



Primary Care Provider Feedback of Training to Identify and Manage Pre-Diabetes

Nancy Sohler^{1*}, Yelena Zubatov², Jordan Sill², Julian Botta², Brenda Matti-Orozco², Edwin Young² and Jeanine Albu²

¹City University of New York School of Medicine, USA

²Mount Sinai St. Luke's and Mount Sinai West Hospitals, Icahn School of Medicine, USA

*Corresponding author: Nancy Sohler PhD, MPH; City University of New York School of Medicine; 160 Convent Avenue, New York, NY 10032, USA, Tel: 212-650-7786; Fax: 212-650-7778; E-mail: nsohler@med.cuny.edu

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Abstract

Introduction: Disease-specific training to improve management of chronic diseases is essential in the context of the patient-centered medical home. Achieving provider and staff satisfaction with practices and training is critical for successful patient care. Models for assessing satisfaction in the context of diabetes management have been reported. Here we extend this work to diabetes prevention.

Materials and methods: We administered a questionnaire to all provider and staff involved in a new pre-diabetes management program implemented in an inner city primary care network before, immediately after, and six months after a one-hour training session that was developed following American Diabetes Association guidelines. The questionnaire was adapted for pre-diabetes from the Provider Satisfaction Inventory, an instrument previously used to evaluate perceived ability to manage diabetes on four scales: chronic disease management, collaborative team practice, outcomes, and supportive environment.

Results: Fifty-six attending physicians, 133 residents, and 28 office staff participated. Mean scores on two of the four scales (chronic disease management and supportive environment) improved significantly immediately after the training. Improvement was noted on the other scales, but the changes did not consistently reach statistical significance. Continued improvement in scores after six months was evident in most scales for the attending physicians and residents, but not for the office staff.

Discussion: We successfully adapted a diabetes management satisfaction instrument to the evaluation of pre-diabetes management, and primary care providers and staff reported improved ability to manage pre-diabetes after our training. However, ongoing training after the initial session might be warranted for the office staff.

Keywords: Diabetes; Satisfaction; Training

Introduction

Type 2 diabetes mellitus (T2DM) remains a significant public health problem [1,2]. It is estimated that 29 million adults in the United States (US) have diabetes, and eight million of them remain unaware of this [3]. In addition, 86 million American adults have pre-diabetes, a condition in which blood glucose is elevated and increases the risk of developing diabetes [3,4]. Since it has been demonstrated that intervening with people at high risk for diabetes can prevent or delay the onset of diabetes [5], the American Diabetes Association [6] and other organizations [7-9] recommend such interventions for those with pre-diabetes. Widespread adoption of screening to detect and manage pre-diabetes is desirable, but effective ways to increase adoption of such recommendations by providers in primary care practices have yet to be fully explored.

We recently implemented a pre-diabetes screening and management program in a large primary health care network as part of a New York City's patient-centered medical home (PCMH) initiative [10]. PCMH is an application of the chronic care model, which focuses on a shift in primary care delivery to prevention, early detection, and patient-

centered interventions [11]. Implementation of the program resulted in a statistically and clinically significant increase in appropriate testing and identification of those with pre-diabetes who could be then targeted for treatment. To fully evaluate our program under the chronic care model, it is crucial to not only monitor patient outcomes, but to understand its broader impact from the perspective of the patient, the provider, and the health care system [12]. Here we report on our evaluation of the program from the perspective of the provider, which we defined broadly to include both physicians and office staff.

The program included a well-defined disease management training component that was delivered to all primary care physicians and staff in the primary care network. Before and after each training session, we administered the Provider Satisfaction Inventory (PSI), an instrument previously used to measure provider satisfaction with diabetes management in the primary care setting [13]. We adapted the questions to focus on pre-diabetes management. We addressed the research question, did the implementation of a pre-diabetes screening and management program improve physicians' and staff's perceived ability to manage patients with pre-diabetes?

Materials and Methods

Setting

A pre-diabetes management and screening program was implemented in six primary care clinics of a large primary health care network in New York City, all part of one academic hospital system. Three of the clinics were private practices and three were three federally-qualified community health centers, all of which served low- and middle-income populations. The program had a formal training component that was delivered to all primary care physicians and staff in the primary care network. The protocol and training material were documented in a manual [14] and consisted of face-to-face presentations regarding the ADA guidelines for appropriate testing and management of diabetes and pre-diabetes in primary care settings, including a) review of the guidelines, b) instructions on how to effectively incorporate these guidelines into clinic visits, c) advise on the processes of eliciting the risk factors that determine screening eligibility for undetected diabetes and prediabetes, d) review of the use of newly developed electronic health record to facilitate the collection of and evaluation of risk information from patients, and e) instructions about diabetes and pre-diabetes management strategies.

