

# Improving Diabetes Prevention with Benefit-Based Tailored Treatment: Disseminating Individualized Risk Estimates

PREVIER MEDICAL ASSOCIATES



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#### Health System Reluctance to Screen

High rates of patients with prediabetes and few resources; if only we could prioritize... (AMGA's Together2Goal® Campaign)

#### Developing the Predictive Model

A risk-stratified analysis of individual patient data from 32 clinical trials including a reanalysis of Diabetes Prevention Program (DPP) Study (Figure 1)<sup>1,2,3</sup> showed:

- Heterogeneity of treatment effect, i.e., not all patients will receive average absolute risk reduction.
- Wide and highly skewed distribution of risk for developing diabetes within 3 years.<sup>4</sup>

The predictive model was implemented in 2 health systems, Premier Medical Associates and Mercy Health, using Allscripts and Epic, respectively.

#### Methods

**Design:** Pre/post implementation study, 2018 – 2019.

**Population studied:**  $\sim$ 3,000 patients with prediabetes, 10 pilot primary care clinics, 40 providers, 2 health systems: (1) providers access model via EHR click, data elements auto-populate (2) manual data entry required.

Adaptations: Predictive model adapted for EHR use using Optum data:

- Removed variables like waist-to-hip ratio, see Table 1 for complete list of 11 variables and Figure 2 for patient prototype;
- Calculated coefficients for missing variables. Table 1 lists three required variables.

Surveys: Pre-implementation focus groups and surveys with patients & providers

**Evaluation:** Measures for Reach, Adoption, Maintenance (RE-AIM)<sup>5</sup> (Figure 3); Pre/post implementation surveys (Figure 4); and assessment of "balance" measures, e.g., preventive care screening rates.

