Pathways of Teach-Back Communication to Health Outcomes Among Individuals With Diabetes: A Pathway Modeling

Young-Rock Hong[1] [iD], Ara Jo[1], Jinhai Huo[1], Michelle I. Cardel[1], and Arch G. Mainous III[1]

Abstract

Teach-back method can help promote interactive communication between patients and providers. However, the mechanism of how teach-back operates in routine care is uninvestigated. Using pathway analysis, we explored the potential pathways of patient teach-back to health outcomes among individuals with diabetes. Study sample included 2901 US adults with diabetes ascertained from the 2011 to 2016 Longitudinal Medical Expenditure Panel Survey. Our pathway model analysis showed that patient teach-back was associated with better interaction with providers, shared decision-making, and receiving lifestyle advice. Teach-back had a direct negative effect on condition-specific hospitalization and indirect negative effects through lifestyle advice and diabetic complication. Teach-back method may promote active interactions between patients and providers by creating an opportunity to be more engaged in shared decision-making and receive additional health advice from providers. These improvements seem to be associated with a reduction in risks for complications and related hospitalization.

Keywords

Introduction

Having interactive communication between patients and providers is the important first step toward establishing effective therapeutic relationship during primary care.[1] Teach-back method is an effective method to help promote collaborative patient-provider communication, associated with greater patient understanding of health problems and better adherence to treatments.[2-4] Our previous studies also examined the association of receiving teach-back in routine patient-provider interactions and found favorable outcomes on self-care management quality and risk for hospitalization among individuals with diabetes.[3,5]

Although there is increasing literature about the effect of teach-back communication,[2,6] we found no previous studies examining how teach-back operates in patient care process and may lead to better health outcomes. Most existing studies analyzed the direct association between teach-back and various health outcomes. Treatment and management of diabetes implicate a complex, multifactorial care process[7]; thus, more comprehensive understanding of the mechanism of how teach-back operates during clinical encounters is

needed to improve the quality of care for patients with diabetes. Using pathway modeling approach, we conducted this follow-up study to further elucidate the role of teach-back in diabetes care and hospitalization risk.

Pathway Modeling and Conceptual Framework

We built a pathway model to explore the hypothesized relationships depicted in Figure 1 and explain how the effect of teach-back links to patient-centered care factors, diabetes care process, and health outcomes. We hypothesized that, during the teach-back process, providers explain medical information easily for their patients to understand, then ask them to repeat back what they were told. This process would

[1]University of Florida, Gainesville, FL, USA

Corresponding Author:
Young-Rock Hong, Department of Health Services Research, Management and Policy, University of Florida, PO Box 100195, Gainesville, FL 32610, USA.
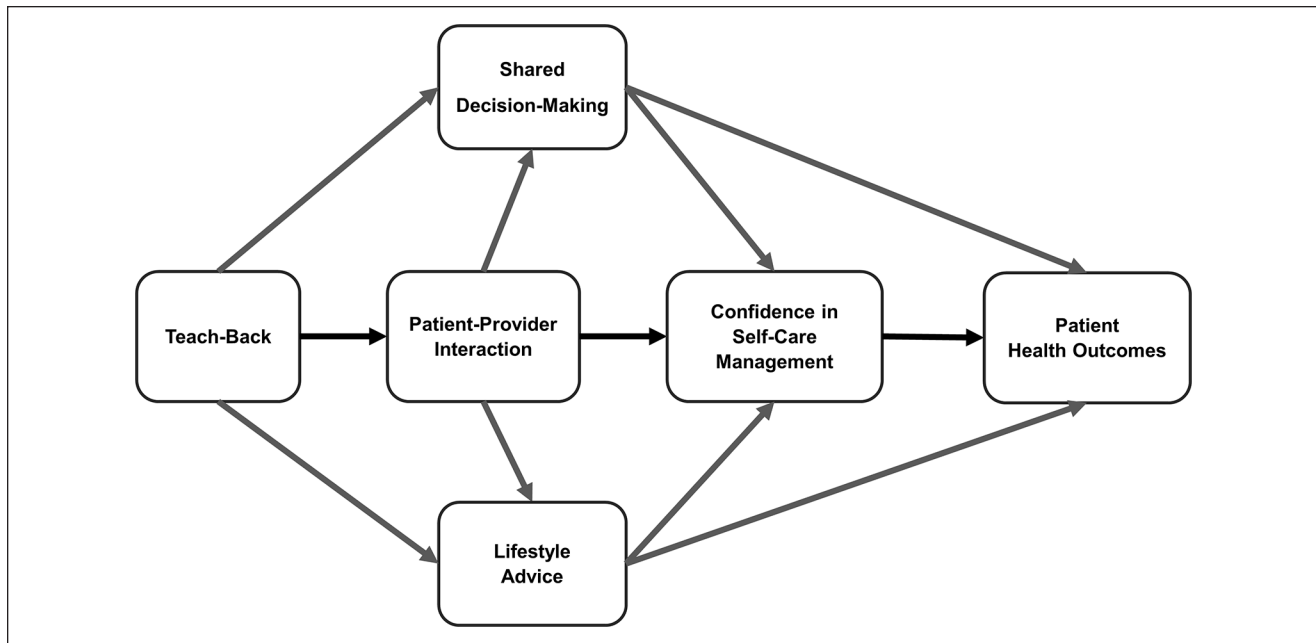Email: YoungRock.H@phhp.ufl.edu

