



Influence of perceived health provider communication, diabetes duration and age at diagnosis with confidence in diabetes self-care

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ABSTRACT

Introduction Several factors influence individuals' confidence to perform diabetes-related self-care activities, including perceived patient-provider communication, diabetes duration and age at diagnosis. It has been well-documented that patient-provider communication is essential when managing chronic diseases such as diabetes; however, the impact of this communication with diabetes duration and age at diabetes diagnosis on confidence in performing self-care behaviors is obscure.

Research design and methods We utilized data from the 2021 Household Component of the Medical Expenditure Survey among participants 18 years or older who had completed the Diabetes Care Survey. Ordinal logistic regression models were utilized to assess the association between confidence in performing diabetes self-care (outcome) and perceived communication with healthcare providers (exposure). Age at diabetes diagnosis and diabetes duration were secondary exposures of interest.

Results 1231 participants were included in the analyses. In primary analyses, we observed that greater perceived healthcare provider communication resulted in greater confidence in diabetes self-care (OR (95% CI) 1.14 (1.08, 1.21)). Results also showed that patients who were diagnosed at older ages have less confidence in managing their diabetes than patients diagnosed at younger ages (OR (95% CI) 0.93 (0.88, 0.99)); correspondingly, longer diabetes duration was associated with greater confidence in diabetes self-care (OR (95% CI) 1.09 (1.01, 1.17)).

Conclusions Confidence in self-care is greatly influenced by perceptions of patient-provider communication, age at diagnosis and diabetes duration. Specifically, having healthcare providers clearly explain things to patients is vital to increasing diabetes self-care. Because self-care is important when managing chronic diseases such as diabetes, future studies should tailor interventions for optimal outcomes.

INTRODUCTION

Diabetes is a major health concern that occurs when one's pancreas has difficulties producing insulin, which results in blood sugar that is too high.¹ Diabetes affects 537 million people and this number is expected to rise to 643 million by 2030 and

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Perceived health provider communication is integral in diabetes self-management.

WHAT THIS STUDY ADDS

⇒ This study adds age at diagnosis and diabetes duration in one's confidence in diabetes self-management.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ This study will facilitate the development of interventions targeting diabetes self-management outcomes.

783 million by 2045.² It can lead to additional health complications, including heart, kidney and vision problems.³ As these numbers rise and complications persist, understanding how to better manage diabetes is paramount. Managing diabetes requires that patients learn appropriate self-care behaviors, which are largely individualistic and multifactorial.⁴

Diabetes self-care behaviors include lifestyle and medical factors such as healthy eating, physical activity, medication adherence, monitoring blood glucose, follow-up medical care and adapting behaviors based on individual needs.⁴ Poor self-care behaviors lead to poor glycemic control⁵ and additional health complications. A factor known to influence diabetes self-care behaviors is confidence in one's ability to accomplish these behaviors, which is associated with better glycemic control and quality of life.⁶ Further research suggests that inadequate confidence in diabetes-related self-care behaviors is associated with inadequate self-care,^{6 7} such as diet and exercise.⁸ In addition, lower confidence in obtaining health information and in doctors is associated with increased avoidance of medical care.^{8 9}

For diabetes self-care behaviors to be optimal, a positive perception of healthcare provider communication is integral. Patients rely on providers to provide tailored and ongoing support and detailed information about their diagnosis.^{10 11} When providers use complex medical terminology, lack detailed information, provide no options or goals, do not foster open communication or follow-up with patients after a diabetes diagnosis,^{10 12} it can lead to patients not adhering to their diabetes treatment regimens. Conversely, when physicians communicate effectively, see patients regularly, utilize multidisciplinary clinics¹³ and consider patients preferred involvement in decision-making,¹⁴ it leads to a positive influence on health, which may be due to the increased positive perception of the quality of care.^{15 16} When physicians provide diabetes self-care education¹⁷ and use patient-centered communication, patients have better self-care behaviors.¹⁸ Improvements in patient-centered communication depend on fostering the patient-provider relationship, patients' participation and involvement and training providers' communication skills.¹⁹ Little research has specifically examined the role of patient-provider communication on confidence in self-care behaviors. This paper aims to examine this relationship in more detail.