### Both have pre-diabetes. Who is at greatest risk for diabetes?

- 38-year-old female
- BMI: 34
- HbA1c: 5.8
- SBP: 153
- African American



**HIGH RISK** 



**LOW RISK** 

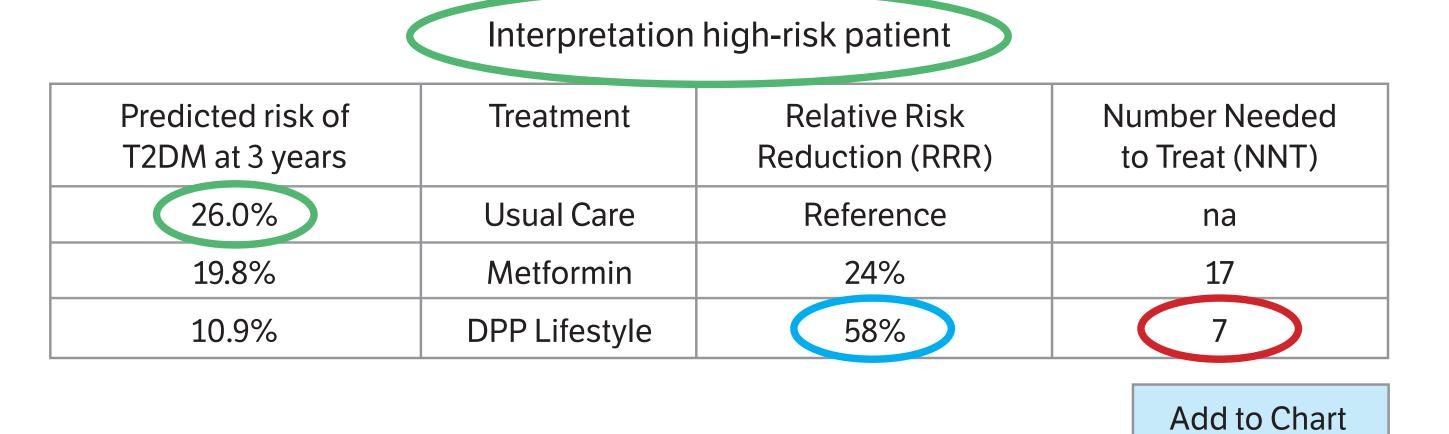
- 58-year-old male

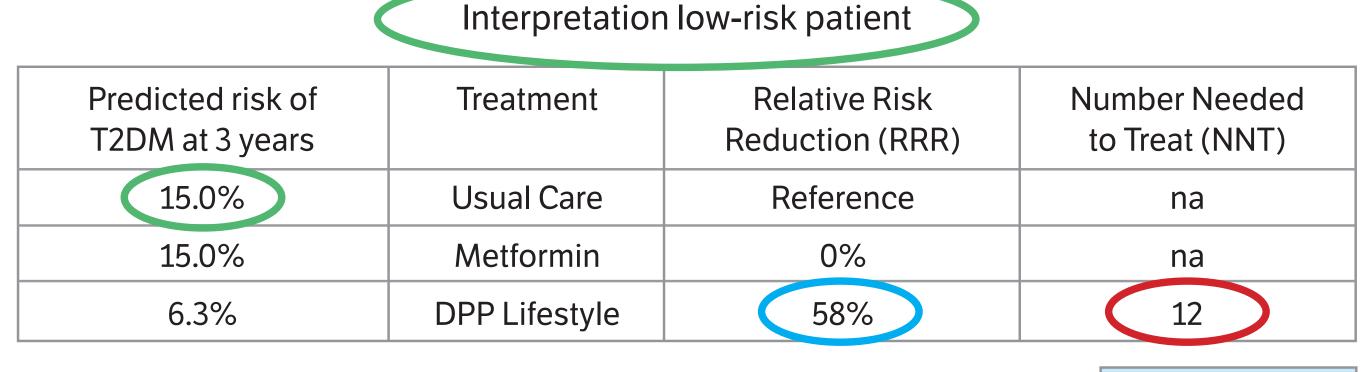
**OPTUM**Labs<sup>®</sup>

- BMI: 22
- HbA1c: 6.1
- SBP: 121
- HDL: 100

# Former Smoker

#### Figure 2. Predictive model results as displayed in EHR, high- and low-risk patients

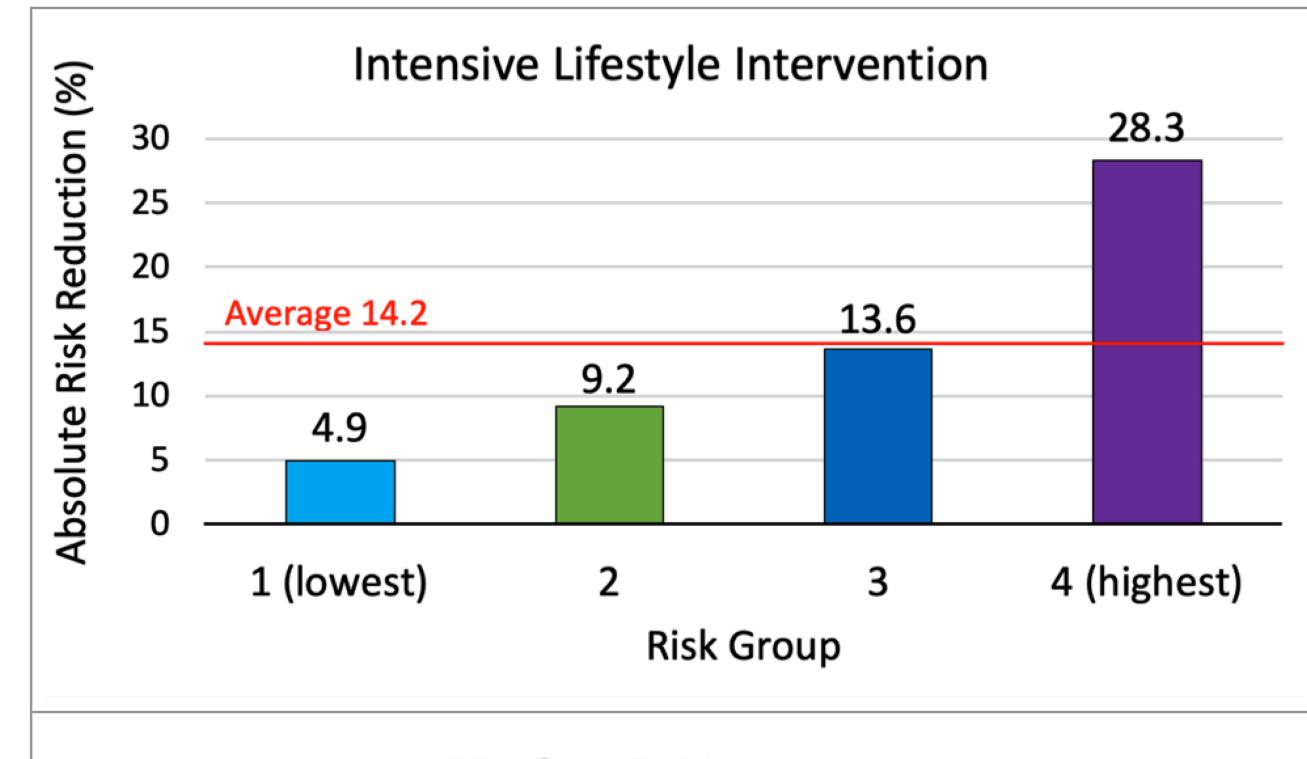


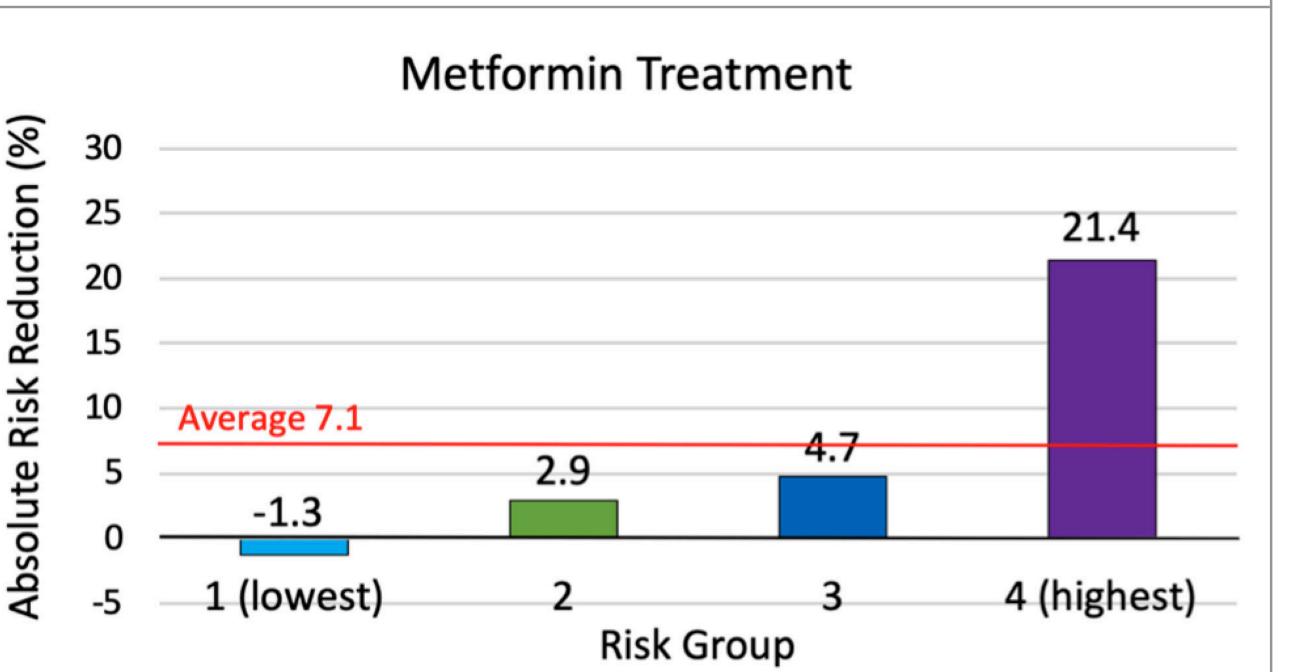


#### Study Objective

Implement in an EHR a predictive model for people with prediabetes that provides individualized benefit estimates for taking metformin or participating in the Diabetes **Prevention Program** 

Figure 1. Heterogeneity of Treatment Effect: DPP Study





#### **Table 1. Diabetes Risk Calculator**

EHR Variables	Value	Required
Age (25–75)	74	Yes
Gender	F	Yes
Race	В	No
Smoke	Υ	No
Hypertension	Υ	Yes
A1c (%)	6.4	No
FPG (mg/dL)*	103	No
Triglycerides (mg/dL)	263	No
BMI (kg/m^2)	30	No
Systolic BP (mmHg)	150	No
HDL cholesterol (mg/dL)	32	No
SCORES		
usual care	56.0%	
DPP lifestyle	23.5%	
metformin	25.1%	

