Insights from Big Data to support population health and social needs

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

Research In Progress Webinar
Wednesday, February 19th, 2020
12-1 pm ET

Systems for Action
Systems and Services Research to Build a Culture of Health

colorado school of
public health

Welcome: Chris Lyttle, JD – Deputy Director for Systems for Action

Presenters: Joshua Vest, MD – Director at Center for Health Policy, Indiana University Richard M Fairbanks School of Public Health at IUPUI

Commentary: John Loonsk, MD FACMI - Consulting CMIO for Association of Public Health Laboratories

Q&A: Chris Lyttle, JD – Deputy Director for Systems for Action

S4A
Systems for Action

Dr. Joshua Vest is a health services researcher with an interest in the organizational determinants and effectiveness of health information technology and systems.

Most of his work is focused on the adoption, utilization, impact, and policy issues of technologies that facilitate the sharing of patient information between different organizations. His work with health information exchange has ranged from organizational adoption and strategy to impact on outcomes such as readmission rates, repeat imaging, and costs. His 85+ peer-reviewed publications have employed a variety of research techniques from large-scale database analyses, to geographical information system mapping, to survey research, to qualitative focus groups and interviews. As a former local public health practitioner, Dr. Vest has a particular interest in effective public health information systems.

John W. Loonsk, MD FACMI is Consulting Chief Medical Informatics Officer for the Association of Public Health Laboratories and an Adjunct Associate Professor in the Center for Population Health IT at the Johns Hopkins University Bloomberg School of Public Health. He has held the positions of Director of Interoperability and Standards in the Office of the National Coordinator for Health Information Technology (ONC), Associate Director for Informatics at the Centers for Disease Control and Prevention (CDC) as well as CMIO for CGI Federal. He is a fellow in the College of the American College of Medical Informatics and received his medical training at the State University of New York at Buffalo after graduating from the Johns Hopkins University.

Insights from Big Data to support population health and social needs

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Better Care. Better Health.

Acknowledgements

- Eskenazi Health
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- Regenstrief Institute Data Core & Engineering

Findings under review or available in:
Vest JR, Menachemi N, Grannis S, Ferrell J, Kasthurirathne S,† Zhang Y, Tong Y, Halverson P. Impact of risk stratification on referrals and uptake of wraparound services to address social determinants: a stepped wedged trial. American Journal of Preventive Medicine. 56(4):e125-e133; 2019.

Kasthurirathne SN, Vest JR, Menachemi N, Halverson PK, Grannis SJ. Assessing the Capacity of Social Determinants of Health Data to Augment Predictive Models Identifying Patients in Need of Wraparound Social Services. Journal of the American Medical Informatics Association. 25(1):47-53; 2018.

Current challenges facing health care organizations:

- Increasing demands for accountability and assumption of risk

- Focus on health creation and not sick care

- Chronic conditions driven and eventually managed by individual behaviors outside primary care settings

- Recognition that factors due to social determinants complicate care delivery, foster disparities, and are important to health status

The current medical care system not designed to address these issues.

We live with an abundance of data...

Behavior

Public data

EHR

Public health

Health information exchange

Can we use these data to address the aforementioned challenges?

Medication

Social media

Text

Focus on services that address social needs and risks

Social workers

Dietitians

Behavioral health

We implemented machine-learning based risk stratification to identify those in need of social and wraparound services.