Diabetes duration and age at diagnosis can also impact patients' ability to manage their diabetes. A longer diabetes duration is associated with a higher prevalence of complications,²⁰ greater risk of cardiovascular disease and mortality^{21 22} and a rapid decline in kidney function.²³ The prevalence of neuropathy remains significantly higher even after adjusting for factors including the duration of diabetes.²¹ Age at diabetes diagnosis has been shown to be inversely associated with risk of all-cause mortality and macrovascular and microvascular diseases.^{24 25} The literature examining the duration of diabetes and age at diabetes diagnosis that accounts for the impact of confidence in self-care behaviors is limited.

The purpose of this paper is to examine the influence of all three variables (perceived health provider communication, diabetes duration and age at diagnosis) with confidence in performing diabetes self-care activities. It was hypothesized that greater perceived healthcare provider communication resulted in greater confidence in performing diabetes self-care activities and a longer duration of diabetes as well as younger age at diagnosis is associated with greater confidence in performing diabetes self-care activities.

METHODS

Study sample

We utilized data from the 2021 Household Component of the Medical Expenditure Survey (MEPS), which includes MEPS panels 23–26. MEPS is a nationally representative survey administered annually by the Agency for Healthcare and Research Quality with the Household Component collecting data on demographic characteristics,

health conditions and healthcare utilization.²⁶ This analysis included individuals who completed the Diabetes Care Survey in July–December of 2021, which corresponds to round 9 of panel 23, round 7 of panel 24, round 5 of panel 25 and round 3 of panel 26. Of note, these data do not differentiate the type of diabetes diagnoses. From 1370 participants aged 18 years or older who completed the Diabetes Care Survey and had at least one visit to a medical office in the last 12 months, we sequentially excluded individuals missing data on the outcome ($n=66$), exposures ($n=67$) or covariates ($n=6$) for a final sample of 1231 participants. Because this study used publicly available deidentified data, Institutional Review Board approval was not required.

Outcomes

Confidence to perform diabetes self-care activities was the outcome. When asked 'How confident are you in taking care of your diabetes', participants responded via a 4-point Likert scale with scores ranging from 'not confident at all' (a score of 1) to 'very confident' (a score of 4).

Exposures

In this study, our primary exposure of interest was perceived communication with healthcare provider; age at diabetes diagnosis and diabetes duration were secondary exposures of interest. To assess various domains of communication with their healthcare providers, participants were asked four questions: (1) 'How often did health providers listen carefully to you?' (2) 'How often did health providers explain things in a way that was easy to understand?' (3) 'How often did health providers show respect for what you had to say?' and (4) 'How often did health providers spend enough time with you?' Participants responded to each question via a 4-point Likert scale with response options ranging from never (score of 1) to always (score of 4). A composite variable reflecting total perceived communication with their healthcare provider was calculated as the sum of responses from the four questions (range: 4–16) where higher values correspond to a more positive perception of healthcare providers' communication. Age at diabetes diagnosis was self-reported by participants and diabetes duration was calculated by subtracting participants' age at diabetes diagnosis from their current age.

Covariates

Covariates were self-reported and included participants' age, race/ethnicity (Hispanic, non-Hispanic Asian, non-Hispanic black, non-Hispanic white, non-Hispanic other race or multiple race), sex (female or male), education (number of completed years), marital status (married, widowed, divorced, separated or never married), household income (US Dollars/year), number of office-based provider visits during the time period, source of diabetes self-care education (physician, group education class, internet, none of the above), history of cardiovascular

disease (coronary heart disease diagnosis, angina, myocardial infarction, stroke or other heart disease diagnosis), presence of chronic conditions (hypertension, emphysema, chronic bronchitis, hyperlipidemia or asthma), physical limitations (any reported limitations on instrumental activities of daily living, activities of daily living or functional or activity limitations surveys), perceived health status (excellent, very good, good, fair, poor), perceived mental health status (excellent, very good, good, fair, poor) and language spoken at home (English or non-English).

