TRANScEND: Bridging Transplant with Endocrine for Early Detection of Post-transplant Diabetes Mellitus Via the Performance of Diabetes Risk Scores in the Clinical Setting

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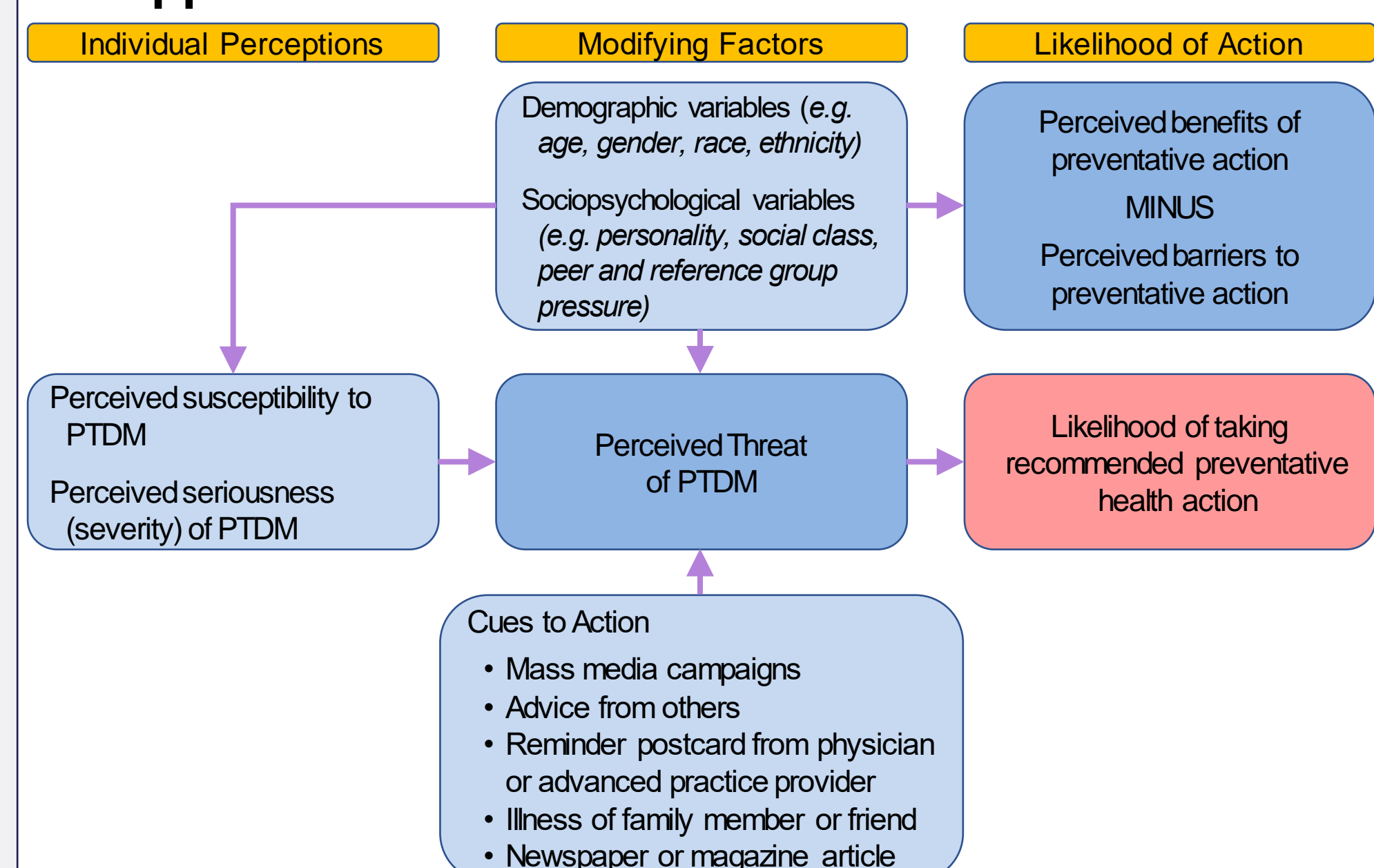
Background