Claims & EHR

Diagnoses & Utilization

Algorithm

Behavioral

Dietitian

Social work referral risk score

www.citygalleryindy.org

Area resources
Living conditions
Social context
Safety
Transport

INPC

Health information exchange
Utilization at other providers

Neighborhood risk behaviors
Chronic diseases
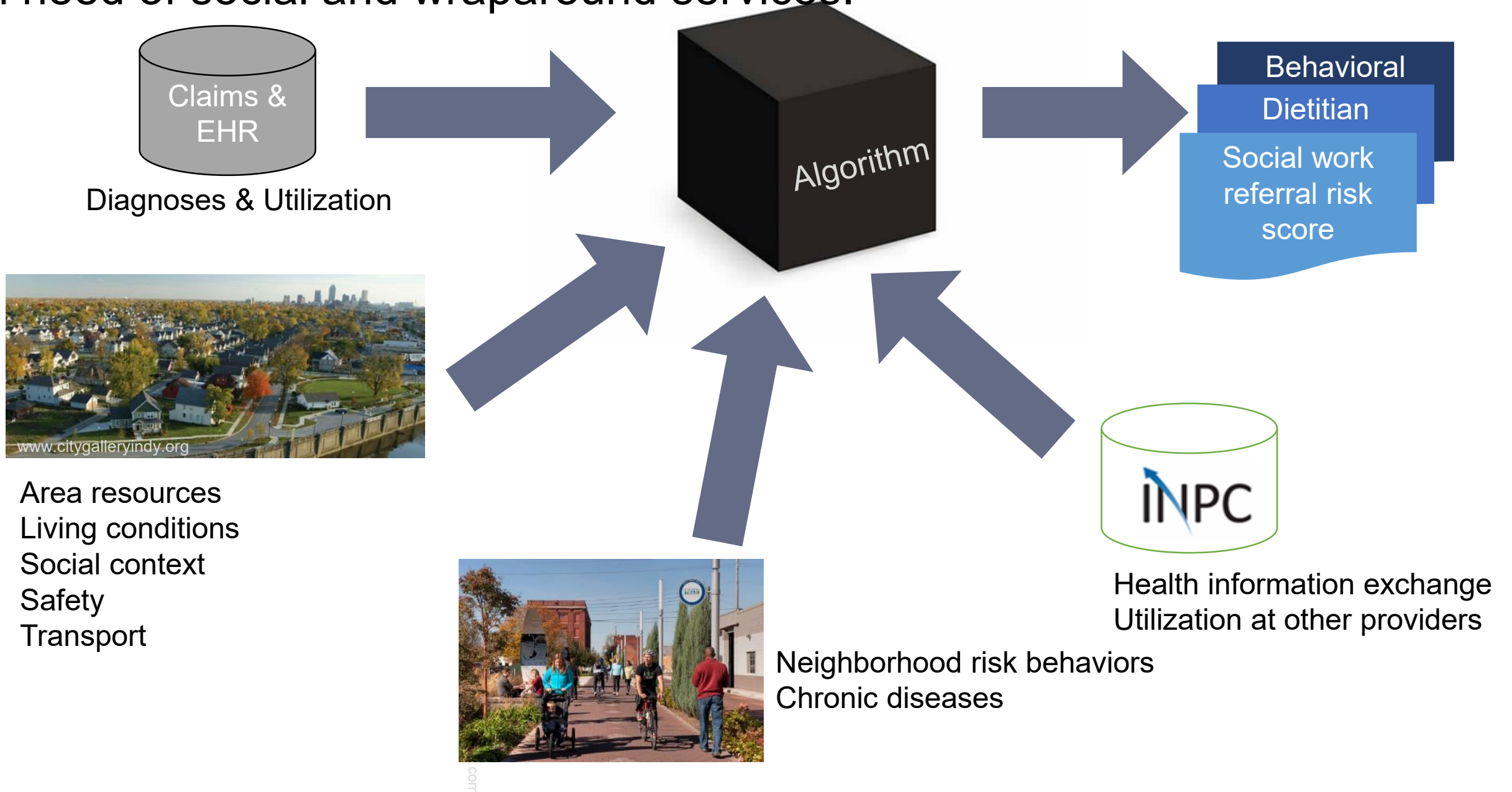
Phase 1: introduced daily line listing reports

Before clinics open

5:00 AM

MRN	Name	provider	DOB	Any referral - need category	Any referral - probability	Mental health - need category	Mental health - probability	Dietitian - need category	Dietitian - probability	Social Work - need category	Social Work - probability
1	A	B	C	Low risk	0.70	Rising risk	0.50	Low risk	0.40	Rising risk	0.30
2	A	B	C	Low risk	0.60	Rising risk	0.40	Low risk	0.20	Low risk	0.10
3	A	B	C	Rising risk	0.90	Low risk	0.20	Low risk	0.50	Rising risk	0.40
4	A	B	C	Low risk	0.60	Low risk	0.20	Low risk	0.40	Rising risk	0.20
5	A	B	C	Low risk	0.50	Low risk	0.27	Low risk	0.30	Low risk	0.00
6	A	B	C	Rising risk	0.90	Low risk	0.20	Low risk	0.40	High risk	0.70
7	A	B	C								
8	A	B	C								
9	A	B	C	Low risk	0.60	Low risk	0.30	Low risk	0.10	Low risk	0.00
10	A	B	C	Low risk	0.40	Rising risk	0.67	Low risk	0.50	Rising risk	0.20