Statistical analysis

Sample characteristics were calculated for the overall sample. Continuous variables were reported as mean and SD, while categorical variables were reported as frequency and percent in each category. We used ordinal logistic regression to assess the unadjusted associations of perceived communication with healthcare providers, age at diabetes diagnosis and diabetes duration (separate models for each exposure) with participants' confidence in performing diabetes self-care activities. We then fit two sets of multivariable-adjusted models: one which adjusted for sex, race/ethnicity, marital status, household income, number of office-based provider visits and source of diabetes self-care education, and a second that additionally adjusted for history of cardiovascular disease, presence of chronic conditions, any physical limitations, perceived health status, perceived mental health status and language spoken at home. In both sets of multivariable-adjusted models, current age was also included as a predictor when perceived health provider communication or diabetes duration served as the exposure. The final models included adjustment for both perceived communication with healthcare provider and age at diabetes diagnosis or perceived communication with healthcare provider and diabetes duration.

In sensitivity analyses, ordinal logistic regression models were repeated with each domain of perceived healthcare provider communication serving as the exposure to assess the contribution of each domain to participants' total perception of healthcare provider communication.

All analyses were completed in SAS V.9.4 (Cary, North Carolina)²⁷ using procedures that account for complex survey design and incorporated the Diabetes Self-Care survey weights from MEPS. A two-sided p value <0.05 was considered statistically significant.

RESULTS

Sample characteristics

Among the 1231 participants in our sample, the survey-weighted mean age was 63 years with an approximately equal distribution of men and women, and most were of non-Hispanic white race (61.7%) but nearly 20% of the sample spoke a language other than English at home (table 1). Over half of the sample was married (52.4%) and had a weighted average income of US\$70 929 and 13

Table 1 Sample characteristics (N=1231)

Characteristic	Mean (SE) or count (%) [*]
Current age (years)	62.9 (0.54)
Age at diabetes diagnosis (years)	49.3 (0.56)
Time since diabetes diagnosis	13.6 (0.39)
Annual household income (US\$)	\$70 929 (2253)
Sex	
Female	692 (50.1)
Male	539 (49.9)
Race	
Hispanic	192 (13.1)
Non-Hispanic Asian	41 (4.8)
Non-Hispanic black	245 (16.8)
Non-Hispanic other race or multiple race	40 (3.6)
Non-Hispanic white	713 (61.7)
Marital status	
Married	529 (52.4)
Widowed	220 (15.0)
Divorced	267 (17.1)
Separated	45 (2.4)
Never married	170 (13.1)
Years of education	13.3 (0.10)
Number of office-based provider visits	13.9 (0.57)
Source of diabetes self-care education	
Physician	892 (70.6)
Group education class	5 (0.3)
Internet	28 (2.5)
None of the above	306 (26.7)
History of cardiovascular disease	489 (37.4)
Presence of chronic condition	1146 (91.9)
Physical limitations	662 (50.4)
Perceived health status	
Poor	97 (8.1)
Fair	292 (22.1)
Good	486 (40.5)
Very good	294 (25.3)
Excellent	62 (4.0)
Perceived mental health status	
Poor	27 (2.0)
Fair	173 (12.4)
Good	462 (36.6)
Very good	354 (30.9)
Excellent	215 (18.1)
Non-English language spoken at home	235 (18.4)

^{*}Mean and SE reported for current age, age at diabetes diagnosis, annual household income, and years of education. Count and percent reported for all other variables.

years of education. The weighted mean age at diabetes diagnosis of 49 years; correspondingly, the average diabetes duration was 14 years. Most individuals learned