- Post-transplant Diabetes Mellitus (PTDM) affects 4% to 25% of kidney transplant recipients
- Delays in detecting PTDM can have a negative impact on patient outcomes including:
  - Organ Rejection
  - Infection
  - Mortality
- Diabetes risk assessment tools are effective in identifying patients in the general population at high risk for developing Type 2 Diabetes Mellitus (T2DM)
- There are many validated diabetes risk assessment tools available
- However, few are validated in post-transplant populations

Purpose

To compare the accuracy of four diabetes risk assessment tools in identifying PTDM

Framework

Application of The Health Belief Model to PTDM

Individual Perceptions	Modifying Factors	Likelihood of Action

Demographic variables (e.g. age, gender, race, ethnicity)

Sociopsychological variables (e.g. personality, social class, peer and reference group pressure)

Perceived benefits of preventative action MINUS Perceived barriers to preventative action

Perceived susceptibility to PTDM

Perceived seriousness (severity) of PTDM

Perceived Threat of PTDM

Likelihood of taking recommended preventative health action

Cues to Action
- Mass media campaigns
- Advice from others
- Reminder postcard from physician or advanced practice provider
- Illness of family member or friend
- Newspaper or magazine article

- According to the Health Belief Model, perceived severity of and susceptibility to PTDM serve as the guiding force in determining the performance of appropriate health behaviors
- Informing patients of their risk for PTDM can lead to positive behavioral changes and optimize disease management

Methods

Design
- Retrospective review of electronic health records (EHR)

Setting
- Large academic medical center in the Midwest

Sample Inclusion Criteria
- Age 18 years or older
- No history of diabetes at time of transplant
- Received a kidney transplant between 2017 and 2018

Measures
- PTDM Risk
  - Calculated using four validated diabetes risk screening instruments
  - The 4 instruments were selected because they rely on data readily available in the EHR

Summary of Instruments

Diabetes Risk Instrument	Race	Mean Age	Gender	Mean BMI	Instrument Type	Patient Characteristics Needed	AUC
Cambridge (n=1,077)	Non-Hispanic White (99%)	56.1	53% Female	28.3	Regression model/ online calculator	7	.80
Chakkera (n=318)	Non-Hispanic White (71%)	49.0	43% Female	27.0	Summary score model	7	.70
Framingham (n=3,140)	Non-Hispanic White (99%)	54.0	51% Female	27.1	Summary Score model	6	.85
SADPM (n=2,903)	Mexican-American (61.7%)	43.7	58% Female	26.8	Multivariate logistic regression model	8	.83