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

Identifiers

Setting & sample

- Eskenazi Health outpatient clinics
  - Indianapolis safety-net provider (for medical indigent)
  - urban population
  - all social services offered on a co-located basis (no referrals to other organizations)
- 238,087 adult outpatient encounters

Sample demographics

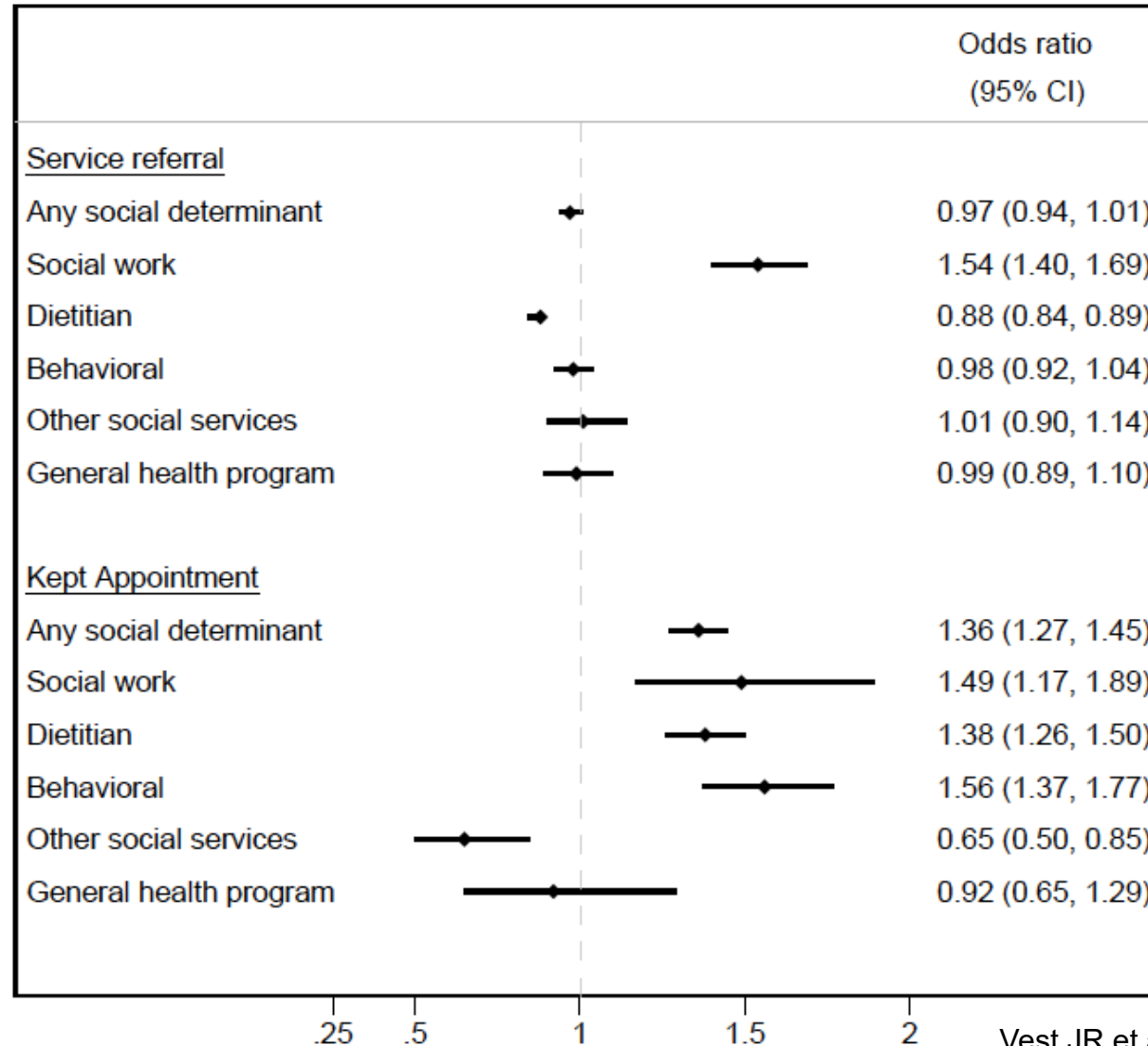| Demographics	
Age (mean, sd)	47.1 (16.1)
Female gender	71%
Race / ethnicity	
White, non-Hispanic	29%
African American, non-Hispanic	48%
Hispanic	22%