Table 2 Assessment of perceived healthcare providers' communication

Question	Mean (SE) or count (%)*
How often did health providers listen carefully to you?	3.5 (0.02)
Never	9 (0.47)
Sometimes	96 (7.13)
Usually	395 (32.11)
Always	731 (60.29)
How often did health providers explain things in a way that was easy to understand?	3.5 (0.02)
Never	16 (1.17)
Sometimes	65 (4.75)
Usually	395 (33.29)
Always	755 (60.78)
How often did health providers show respect for what you had to say?	3.6 (0.02)
Never	14 (1.06)
Sometimes	71 (5.38)
Usually	342 (28.36)
Always	804 (65.20)
How often did health providers spend enough time with you?	3.4 (0.03)
Never	22 (1.83)
Sometimes	127 (10.64)
Usually	402 (34.21)
Always	680 (53.31)
Composite perception of health providers' communication†	14.0 (0.08)

*Mean and SE of all responses for a given question are reported on rows where questions are specified. Count and % are given for individual response options. Summary statistics for composite perception reported as mean and SE.
 †Composite perception calculated as the sum of responses from the listed questions such that higher values indicate a more positive perception of healthcare providers' communication.

to care for their diabetes from a physician and reported a survey-weighted mean of 14 office-based provider visits in the year of observation. Half of the participants reported physical limitations, and almost all reported the presence of at least one chronic condition. Self-reported physical health largely ranged from 'fair' to 'very good,' while mental health was mostly reported as 'good' or 'very good.'

Overall, participants reported a positive perception of health providers' communication with a mean composite score of 14 out of a possible 16. More than half of the participants reported that healthcare providers always listened, explained things clearly, respected them and spent enough time with them (table 2). The majority of

participants (94%) reported that healthcare providers usually or always explained things in a way that was easy to understand, making it the most highly rated component of healthcare provider communication. In contrast, 12% of participants felt that providers never or only sometimes spent enough time with them, making it the lowest-rated component of healthcare provider communication (table 2).

Primary analyses

Within the sample, 24 participants (1.7%) were not confident at all in caring for their diabetes, 231 (18.2%) were somewhat confident, 490 (38.3%) were confident while 525 (41.7%) were very confident. Ordinal logistic regressions were used to analyze the associations between three key variables (perceived healthcare provider communication, age at diabetes diagnosis, duration of diabetes diagnosis) on confidence in performing diabetes self-care activities. In an unadjusted model, each Likert-point increase in perceived health provider communication was associated with a 17% increase in the odds of having higher confidence in caring for diabetes (table 3; OR (95% CI) 1.17 (1.11, 1.23)). This association remained robust and statistically significant in multivariable-adjusted models (fully adjusted OR (95% CI) 1.14 (1.08, 1.21)). The unadjusted association between age at diabetes diagnosis and confidence in performing diabetes self-care activities was not statistically significant (table 3; OR (95% CI) 0.95 (0.91, 1.01)) and remained null on adjustment for demographics, number of office-based provider visits and source of diabetes self-care education (OR (95% CI) 0.95 (0.90, 1.01)). However, on additional adjustment for physical and mental health factors and language spoken at home, there was a significant association between age at diabetes diagnosis and confidence in performing diabetes self-care activities such that each additional 5 years of age at diagnosis was associated with a 7% decrease in the odds of having greater confidence in performing self-care activities (95% CI (0.88, 0.98)). Unsurprisingly, because diabetes duration is calculated from current age and age at diagnosis, this same pattern was observed when assessing the association between diabetes duration and confidence in performing diabetes self-care activities (table 3). Thus, while the unadjusted association between diabetes duration and confidence in performing diabetes self-care activities was not significant, on adjustment for demographics, physical and mental health factors, and whether the participant spoke English at home, each additional 5 years since diabetes diagnosis was associated with a 9% increase in the odds of having higher confidence in performing diabetes self-care activities (95% CI (1.01, 1.16)).