Study Population: Providers at the clinics who participated in the training were attending physician providers; physicians-in-training (residents) from an accredited Internal Medicine program, years 1-3; nurse practitioners; and physician assistants. This study only includes attending physicians and residents, as too few nurses and physician assistants participated for meaningful evaluation. Clinic staff who participated included front desk clerks, office coordinators/managers, and medical office assistants. Training was delivered by a Certified Diabetes Educator (CDE) in one-hour in person sessions at each clinic site. Training across all sites was completed over a six-month period.

Instrument

Immediately before and after the training session and six months later, participants were asked to complete a 15-minute questionnaire about their satisfaction with the training after signing informed consent. The study was approved by the Institutional Review Board of the St. Luke's Roosevelt Institute of Health Sciences.

The questionnaire was based on a Provider Satisfaction Inventory (PSI) previously developed to assess satisfaction with diabetes management in the primary care setting [13]. We adapted the PSI to assess pre-diabetes rather than diabetes management. We also omitted statements that ask about a nurse educator/specialist because at the time the primary care clinics for our study population did not consistently include a nurse educator/specialist. Our pre-diabetes PSI consisted of 25 items, grouped in four scales that measured providers' ability to take responsibility to direct pre-diabetes care for their patients (chronic disease management), work in collaboration with a clinical team at the health center to manage patients with pre-diabetes (collaborative team practice), deliver high quality pre-diabetes care with compassion and trust (outcomes), and the degree to which the health center resources and environment encouraged and supported pre-diabetes management (supportive environment). Each scale consists of several statements relevant to the domain, for which the respondent is asked to rate on a seven-point Likert scale from strongly disagree to strongly agree.

We tested the internal consistency reliability of each of the four scales of our adapted questionnaire using the data collected for the

current study. Cronbach's alpha for chronic disease management (5 statements) was 0.85 for attending physicians, 0.87 for residents, and 0.90 for staff; for collaborative team practice (4 statements) was 0.81 for attending physicians, 0.82 for residents and 0.75 for staff; for outcomes (5 statements) was 0.83 for attending physicians, 0.84 for residents and 0.75 for staff; and for supportive environment (11 statements) was 0.89 for attending physicians, 0.90 for residents and 0.88 for staff. Overall the Cronbach's alpha for chronic disease management (5 statements) was 0.90; for collaborative team practice (4 statements) was 0.75; for outcomes (5 statements) was 0.75; and for support environment (11 statements) was 0.88.

Data Analysis

We sought to include all providers in the target clinics who participated in diabetes and pre-diabetes management. A total of 227 attending physicians, residents, and office staff participated in the training. Here we report on the 217 people (96% of those participating) who completed both pre-training and immediate post-training questionnaires, and the 138 people (61%) who completed both pre-training and the six-month post training questionnaires.

We report mean scale scores and standard deviations for each provider type (attending physicians, residents, and office staff) measured at three time points: pre-training, immediate post-training, and six-month post-training. To test whether the intervention improved satisfaction with pre-diabetes management in the clinic for each provider group, we compared mean values of the average score of each of the four scales measured prior to training with those obtained immediately after training and six months after training. To test the statistical significance of observed differences in mean scores between time points, we conducted paired t-tests. We could not make formal statistical comparisons across provider groups because the sample size was too small. Also, because of the small sample size in some provider groups, we base our interpretations partially on the magnitude of the observed differences, rather than solely on the results of the statistical significance tests. Participants were dropped from the analysis of a scale if they did not provide valid responses for all items in that scale.

Results

A total of 56 attending physicians, 133 residents, and 28 office staff completed both pre- and immediate post-training questionnaires, and 32 physicians, 84 residents, and 22 office staff also completed the 6-month post-training questionnaire.

The mean scores and paired t-test results for valid scales are presented in Table 1. Each scale had a potential average range of "0" (strongly disagree) to "6" (strongly agree), with a "3" representing a neutral opinion. On all items "strongly disagree" was equivalent to the most negative opinion about perceptive ability to manage pre-diabetes in the context of the new program, and "strongly agree" was the equivalent to the most positive opinion.