90% -

80% -

60%

40% -

30%

20% -

10% -

\*Treated with DPP or metformin

## Conclusions

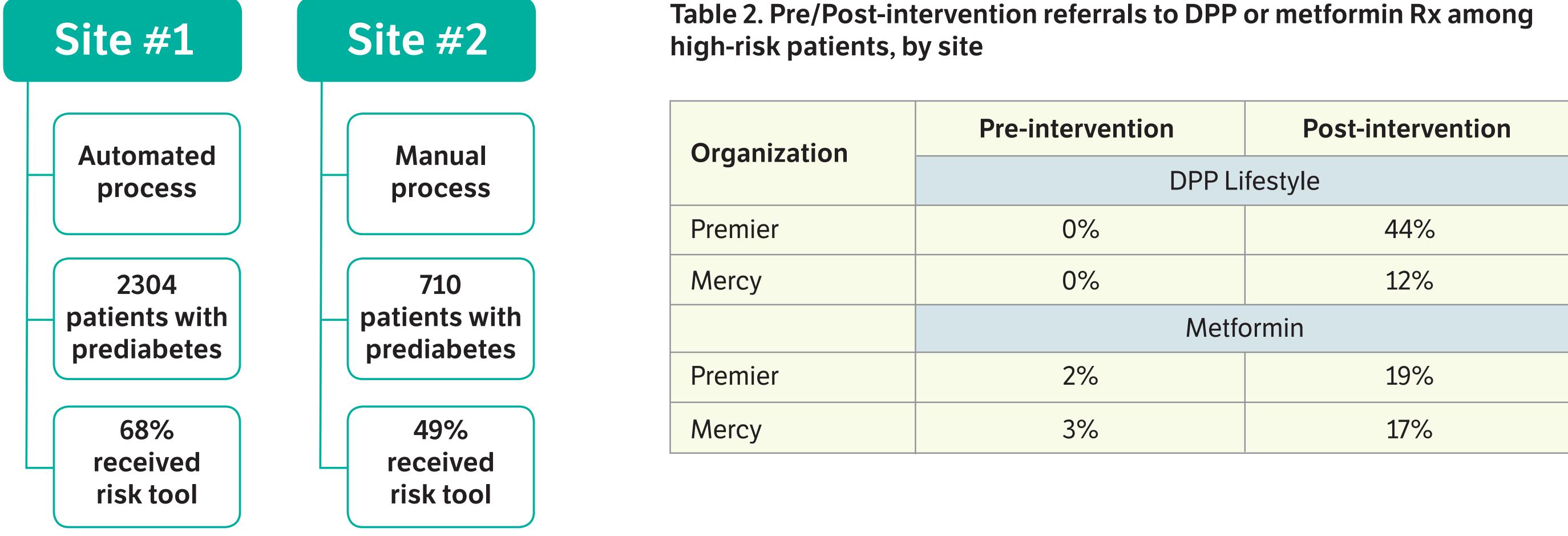
- A predictive model, embedded in the EHR, that predicts individual patient risk for developing diabetes at the point of care improved treatment for patients with prediabetes.
- Use of individualized risk estimates resulted in prioritization of treatment for patients at greatest risk of developing type 2 diabetes.