Figure 1. Hypothesized pathways of teach-back and enhanced patient-provider communication to patient health outcomes.

generate interactive communication between patients and providers (known as "*closing the loop*"),[2] which helps have an enhanced understanding of health conditions, treatment plans, and better experience with care.[2,4] Higher interaction quality with the provider and improved patient understanding would then influence patient confidence in self-care management, which would be associated with better patient adherence and health outcomes.[8]

Methods

Data and Study Population

This was a longitudinal pathway analysis of the Medical Expenditure Panel Survey (MEPS) that provides nationally representative estimates of health care access, utilization, and source of payments for the US population.[9] The MEPS uses a 2-year longitudinal panel survey design, and we pooled 6 years of MEPS panel data from 2011 to 2016 (including panels 16-20) linked to supplementary Medical Condition and Hospital Inpatient Stays Files. Detailed descriptions of the study data and linking process are available elsewhere.[3,5] We included individuals aged 18 or older with diabetes diagnosis (both type 1 and type 2) without complications identified using the International Classification of Diseases, ninth Revision (ICD-9 code 250) and Clinical Classification Category (CCC code 049) at baseline. We excluded individuals with a history of cancer or pregnancy, or no visit to healthcare providers at the baseline survey (Year 1); this resulted in the final analytic sample of 2901 (Table 1).

Study Variables

Patient teach-back experience was identified if study participants responded affirmatively to the following questions at the baseline: (1) whether received medical instruction which was easy to understand; and (2) then whether asked to describe how to follow the instructions given. Patient-provider interaction quality was assessed using a composite score of 5 CAHPS® items about providers' attitudes (asking how often their health provider (1) listened to them carefully, (2) explained things easy to understand, (3) showed respect, and (4) spent enough time, (5) and global satisfaction [asking overall patient experience on a 10-point scale]).[9] Shared decision-making process was defined if patient's provider helped when deciding between treatment options and showed respect for patient's preference. In the Diabetes Care Survey component of the MEPS, study participants were asked about perceived confidence in diabetes self-care management and whether they received additional lifestyle or health recommendations (eg, diet, exercise) from healthcare providers. We included health outcomes measured in the follow-up year (Year 2), including any complication related to diabetes (cardiovascular disease, other heart disease, eye, and kidney problems) recorded in the Medical Condition File and inpatient admission due to diabetes or its complications. More details about study variable selection and operationalization are documented in previous studies.[3,5]

Statistical Analysis

The survey design-adjusted descriptive statistics were used to summarize the sample characteristics. The hypothesized

Table 1. Study Population Characteristics.

