient fixed effects regression models with year dummies omitted for readability.
Receipt of any wraparound service was associated with a lower count of ED visits in the subsequent year.

<table>
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<th>Hospitalizations</th>
<th></th>
<th>Emergency department visits</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β (95% CI)</td>
<td>p</td>
<td>β (95% CI)</td>
<td>p</td>
</tr>
<tr>
<td>Receipt of any wraparound service in the prior year</td>
<td>-0.07 (-0.12, -0.02)</td>
<td>0.006</td>
<td>-0.05 (-0.09, -0.02)</td>
<td>0.003</td>
</tr>
<tr>
<td>Severity score</td>
<td>0.66 (0.63, 0.69)</td>
<td>&lt;0.001</td>
<td>0.52 (0.51, 0.54)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Annual number of encounters</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospitalizations</td>
<td>--</td>
<td></td>
<td>0.03 (0.01, 0.04)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>ED visits</td>
<td>0.01 (0.00, 0.02)</td>
<td>0.008</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Outpatient visits</td>
<td>0.01 (0.01, 0.02)</td>
<td>&lt;0.001</td>
<td>0.01 (0.00, 0.01)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Specialty care visits</td>
<td>0.03 (0.03, 0.03)</td>
<td>&lt;0.001</td>
<td>0.01 (0.00, 0.01)</td>
<td>0.016</td>
</tr>
</tbody>
</table>

Patient fixed effects regression models with year dummies omitted for readability.
Limitations

• Generalizability
  – Single, safety-net institution
  – Wraparound services offered on a co-located basis (may not apply to organizations relying on referrals)

• Reductions may be attributable to other quality improvement activities occurring at the same time

• Results do not provide insights as to the relative value of each service
Receipt of any wraparound service was associated with a 7% lower count of hospitalizations & a 5% lower count of ED visits in the subsequent year.

• A portfolio of wraparound services may be an effective strategy for organizations serving a complex patient populations.
• Wraparound service could complement health information exchange, risk stratification, or cross-sectoral collaborations.
So how can we better support efficient and effective use of wraparound services?
Machine learning algorithms to identify those in need of wraparound services.

- Claims & EHR
- Diagnoses & Utilization
- Algorithm
- Any wraparound referral score
- Behavioral referral score
- Dietitian referral score
- Social work referral score
- Additional health behaviors
- Utilization at other providers
- Neighborhood risk behaviors
- Chronic diseases

Area resources
Living conditions
Social context
Safety
Transport

The Polis Center
The Polis Center
www.citygalleryindy.org
www.citygalleryindy.org

nationswell.com
nationswell.com

Machine learning algorithms to identify those in need of wraparound services.
Research and Applications

Assessing the capacity of social determinants of health data to augment predictive models identifying patients in need of wraparound social services

Suranga N Kasthurirathne,¹ Joshua R Vest,²,³ Nir Menachemi,²,³ Paul K Halverson,² and Shaun J Grannis³,⁴

¹Indiana University School of Informatics and Computing, Indianapolis, IN, USA, ²Indiana University Richard M. Fairbanks School of Public Health, Indianapolis, IN, USA, ³Regenstrief Institute, Indianapolis, IN, USA and ⁴Indiana University School of Medicine, Indianapolis, IN, USA
Automated process to provide risk stratification information.

Before clinics open

The predicted probably the patient is in need of mental health services.
Research question:

Does risk stratifying patients according to wraparound service needs:
1. Increase referrals
2. Increase kept appointment (i.e. better uptake)

Approach:

Pragmatic trial using a stepped-wedge design
Risk stratification was rolled out 3 clinics at a time from July to November 2017.
Measures & analyses

- Exposure:
  - Risk stratification category for each service
80% of the population has a probability <0.19

95% of the population has a probability <0.27
Measures & analyses

• Exposure:
  – Risk stratification category for each service
    • High
    • Rising
    • Low
    • Same day appointments
    • Control site (reference group)
Measures & analyses

• Exposure:
  – Risk stratification category (high, rising, low, same day, none)

• Covariates
  – Demographics (e.g. gender, age, race/ethnicity)
  – Location
  – Comorbidity scores

• Analysis
  – Generalized Estimating Equation (GEE) logistic regression models for each wraparound service (accounts for repeated patient observation)
  – Kept appointments only for patients with referrals
  – Nonequivalent DV (HealthyMe)
Intervention was not associated with increased referrals for any service.

Intervention was associated with increased referrals to social workers.

For say day appointments (when no score available) referrals are less likely
  - Workflow issue?
  - Same day more likely to be acute condition?

Suggests no broad changes to general referral practices in the clinics.
General increase in kept appointments once patients were referred to services.

- Even with some indications of dose response (not overselling pilot!)
Automated risk stratification scores successfully delivered to Eskenazi Health primary care clinics.

- Intervention associated with increased referrals for social workers.
- Intervention associated with increased rates of kept appointments for multiple social determinants of health services.
- Next step: put it into EPIC
# Upcoming Webinars

## Archives

[http://systemsforaction.org/research-progress-webinars](http://systemsforaction.org/research-progress-webinars)

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<tr>
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<th>Project Type</th>
<th>Title</th>
<th>Speaker(s)</th>
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<tbody>
<tr>
<td>January 23, 2019</td>
<td>12 p.m., ET</td>
<td>Systems for Action Individual Research Project</td>
<td>Implementing a Culture of Health among Delaware’s Probation Population</td>
<td>Daniel J. O'Connell, PhD, Department of Criminal Justice, University of Delaware</td>
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<td>February 13, 2019</td>
<td>12 p.m., ET</td>
<td>Systems for Action Intramural Research Project</td>
<td>TBA</td>
<td>Glen P. Mays, PhD, MPH, and CB Mamaril, PhD, Systems for Action National Program Office, University of Kentucky College of Public Health</td>
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<tr>
<td>February 27, 2019</td>
<td>12 p.m., ET</td>
<td>Systems for Action Individual Research Project</td>
<td>Housing for Health: Cross-Sector Impacts of Supportive Housing for Homeless High Users of Health Care</td>
<td>Ricardo Basurto Davila, PhD, MS, Chief Executive Officer, Policy Analysis Unit, Los Angeles Co. Department of Public Health and Corrin Buchanan, MPP, Program Manager, Housing for Health, Los Angeles Co. Department of Public Services</td>
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Questions?

www.systemsforaction.org
Acknowledgements

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