Following the intervention, the average rating across all scales ranged from 4.10 to 4.50 for attending physicians, from 4.38 to 4.74 for residents, and from 3.89 to 4.81 for office staff. For all three groups, the average rating improved from pre- to post-training for all scales. This improvement reached statistical significance for providers for all scales except the scale that measured the attending physicians' perceived ability to develop an open and trusting relationship (outcomes), for residents for all scales, and for office staff for all scales except the scale

that measure the staff member's ability to work within a functional, collaborative team to manage patients with pre-diabetes.

	Chronic Disease Management				Collaborative Team Practice				Outcomes				Supportive Environment			
	N	mean	s.d.	p-value	N	mean	s.d.	p-value	N	mean	s.d.	p-value	N	mean	s.d.	p-value
Attending Physicians																
Pre	53	3.94	1.03		49	3.97	1.10		52	4.39	0.90		48	3.74	0.90	
Post*	53	4.25	1.14	0.004	49	4.14	1.02	0.041	52	4.50	1.03	0.113	48	4.10	0.93	0.000
6-months*	29	4.48	0.93	0.063	28	4.75	0.95	0.013	29	4.79	0.78	0.055	24	4.40	0.90	0.046
Residents																
Pre	130	4.15	1.01		131	4.17	1.04		129	4.64	0.94		124	3.95	0.87	
Post*	130	4.53	0.95	0.000	131	4.50	0.95	0.000	129	4.74	0.88	0.028	124	4.38	0.91	0.000
6-months*	83	4.66	0.79	0.000	84	4.61	0.79	0.000	82	4.84	0.72	0.005	78	4.32	0.85	0.000
Office Staff																
Pre	26	3.44	1.37		28	4.51	0.99		27	4.56	0.97		26	4.23	0.91	
Post*	26	3.89	1.17	0.010	28	4.63	1.08	0.294	27	4.81	0.86	0.026	26	4.45	0.90	0.012
6-months*	21	3.61	1.13	0.436	21	4.64	0.99	0.407	22	4.64	0.91	0.401	20	4.10	0.85	0.635

Table 1: Attending physicians, residents, and office staff ratings of perceived ability to manage pre-diabetes before and after training in urban primary care clinics

At six months, the improvement in all of the scale scores was largely maintained for attending physicians and residents, although the improvements between pre- and six-months post-training were not consistently statistically significantly different due to the reduced sample size at the six-month point. At six months, the post-training rating level for office staff dropped for chronic disease management, outcomes and supportive environment.

Discussion

While emphasis on diabetes screening and management is crucial to most health care systems across the country, few have integrated systematic screening and management of pre-diabetes in routine care. We developed and implemented a pre-diabetes management program in an urban primary care setting [10], offered a structured training for the program that targeted both providers and staff, and evaluated whether the providers' and staff's perceived ability to manage patients with pre-diabetes improved after the training and then again after working within this program for six months. This study is the first to focus on satisfaction with a pre-diabetes management program reported by both providers and office staff. There were three main findings.

First, providers (attending physicians and residents) reported improvements in their ratings of the program immediately after receiving pre-diabetes management training, although for one of the attending physicians' scales (outcome) this improvement did not reach statistical significance. This indicates that the training improved their expected ability to perform necessary tasks and roles within the health care system related to pre-diabetes management. For example, they expected that the new program would better allow them to provide

appropriate care, work within a collaborative team, and develop an open and trusting relationship with their patients, and that their health system environment overall would be more suited to appropriate pre-diabetes care.

Our second finding is that both attending physicians and residents reported improvements in the perceptions of their ability to manage pre-diabetes after working within the newly implemented pre-diabetes program for a six-month period, although this improvement didn't consistently reach statistical significance because of the smaller sample size available at follow-up. We believe this indicates the training proved to be meaningful in its application to their practices in the clinic.

Our third finding is that we observed improvement in ratings with pre-diabetes management among office staff as well as the providers. For the office staff, while not consistently statistically significant, improvement after training was observed immediately on all scales and improvement after six months in practice was observed on most scales. The magnitude of improvement after six months in practice was smaller than that immediately after the training for the scale that measured perceived ability to take responsibility to direct pre-diabetes care (chronic disease management). This is probably because as staff learned more about diabetes and pre-diabetes and the rationale for specific management, they realized how much more there was to learn.