	Total no.	Weighted % (95% CI)[a]
Median age (IQR)		60 (51-69)
Age group		
18-49	628	20.0 (18.3-21.8)
50-59	781	24.8 (22.8-26.9)
60-64	444	15.8 (13.9-17.7)
65-69	379	13.7 (12.0-15.4)
70+	669	25.6 (23.0-28.2)
Sex		
Female	1598	52.6 (50.4-54.8)
Male	1303	47.4 (45.2-49.6)
Race/ethnicity		
Non-Hispanic White	1051	59.5 (56.5-62.5)
Non-Hispanic Black	765	16.1 (14.1-18.1)
Hispanic	796	15.4 (13.2-17.6)
Other[b]	289	9.0 (7.2-10.8)
Education		
Less than high school	1272	37.2 (34.8-39.5)
High school/GED	706	25.5 (23.1-27.9)
Some college	565	22.7 (20.5-24.9)
Bachelor's or beyond	358	14.6 (12.7-16.5)
Family income[c]		
Poor	824	20.4 (18.2-22.6)
Low income	530	15.7 (13.9-17.6)
Middle income	836	30.7 (28.0-33.4)
High income	711	33.1 (30.2-36.1)
Perceived English proficiency		
Comfortable	1716	61.9 (59.5-64.4)
Not comfortable	1185	38.1 (35.6-40.5)
Census region, no. (%)		
Northeast	445	15.8 (14.0-17.5)
Midwest	517	22.8 (20.2-25.4)
South	1206	41.3 (38.4-44.2)
West	733	20.1 (18.1-22.2)
Health insurance, no. (%)		
Private	1440	59.3 (56.7-61.8)
Public	1203	34.8 (32.3-37.3)
Uninsured	258	6.0 (5.0-7.0)
General health status		
Fair to poor	1160	34.5 (32.4-36.7)
Excellent to good	1739	65.5 (63.3-67.6)
Current smoking		
No	2431	85.4 (83.5-87.3)
Yes	423	14.6 (12.7-16.5)
Obesity (BMI ≥ 30)		
No	1279	43.4 (40.8-46)
Yes	1585	56.6 (54-59.2)
Hypertension		
No	677	24.2 (21.9-26.5)
Yes	2224	75.8 (73.5-78.1)
Hyperlipidemia		
No	849	28.7 (26.5-30.8)
Yes	2052	71.3 (69.2-73.5)
Asthma		
No	2499	86.5 (85.0-88.0)
Yes	402	13.5 (12.0-15.0)

(continued)

Table 1. (continued)

	Total no.	Weighted % (95% CI)[a]
Chronic obstructive pulmonary disease		
No	2743	93.6 (92.3-94.8)
Yes	158	6.4 (5.2-7.7)

Abbreviations: IQR, interquartile range; GED, general educational development; BMI, body mass index; COPD, chronic obstructive pulmonary disease; DM, diabetes mellitus.
[a]Estimates were weighted to be nationally representative using recommended stratification, clustering, and weighting by Agency for Healthcare Research and Quality.
[b]Other includes non-Hispanic Asians/Pacific Islanders, Alaskan/American Natives, and other multiple races.
[c]Family income level was defined based on federal poverty level [FPL] < 100% as poor income, FPL 100% to 200% as low income, FPL 200% to 400% middle income, and FPL > 400% high income.

pathway model was then tested with maximum likelihood estimation using SPSS AMOS 24 (IBM, Chicago, IL) and Mplus version 8 (Muthén & Muthén, Los Angeles, CA). We adjusted the model for age, sex, race/ethnicity, education, family income, health insurance, English proficiency, general health status, smoking, obesity, and other comorbid conditions (hypertension, hyperlipidemia, asthma, and chronic obstructive pulmonary disease) as best-fitting model. Model fit was assessed using 4 indexes: chi-square, Comparative Fit Index (CFI), Tucker Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA); cutoff criteria indicate an acceptable model fit if values are greater than 0.95 for CFI and TLI, and insignificance of chi-square and RMSEA.[10,11] Standardized path coefficients and standard errors were estimated with a bootstrap of 1000 replicates.[11] The Institutional Review Board at our institution deemed this study exempt from review.

Results

Our study sample included of 2901 individuals with a diagnosis of diabetes without complications (median age, 61 years old; 59.5% non-Hispanic White; 52.6% Female). Of those, 805 (25.0%) reported patient teach-back experience during their visit to care at the baseline year. During follow-up year, 518 patients (16.8%) developed complications related to diabetes and 181 patients (6.5%) were admitted to hospitals at least once.

The final study model demonstrated a good fit to the study data (Chi-square=4.751, df=9, P=.856, CFI=.998, TLI=1.00, and P for RMSEA=1.00). Figure 2 presents the final model of teach-back experience in the diabetes care process (see Supplemental Appendix Figure 1 for the full model results). The final outcome of the model was the complication-related hospitalization; and the variables included in the model explained 32.1% of the variance in the outcome. Table 2 shows the parameter estimates from the final model.