Sensitivity analyses

In sensitivity analyses, perceived healthcare provider communication was disaggregated into its four domains to evaluate the contribution of each domain to the association between participants' total perception of healthcare

Table 3 Associations of perceived healthcare provider communication, age at diabetes diagnosis and diabetes duration with confidence in caring for diabetes

Independent variable of interest	Unadjusted model		Multivariable adjusted model 1*		Multivariable adjusted model 2†	
	OR (95% CI)	P value	OR (95% CI)	P value	OR (95% CI)	P value
Perceived healthcare provider communication	1.17 (1.11, 1.23)	<0.0001	1.18 (1.11, 1.25)	<0.0001	1.14 (1.08, 1.21)	<0.0001
Age at DM diagnosis‡	0.95 (0.91, 1.01)	0.0847	0.95 (0.90, 1.01)	0.0760	0.93 (0.88, 0.98)	0.0092
Years since DM diagnosis‡	1.05 (0.99, 1.13)	0.1203	1.07 (0.99, 1.15)	0.0696	1.09 (1.01, 1.16)	0.0364

All OR and corresponding 95% CI from ordinal logistic regression models in which confidence in caring for diabetes served as the outcome.

* Includes adjustment for sex, race/ethnicity, marital status, annual household income, number of office-based provider visits and source of DM self-care education. Models in which perceived healthcare provider communication and diabetes duration serve as the independent variable of interest are additionally adjusted for current age.

† Includes adjustment for all covariates listed in (a) plus history of cardiovascular disease, presence of chronic conditions, any physical limitations, perceived health status, perceived mental health status and whether a language other than English is spoken at home.

‡ OR and 95% CI calculated per 5 years.

DM, diabetes mellitus.

provider communication and confidence in performing diabetes self-care activities. In unadjusted models, all domains of perceived healthcare provider communication were significantly associated with confidence in performing diabetes self-care activities (table 4). All associations remained significant on adjustment for demographics, physical and mental health factors, and whether English was spoken at home. However, in a model that simultaneously adjusted for all four domains of perceived healthcare provider communication, only the domain that indicated that providers explained things to patients in a way they could understand remained statistically significant (table 4; OR (95% CI) 1.51 (1.13, 2.03)). Of note, the effect sizes corresponding to whether healthcare providers listened to and showed respect for patients were completely attenuated (OR (95% CI) 1.00 (0.69, 1.45) and 0.92 (0.62, 1.35), respectively) when all four domains were included in a single model.

DISCUSSION

This study found that patients diagnosed at older ages have less confidence in managing their diabetes than patients diagnosed at younger ages. Correspondingly, a longer diabetes duration also leads to greater confidence in diabetes self-care. In addition, greater perceived healthcare provider communication resulted in greater confidence in diabetes self-care. These results were unchanged when adjusted for perceived healthcare communication and either age at diabetes diagnosis or diabetes duration, indicating that diabetes duration and perception of healthcare provider communication are independent predictors of confidence in diabetes self-care, since, if they were dependent on one another, the effect estimates would differ on adjusting for both factors.

Previous research has shown that younger, rather than older age at diabetes diagnosis, was associated with higher

Table 4 Associations of domains of perceived healthcare provider communication with confidence in caring for diabetes

Domain of perceived healthcare provider communication	Unadjusted model		Adjusted model 1*		Adjusted model 2†		Adjusted model 3‡	
	OR (95% CI)	P value	OR (95% CI)	P value	OR (95% CI)	P value	OR (95% CI)	P value
Provider listened carefully to me	1.58 (1.30, 1.93)	<0.0001	1.62 (1.32, 1.99)	<0.0001	1.44 (1.17, 1.76)	0.0006	1.00 (0.69, 1.45)	0.9914
Provider explained things to me	1.76 (1.45, 2.14)	<0.0001	1.77 (1.45, 2.17)	<0.0001	1.65 (1.35, 2.03)	<0.0001	1.51 (1.13, 2.03)	0.0058
Provider showed respect to me	1.50 (1.22, 1.83)	0.0001	1.51 (1.23, 1.86)	0.0001	1.38 (1.12, 1.70)	0.0029	0.92 (0.62, 1.35)	0.6628
Provider spent enough time with me	1.52 (1.27, 1.81)	<0.0001	1.56 (1.30, 1.89)	<0.0001	1.45 (1.20, 1.75)	0.0001	1.25 (0.94, 1.66)	0.1243

All OR and corresponding 95% CI from ordinal logistic regression models in which confidence in caring for diabetes served as the outcome and each domain of perceived healthcare provider communication was modeled ordinally.