Design: stepped-wedge trial

Introduction of daily reports was associated with increases in social work referrals & kept appointments.

Vest JR et al. American Journal of Preventive Medicine. 2019.

Current work as part of S4A

- Modeling
    - More data sources
    - More measures / factors to include

- Intervention
    - Decision support systems have better uptake when integrated into the EHR
    - Expand intervention to include pediatric population

Comparison of new risk prediction model inputs

Feature type	Phase 1	Phase 2
Demographics	Included	Included, unchanged
Weight and nutrition	Not included	Included
Encounter frequency	Included	Included, unchanged
Chronic conditions	Included	Included, unchanged
Additions and narcotics use	Included	Expanded to cover specific types of opioids and narcotics.
Medications	Not included	Included
Patient level SDoH	Not included	Included 12 patient level social features (ICD Z codes)
Population-level SDoH	Included	Expanded to cover 60 SDoH measures

Model performance improved with addition of new features.

under review
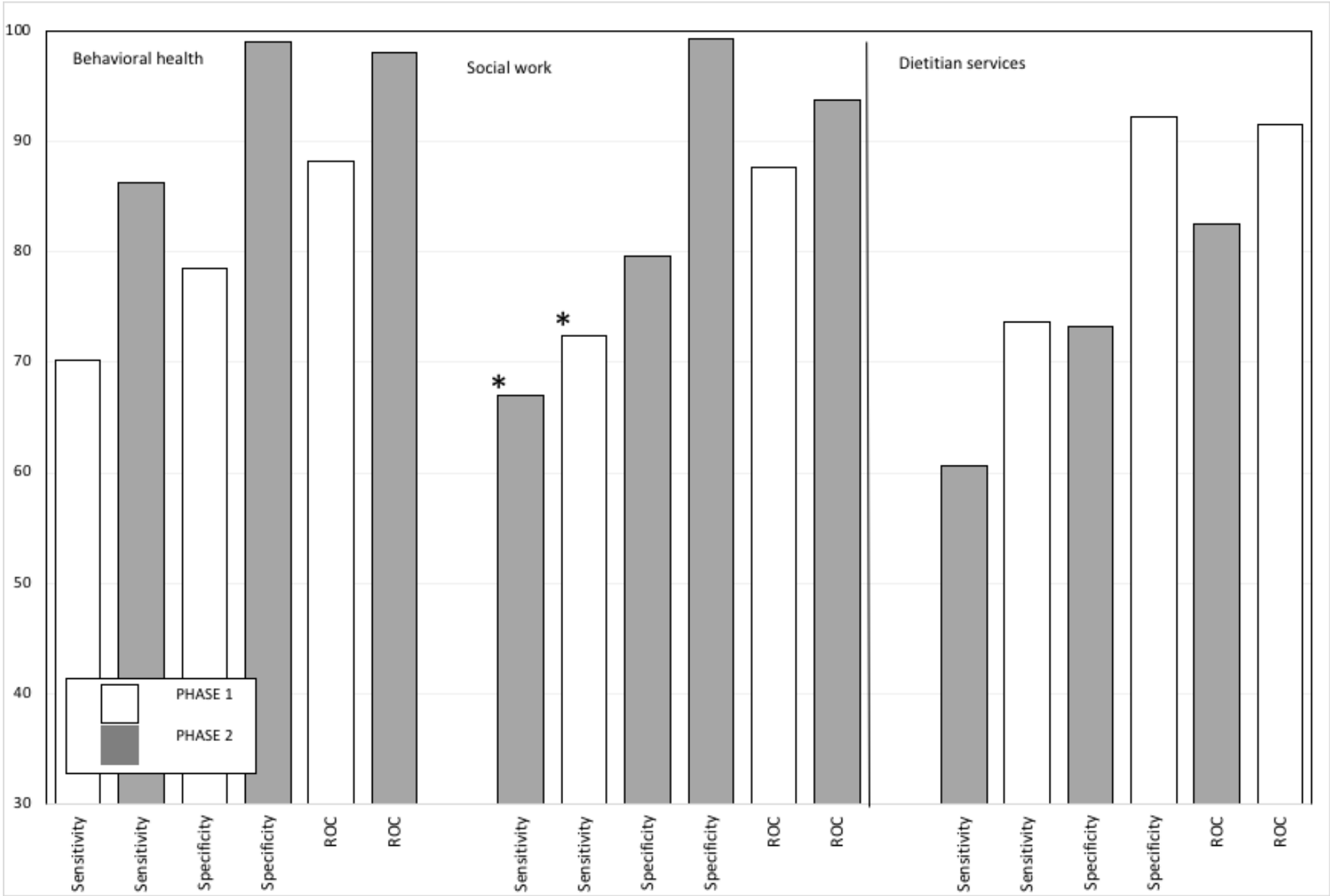
*no significant increase

Decision support for pediatric patients

- Pediatrics social risk is complicated
  - Infants different than kids different than pre-teens
  - Much of social risk is a product of the parents & families – but relationships are poorly linked
- After conversations with end users preference for "rules"

| Present?	Behavioral Health
	Depression screening
	Developmental delay
ⓘ	Learning problems
	ADHD
	Separation anxiety
	Autism Spectrum Disorder
	Previous referrals for behavioral health
	Dieticians
	Obese (BMI > 95th percentile)
	Overweight (BMI > 85th percentil)
	BMI < 10th percentile
	Social Workers
	Failure to thrive

Current work as part of S4A

- Modeling
  - More data sources
  - More measures / factors to include
- Intervention
  - Decision support systems have better uptake when integrated into the EHR
  - Expand intervention to include pediatric population
- Evaluation
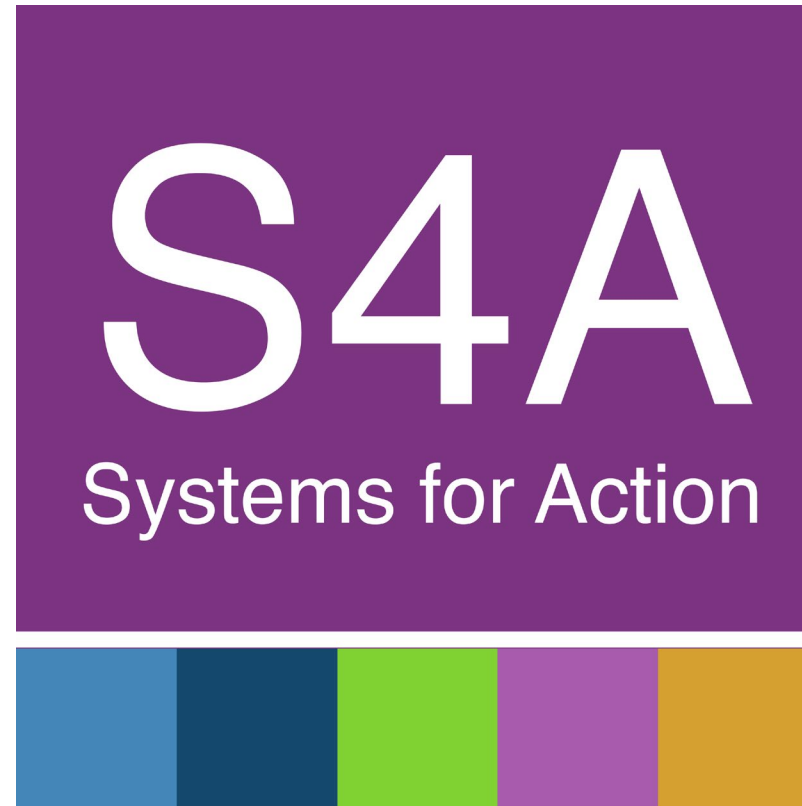 - Pre-post design on impact of decision support tool on utilization outcomes