- PTDM Diagnosis
  - Presence / Absence of PTDM was based on diagnosis of T2DM or PTDM within 3 years of transplant
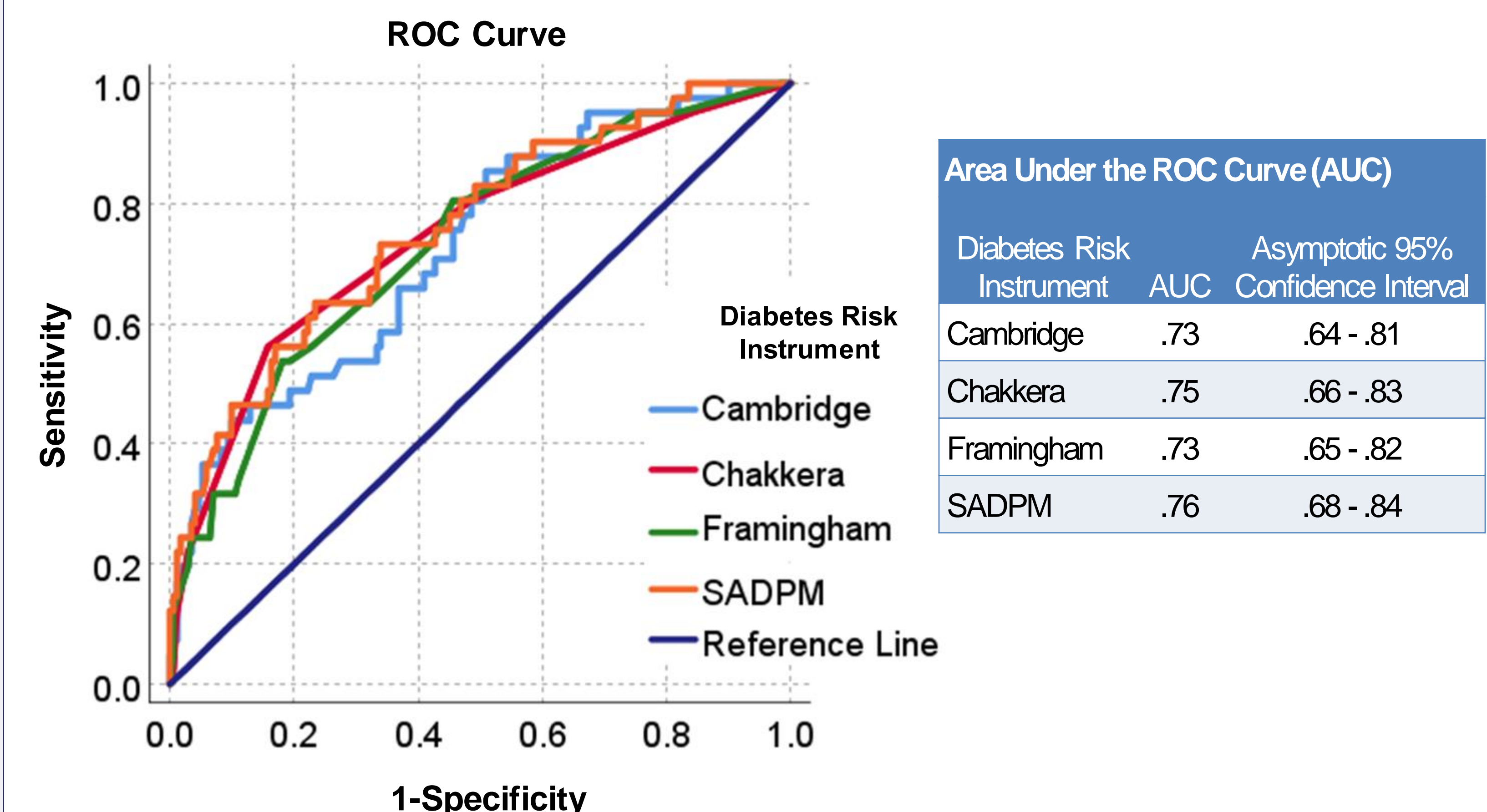
Analysis
- Scale performance was determined using receiver operating characteristic (ROC) curves
- ROC curves plot sensitivity (true positive rate) versus 1-specificity (false positive rate)
- The area under the ROC curve (AUC) is a summary of the instrument's performance, with higher values indicating better predictive performance

Results

- A total of 212 patients without diabetes received transplants between 2017 and 2018

Patient Characteristics (n=212)	n	%
Gender		
Female	88	41.5
Race/ethnicity		
Black/African American	88	41.5
Non-Hispanic White	71	33.5
Hispanic/Latinx	42	19.8
Asian	11	5.2
PTDM within 3 years		
Yes	41	19.3
Age (years), M, SD	59.9	14.0
BMI, M, SD	26.5	4.8

- All tests were fair predictors of PTDM (AUCs > .70, $ps < .001$)

ROC Curve

Area Under the ROC Curve (AUC)		
Diabetes Risk Instrument	AUC	Asymptotic 95% Confidence Interval
Cambridge	.73	.64 - .81
Chakkera	.75	.66 - .83
Framingham	.73	.65 - .82
SADPM	.76	.68 - .84

- SADPM had the highest AUC (AUC .76)
- There were no between-instrument differences in AUCs (all $ps > .42$)

Conclusions

- Although SADPM was the most accurate in predicting PTDM, any of these instruments can be used to identify patients' risk for PTDM in order to facilitate prevention, timely diagnosis, and management
- For clinical purposes, the choice of PTDM risk assessment instrument should be based on the ease of implementation in one's practice
- Future research should examine the use of these instruments in larger kidney transplant populations and whether they can be used to reduce PTDM rates and improve patient outcomes by encouraging patients to adapt positive behaviors based on their risk perception of PTDM