* Includes adjustment for sex, race/ethnicity, marital status, annual household income, number of office-based provider visits and source of DM self-care education. Models in which perceived healthcare provider communication and diabetes duration serve as the independent variable of interest are additionally adjusted for current age.

† Includes adjustment for all covariates listed in (a) plus history of cardiovascular disease, presence of chronic conditions, any physical limitations, perceived health status, perceived mental health status and whether a language other than English is spoken at home.

‡ Includes adjustment for all covariates listed in (a) and (b) plus all other domains of perceived healthcare provider communication.

DM, diabetes mellitus.

risk of mortality and vascular disease.²⁴ In this study, diagnosis at older age was associated with less confidence in performing diabetes self-care activities than their younger counterparts. Perhaps this is because as age increases, patients are more likely to encounter barriers to self-care, including age-related physical limitations, a smaller social network, cognitive decline, multiple medical conditions and financial constraints that may decrease confidence.³ In addition, older adults also have geriatric syndromes such as urinary incontinence, chronic pains, falls, frailty and coexisting illnesses that can affect self-care if not addressed in combination with their diabetes diagnosis.³

Research has shown that a diabetes duration of less than 10 years is associated with low confidence in diabetes self-care.²⁰ In this study, we found that diabetes duration was associated with having greater confidence in performing diabetes self-care activities. This finding seems reasonable since the earlier patients are diagnosed, the more time they can master self-care. However, literature shows that a longer diabetes duration leads to more diabetic complications including retinopathy, neuropathy, chronic kidney disease and carotid artery plaque,^{3 20} suggesting that confidence would decline with these complications. Future studies should aim to examine factors that may impact confidence in self-care based on diabetes duration to further delineate these findings.

It was hypothesized that greater perceived healthcare provider communication would result in greater confidence in performing diabetes self-care activities. There is a body of literature that indicates perceived health provider communication has a substantial effect on self-care.^{8–16} This suggests that patients' confidence in self-care should increase when positive provider communication is perceived. When examining the domains of perceived healthcare provider communication with confidence in diabetes, each domain was positively associated with confidence in performing diabetes self-care activities. However, when adjusting for all four domains, having healthcare providers clearly explain things to patients was the largest driver in increasing adherence to diabetes self-care activities. This is consistent with the literature on perceived patient–provider communication in which patients perceive the communication with their physicians more positively when their physicians take the time to make sure they understand the information provided to them regarding their diagnosis.^{10–12 17 18} In addition, the percentages of participants reporting 'never' or 'sometimes' were relatively low across all four questions, suggesting that most patients generally had positive experiences with their health providers' communication skills. These findings indicate the need for interventions aimed at aiding better patient-physician communication for older adults who are newly diagnosed with diabetes.

Limitations

Although this study leverages a nationally representative sample of individuals with diabetes, it has limitations.

First, MEPS did not distinguish between type 1 and type 2 diabetes. It is likely that both duration and type of diabetes influence confidence in diabetes self-care. Since most people diagnosed with diabetes in the USA have type 2 diabetes,² it is probable that these findings are primarily applicable to individuals with type 2 diabetes. MEPS does not collect data on patients' definition of diabetes self-care activities, and we were unable to adjust for this important factor. However, the survey asked patients the source of the diabetes self-care education, which is likely a reasonable proxy for this variable. In addition, the current study did not examine the sample's diversity regarding social determinants of health, which have been shown to influence diabetes self-care.^{28 29} Future studies should examine access to resources and social determinants of health that may impede confidence in self-care at an older age or the ability to regularly see a physician.

CONCLUSIONS

In conclusion, confidence in diabetes self-care is greatly influenced by perceptions of patient-provider communication, particularly patients' feelings that providers have adequately explained things to them. In addition, age at diagnosis and diabetes duration are important when examining confidence in performing diabetes self-care activities. Because self-care is essential when managing chronic diseases such as diabetes, future studies should tailor interventions based on these factors for optimal outcomes.

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