Inclusion of features from multiple datasets contributed to substantial improvement in prediction models.
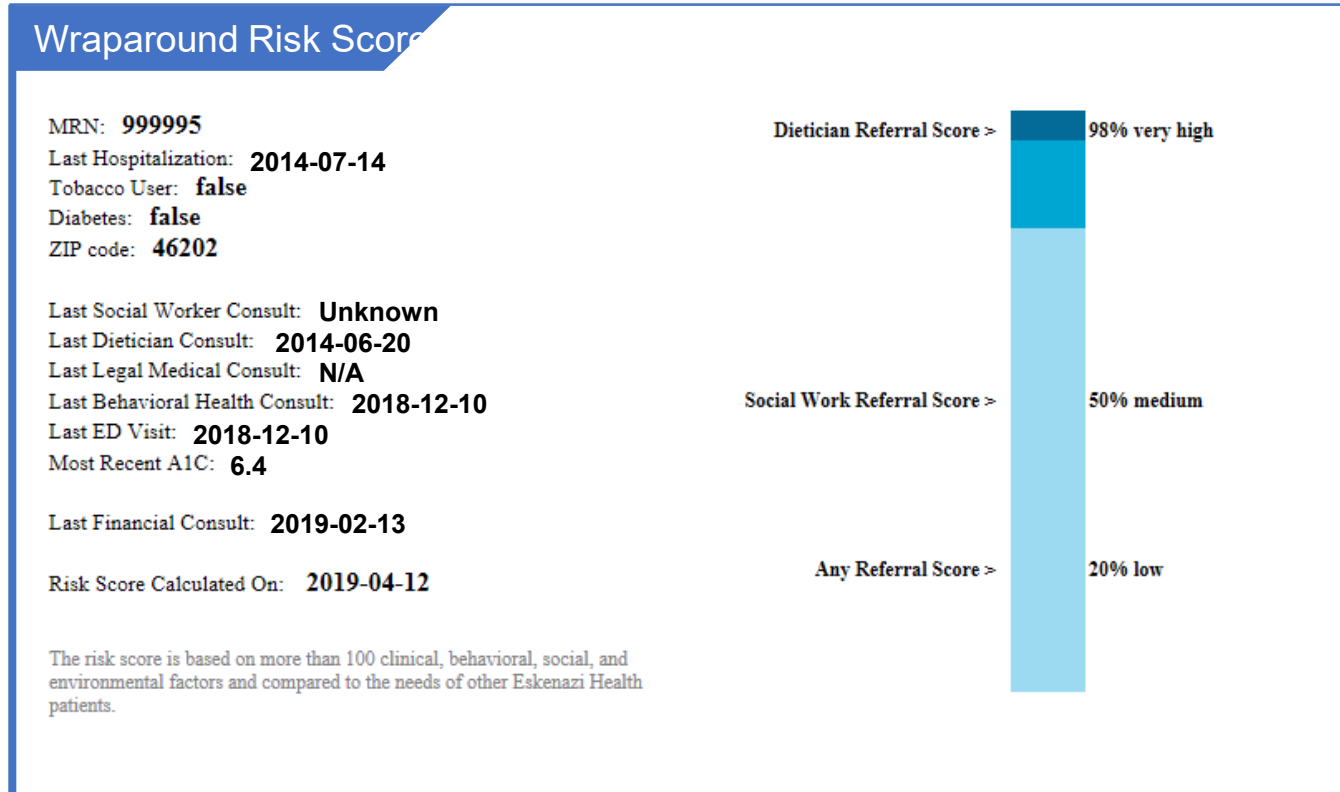
Models are in use within an EHR environment to identify patients in need of services that address needs and risks due to social determinants.

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Commentary: Dr. John Loonsk

Questions?

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Upcoming Webinars

S4A
Systems for Action

March 18th, 2020 12 pm ET

Systems for Action Individual Research Project

Implementing the Tasina Luta: A Public Health Foundation for Cheyenne River

David J. Washburn, ScD, School of Public Health Texas A&M University

April 1st, 2020 12 pm ET

Systems for Action Collaborating Research Center

Financing and Service Delivery Integration for Mental Illness and Substance Abuse

William Riley, PhD, Michael Shafer, PhD, & Kailey Love MBA, School for the Science of Health Care Delivery, Arizona State University

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