Overall, our pathway model indicated that patient teach-back experience was associated with reduced hospitalization,
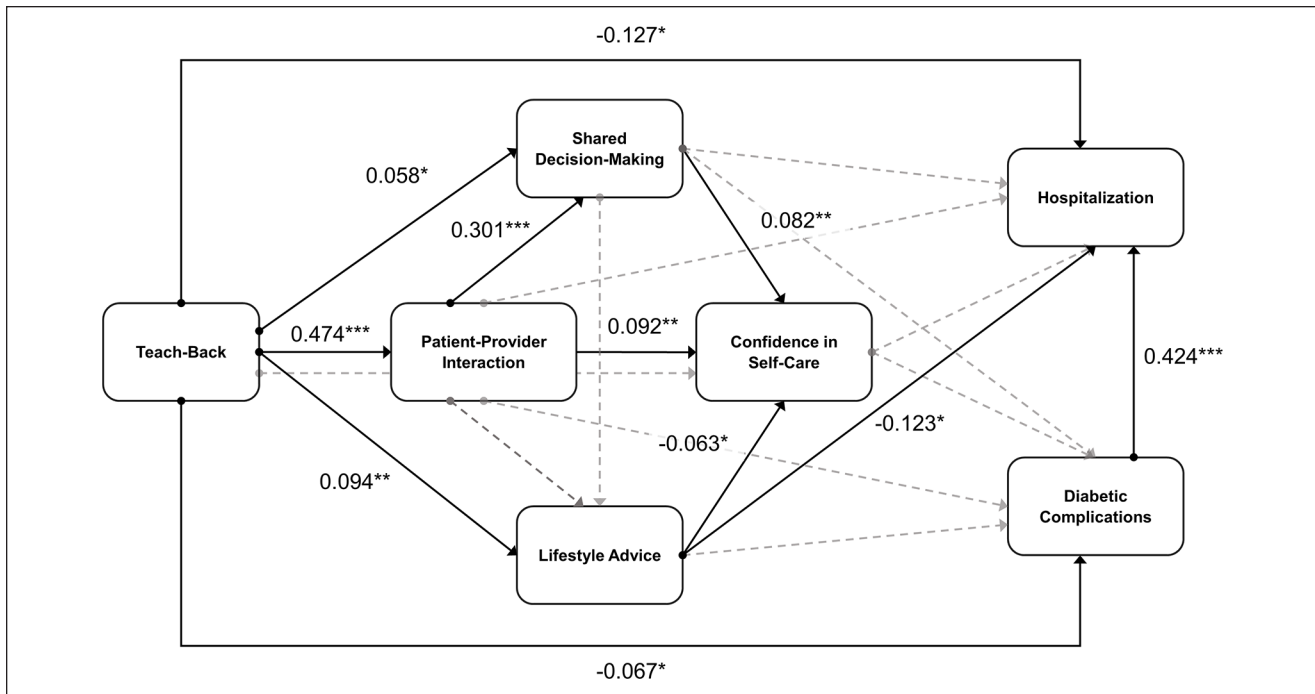
Figure 2. Final path model for teach-back experience in the diabetes care.
Path coefficient and significance *p<.05, **p<.01, ***p<.001.
Insignificant pathways are depicted as dotted lines to minimize the complexity of interpretation. Model fit indices: Chi-square = 4.751, *df* = 9, *P* = .856, CFI = .998, TLI = 1.00, and *P* for RMSEA = 1.00. R^2 = .321.

with effects being partially mediated by lifestyle advice and diabetic complication. Specifically, having the teach-back experience had a direct negative effect on hospitalization (β = −.127, *P* = .021) and indirect negative effects through lifestyle advice (β = −.012, *P* = .045) and diabetic complication (β = −.029, *P* = .049). Teach-back experience also had direct positive association with interaction quality with the provider (β = .474, *P* < .001), shared decision-making (β = .058, *P* = .032), and lifestyle advice (β = .094, *P* = .001). The effect of teach-back on confidence in self-care management was fully mediated by interaction quality and shared decision-making (total indirect; β = .056, *P* = .001), suggesting that teach-back positively influences patient confidence in self-care management thru active patient-provider interactions. However, there was no significant path of patient confidence in self-care to diabetic complication (*P* = .265) or hospitalization (*P* = .251).

Discussion

Patient teach-back experience was associated with better interaction with providers and a higher likelihood of receiving additional lifestyle advice (diet and exercise combined), which was in turn associated with the reduction of diabetic complication and hospitalization risks. To our knowledge, this is the first study to employ the complex pathway modeling approach to evaluate the potential causal mechanism

of patient-provider communication in diabetes care management.

