RESEARCH LETTER

# Interpersonal Continuity of Care May Help Delay Progression to Type 2 Diabetes

*Bobbie L. Johannes, PhD, G. Craig Wood, MS, Arch G. Mainous III, PhD, Adam Cook, BA, Alanna Kulchak Rahm, PhD, Christopher D. Still, DO, and Lisa Bailey-Davis, DEd*

***Background:*** **The association between interpersonal continuity of care (CoC) and progression from the prediabetic state to Type 2 Diabetes (T2D) remains unknown.**

***Aim:*** **To evaluate the association between interpersonal CoC and the progression to T2D among persons with prediabetes.**

***Design and Setting:*** **A retrospective cohort study using electronic health record (EHR) data from 6620 patients at Geisinger, a large rural health care system in Danville, PA.**

***Methods:*** **Cox regression methods were used to estimate the hazard ratio associated with progression to T2D within 3-years of being diagnosed with prediabetes.**

***Results:*** **One additional visit with the primary care provider most frequently seen by the patient is associated with 14% decreased risk (HR = 0.86; 95% CI = 0.85, 0.87; $P < .001$) of transitioning to type 2 diabetes within 3 years of being diagnosed with prediabetes.**

***Conclusions:*** **This study demonstrates an association between increased interpersonal CoC after a person is diagnosed with prediabetes and a reduced risk of progressing to T2D within 3 years. (J Am Board Fam Med 2024;00:000–000.)**

***Keywords:*** **Access to Primary Care, Continuity of Patient Care, Electronic Health Records, Prediabetic State, Primary Health Care, Retrospective Studies, Type 2 Diabetes Mellitus**

Type 2 diabetes (T2D) is a leading cause of morbidity and mortality; progression to diabetes can be prevented with the detection of prediabetes and treatment.[1–3] Many modifiable risk factors for prediabetes and T2D can be addressed by primary care, such as obesity, hypertension, and smoking.[4] However, a recent study found that there are numerous missed opportunities to screen, diagnose, and treat prediabetes among a cohort of primary care patients.[5] One potential solution to earlier detection and treatment is interpersonal continuity of care (CoC)—a long-term relationship between a patient and a primary care clinician, that may be characterized by mutual trust and a shared sense of responsibility for care.[6,7] Interpersonal CoC may improve the likelihood of patients being offered or referred treatment as well as compliance with treatment. Therefore, interpersonal CoC may lead to resolution of prediabetes or prevention of T2D.[8] However, team-based care is becoming a standard practice for primary care, while this may foster chronological CoC, it may hinder interpersonal CoC and the value associated with seeing the same clinician throughout the duration of a chronic condition.[9] The purpose of this study is to evaluate the association between interpersonal CoC and the progression to T2D among persons with prediabetes. We hypothesize that greater interpersonal CoC will

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*From* the Department of Population Health Sciences, Geisinger, Danville, PA (BLJ, LBD); Center for Obesity and Metabolic Health, Danville, PA (GCW, AC, CDS, LBD); Department of Health Services Research, Management and Policy, University of Florida, Health Sciences Center, Gainesville, FL (AGM); Geisinger Department of Genomic Health, Danville, PA 17822 (AKR); Division of Genomic Medicine, National Human Genome Research Institute, National Institutes of Health, Bethesda, MD (AKR).
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*Corresponding author:* Bobbie L. Johannes, PhD, 100 N Academy Avenue, MC 44-00, Danville, PA 17822 (E-mail: bjohannes@geisinger.edu).

be associated with lower risk of progression from prediabetes to T2D. This is the first study to assess interpersonal CoC among persons with prediabetes.

## Methods

The sample comes from Geisinger's Diabetes Risk Calculator which retrospectively identified 6620 patients with prediabetes through the Epic EHR.[8] The sample was cared for by a total of 504 different clinicians at their index date, and 70 providers accounted for 50% of cases over the study period. The sample is predominantly non-Hispanic white (94%), 56% are female, and the median age at baseline was 55. Greater details on the study setting and inclusion and exclusion criteria are described elsewhere.[8] Progression from prediabetes to T2D is defined as an HbA1c measure of ≥6.5% or a diagnosis of T2D. Interpersonal CoC is defined as the number of primary care visits with the clinician most frequently seen in the 3-year period after diagnosis with prediabetes until a diagnosis of T2D or until 3 years of follow-up had occurred. A value of zero is imputed for patients with no visits. We use cox regression methods to estimate the hazard ratios of progressing to T2D within 3-years of being diagnosed with prediabetes. We control for characteristics that put people at greater risk of progressing to T2D such as their initial HbA1c, baseline BMI, hypertension, and hyperlipidemia.[10–13] Finally, we control for behavior and lifestyle changes (ie, weight loss and weight regain).[14–18] This research was deemed not human subjects research due to the use of deidentified secondary data by Geisinger's Institutional Review Board (# 2023-1041).

## Results

One additional visit with the clinician most frequently seen is associated with 14% decreased risk of progressing to T2D within 3 years of being diagnosed with prediabetes (Table 1). Factors associated with higher risk of progression to T2D within 3 years included a higher HbA1c, BMI, and age at baseline. A percentage point increase in the amount of weight lost at 1-year post baseline is associated with 4% decreased risk of progressing to T2D within 3-years.

## Limitations

This is a secondary analysis of a study population selected for the development of a Diabetes Risk Calculator; therefore, provider turnover is unknown. In addition, due to the high correlation between total primary care visits and interpersonal CoC, we were unable to control for both measures in our analyses.

**Table 1. Cox Regression Models Estimating the Hazard Ratios (HR) of Progressing to Type 2 Diabetes (T2D) within 3-Years of Being Diagnosed with Prediabetes**

| | HR (95% CI) |
|---|---|
| Number of primary care visits with the most frequently seen clinician | 0.86 (0.85, 0.87)*** |
| Hypertension | 1.02 (0.90, 1.15) |
| Hyperlipidemia | 1.10 (0.97, 1.23) |
| HbA1c at Baseline | 33.25 (25.65, 43.12)*** |
| BMI at Baseline | 1.02 (1.02, 1.03)*** |
| Age at Baseline | 1.01 (1.00, 1.01)** |
| Sex (ref= female) | 1.24 (1.11, 1.38)** |
| Race/ethnicity (ref=non-Hispanic White) | |
| Black | 0.75 (0.50, 1.13) |
| Hispanic | 1.33 (0.9, 1.96) |
| Other/Unknown | 1.59 (1.20, 2.11)** |
| Percent weight lost (WL) at 1 year post baseline | 0.96 (0.94, 0.97)*** |
| Lost >=3% WL at 1-year and then regained at least 2% by 3 years post | 1.19 (1.00, 1.42) |

*Notes*: $^{**}P < .01$; $^{***}P < .001$.
*Abbreviation:* CI, confidence interval.

## Conclusions

We find that increased interpersonal CoC is associated with lower risk of progressing to T2D (as determined by HbA1c ≥6.5%) upon diagnosis of prediabetes. Similarly, a study by Mainous et al. (2004)[18] found that persons with T2D had better HbA1c control if they had a usual source of care. Our findings suggest that interpersonal CoC may be associated with preventive benefit in the prediabetic state. These findings support the premise that more frequent visits with a single primary care clinician, and therefore, an opportunity to foster interpersonal CoC, may improve outcomes for persons with prediabetes and prevent the progression to T2D.

*To see this article online, please go to: http://jabfm.org/content/00/00/000.full.*

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