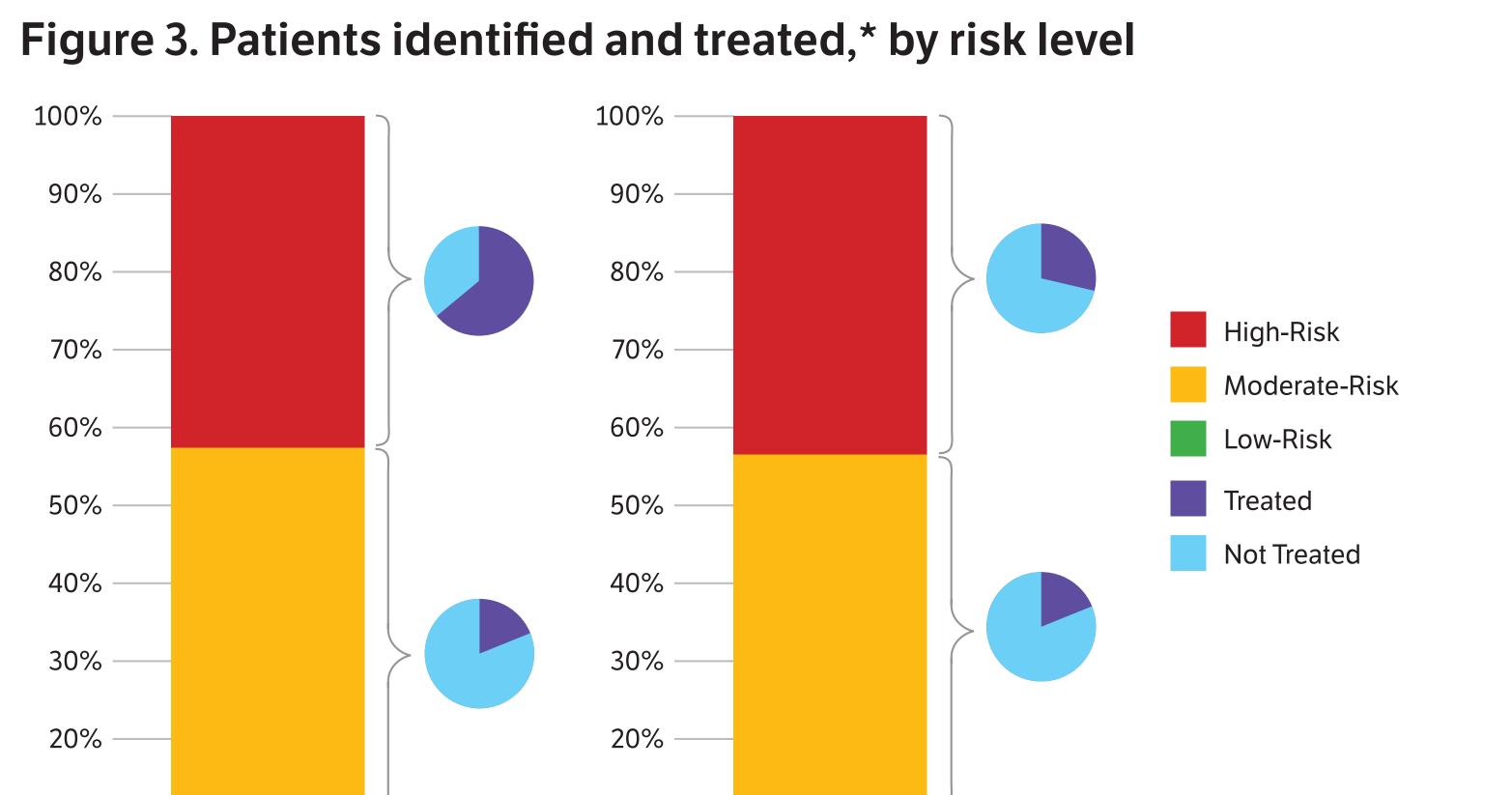
#### **Implications**

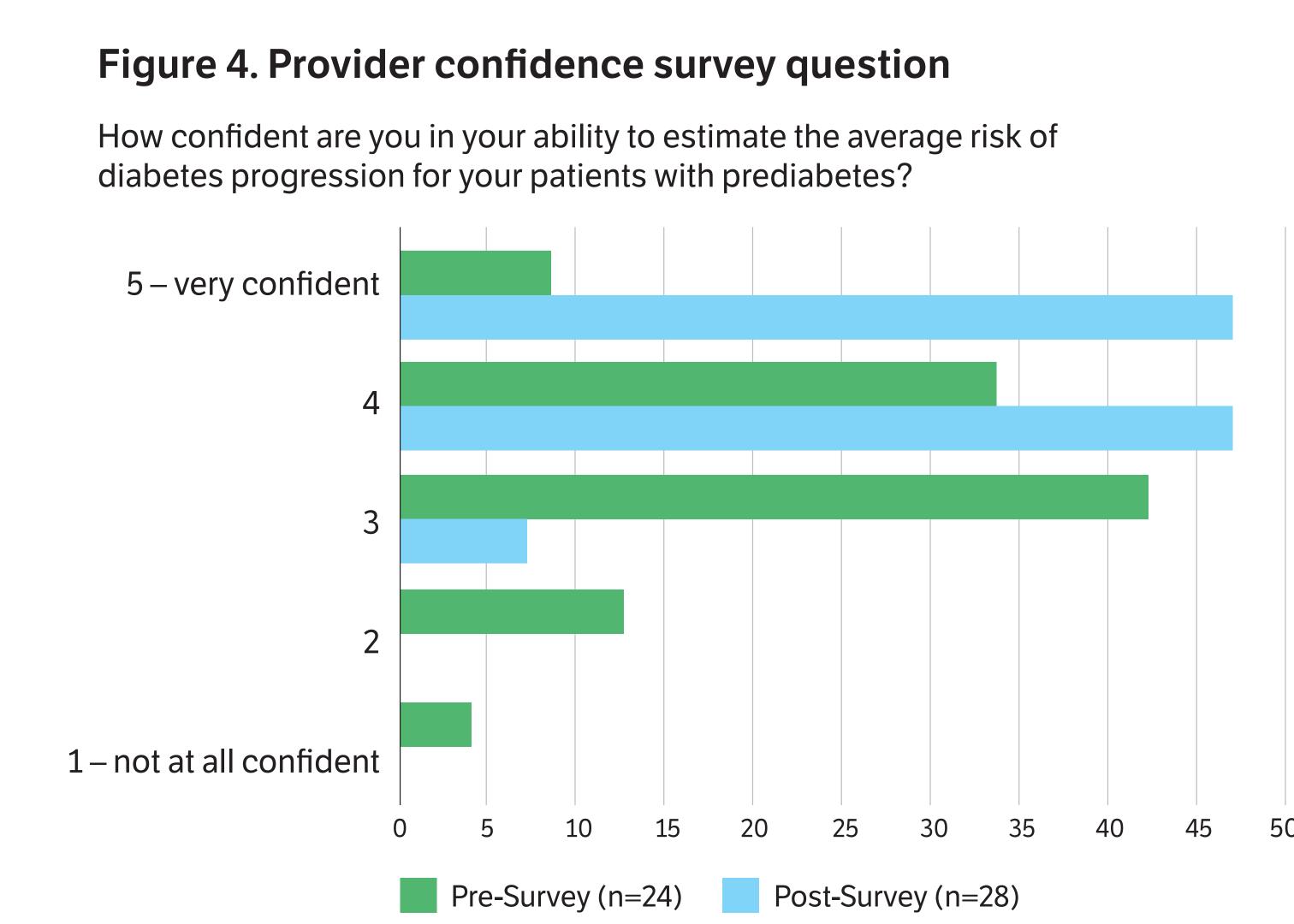
Add to Chart

- Only 3.7% of patients with prediabetes receive metformin; even fewer enroll in the DPP. Change is needed to engage patients and empower providers with tools to increase shared decision making around treatment choices.
- Providers and systems need tools to help prioritize limited resources to increase patient treatment, referral, and adherence through more targeted and tailored treatment recommendations.
- Potential to impact the ~86 million people in the US, one in three adults, with prediabetes. Most are undiagnosed and therefore untreated.
- Cost savings estimated at \$17,500 per patient averted or delayed diabetes for 5 years.

#### Results







#### References

- 1. PCORI grant # 1IP2PI000722 2. Kent, D.M., Nelson, J., Dahabreh, I.J., Rothwell, P.M., Altman, D.G., Hayward, R.A. (2016). Risk and treatment effect heterogeneity: re-analysis of individual participant data from 32 large clinical trials. Int J Epidemiol; 45(6):2075-2088
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- 4. Sussman, J.B., Kent, D.M., Nelson, J.P., & Hayward, R.A. (2015). Improving diabetes prevention with benefit based tailored treatment: risk based reanalysis of Diabetes Prevention Program. *BMJ 350*:h454
- 5. Glasgow, R.E., Vogt, T.M., & Boles, S.M. (1999). Evaluating the public health impact of health promotion interventions: the RE-AIM framework. Am J Public Health 89:1322-27. Also see www.re-aim.org.