Our analysis showed that the pathways linking teach-back to complication-related hospitalization consisted of 1 direct path and 2 indirect paths: one was mediated by lifestyle advice and the other was by diabetic complications. This suggests that teach-back experience alone may contribute to the risk reduction for hospitalization and its effect may also foster more lifestyle advice and a lower number of diabetic complications developed. It is plausible that patients with teach-back experience may have established healthier lifestyle changes and have better diabetes control outcomes. A large body of the literature proved that interventions of diabetes and lifestyle education were effective and decreased A1c level by 0.8% to 1.0%[12] and provider's follow-up assessment of patient understanding in provider-patient communication was associated with better glycemic control (defined <8.6% A1c).[2]

As hypothesized, patients with teach-back experience tend to have better interaction quality with providers and shared decision-making process.[3] These associations, in turn, seem to increase patient confidence in self-care management.[13] These results support the study hypothesis that teach-back would be associated with increased self-efficacy, and better patient-provider interaction quality appears to function in this process. However, contrary to the hypothesis, patient confidence in self-care management did not

Table 2. Final Path Model Parameter Estimates of Teach-Back Experience, Patient-Centered Care, Diabetes Care Process, and Health Outcomes.

Parameter	Standardized estimates		
	β	SE	*P*-value
Direct effects			
Complication-related hospitalization as outcome			
Teach-back experience	−.127	0.055	.021
Interaction quality with provider	.129	0.087	.099
Shared decision-making	−.043	0.067	.523
Lifestyle advice	−.123	0.052	.018
Confidence in self-care	−.047	0.041	.251
Diabetic complications	.424	0.046	<.001
Diabetes complications as outcome			
Teach-back experience	−.067	0.034	.049
Interaction quality with provider	.006	0.054	.918
Shared decision-making	−.003	0.048	.946
Lifestyle advice	.003	0.036	.935
Confidence in self-care	−.032	0.028	.265
Confidence in self-care as outcome			
Teach-back experience	−.019	0.023	.428
Interaction quality with provider	.092	0.035	.008
Shared decision-making	.082	0.030	.005
Lifestyle advice	−.066	0.027	.015
Lifestyle advice as outcome			
Teach-back experience	.094	0.029	.001
Interaction quality with provider	−.067	0.035	.059
Shared decision-making	.002	0.034	.962
Shared decision-making as outcome			
Teach-back experience	.058	0.027	.032
Interaction quality with provider	.301	0.033	<.001
Interaction quality as outcome			
Teach-back experience	.474	0.018	<.001
Indirect effects[a]			
Teach-back experience → lifestyle advice → complication-related hospitalization	−.012	0.006	.045
Teach-back experience → diabetic complications → complication-related hospitalization	−.029	0.014	.049
Teach-back experience → interaction quality with provider → shared decision-making → confidence in self-care	.012	0.004	.007
Teach-back experience → interaction quality with provider → confidence in self-care	.043	0.016	.008
Teach-back experience → shared decision-making → confidence in self-care	.005	0.003	.097
Teach-back experience → lifestyle advice → confidence in self-care	−.006	0.003	.057
Teach-back experience → interaction quality with provider → shared decision-making	.143	0.017	<.001

Abbreviation: SE, standard error.
[a]Results are estimated based on 1000 weighted bootstrap samples.

have a direct association with hospitalization risk. With the current study model, we do not know whether the association between patient confidence in self-care with actual lifestyle changes or other intermediate outcomes (eg, self-monitoring behavior or glycemic control). However, studies showed that patients with higher self-efficacy were more likely to follow the recommended diet and exercise plan (0.10-0.16 days more likely to follow) and perform self-monitoring of blood glucose (1.14 times more likely to be adherent).[14] Although this may be the case in this study

population, further studies are needed to further explore the pathways of teach-back to these intermediate outcomes, including behavioral and diabetes control outcomes.

Study limitations included reliance on patient self-reported data, which is subject to response and recall biases. Besides, information on patient teach-back experience relied solely on patient self-report. Thus, we were not able to incorporate provider's aspects and it is impossible to determine the appropriateness of teach-back methods that were used in patient care. It is also important to note that we hypothesized the pathways tested in this study; therefore, direct causality of the teach-back and health outcomes still cannot be established.[15] Future studies with a more rigorous study design would be beneficial to delineate causal pathways in the teach-back and patient health outcomes. Despite these limitations, our findings add some evidence to encourage interactive patient-provider communication using teach-back method and demonstrate how this patient-centered care approach in clinical practice might function to improve the patient-provider relationship, clinical care process, and patient health outcomes.

In summary, our pathway analysis suggests that patient teach-back may operate as a catalyst for active interaction between patients and providers, creating an opportunity for patients to be engaged in the shared decision-making process and receive additional health-related advice from providers. These interactions seem to be associated with a reduction in risks for diabetic complications and related hospitalization.

ORCID iD

Young-Rock Hong [iD] https://orcid.org/0000-0002-0366-5687

Supplemental Material

Supplemental material for this article is available online.

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