Office staff may require ongoing or additional training to understand fully the need for rigorous screening and management, and engage in this process in a meaningful way in their clinics [12,15,16]. With regard to the other measures (outcomes, collaborative team practice and supportive environment), it is possible that there is a need for more emphasis on establishing processes that increase the staff

feeling more valued and essential in the processes of care. Making staff feel valued and providing ongoing opportunities for learning and personal growth are key characteristics to staff satisfaction and should be a crucial topic of focus.

We note that the level of satisfaction in each of the 4 scales measured on the PSI in our study is lower than that reported in the previous study that used the same instrument to evaluate satisfaction with diabetes care among primary care and other physicians who treat patients with diabetes [13]. In the previous study the mean ratings for physician providing usual diabetes care ranged from 4.4 to 5.12 across the four scales. For our study, the range for physician providing diabetes care in primary care practices was 4.1 to 4.5 immediately after the training.

These differences in average ranges are important to note because the previous study considered scale scores lower than or equal to 4.5 as indicative of “dissatisfaction;” all four of our averages were lower than 4.5. We believe this lower rating might be because our evaluation was conducted closer to the initiation of training for a new program. Evidence that our 6-month follow up scores were slightly higher supports that hypothesis, although the large loss to follow-up forces us to interpret this potential pattern with caution. Ongoing evaluations of our program will allow us to fully understand provider and staff satisfaction.

Our study also has implications for post-graduate training of residents working in the primary care setting. Some studies indicate that a significant number of graduates of primary care residency programs are inadequately trained in the outpatient diabetes care [17] and that formal diabetes management training can improve their ability to achieve goals of care [12,17]. Our results indicate that residents felt more confident in their ability to deliver appropriate pre-diabetes care after our one-hour training program and after working within our new program for 6 months.

There are a number of limitations to this study that should be noted. It was difficult to engage the study participants in the six-month follow-up survey because providers and staff moved to other practices, residents graduated and moved away. Because of this, we cannot make strong conclusions about our 6-month findings.

The large loss to follow-up, in each category of provider makes it impossible to determine whether our findings would have remained as strong or even in the same direction had the full sample participated at 6 months. We included all providers and staff engaged in diabetes care in our training, but the number of nurses and physician assistants was too small to include in our evaluation. Inclusion of all providers of all types might have changed our overall results. Our study was conducted in urban clinics affiliated with one academic hospital center, so our findings can only be generalizable to similar settings.

The instrument we used was developed for diabetes management and may not have covered all issues relevant for considering management of pre-diabetes. Finally only provider perceptions, not actual processes of care, such as time with patients, or patient outcomes were measured. It has been previously suggested that primary care providers have difficulty finding sufficient time to address diabetes management to the fullest capacity because the average duration of a visit is only 16.5 minutes [18]. It is likely though not yet proven [19] that screening and management of pre-diabetes is even more challenging to fit into a routine care visit. Thus, to best understand the impact of our program and provider reactions, future studies should incorporate other measures as well.

Conclusion

Our results show that 1) training of both providers and office staff in the context of PCMH programs to manage pre-diabetes was well received by primary care attending physicians, residents, and office staff in urban primary care clinics in an academic hospital system setting; 2) was meaningful in its application to practice.

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References

1. Yang W, Dall TM, Halder P, Gallo P, Kowal SL, et al. (2013) Economic costs of diabetes in the U.S. in 2012. *Diabetes Care* 36: 1033-1046.
2. Cheng YJ, Imperatore G, Geiss LS, Wang J, Saydah SH, et al. (2013) Secular changes in the age-specific prevalence of diabetes among U.S. adults: 1988-2010. *Diabetes Care* 36: 2690-2696.
3. Centers for Disease Control and Prevention (2014) National diabetes statistics report: Estimates of diabetes and its burden in the United States, 2014. Atlanta: US Department of Health and Human Services.
4. Bullard KM, Saydah SH, Imperatore G, Cowie CC, Gregg EW, et al. (2013) Secular changes in U.S. pre-diabetes prevalence defined by hemoglobin A1c and fasting plasma glucose: National health and nutrition examination surveys, 1999-2010. *Diabetes Care* 36: 2286-2293.
5. Diabetes Prevention Program Research Group (2012) The 10-year cost-effectiveness of lifestyle intervention or metformin for diabetes prevention: An intent-to-treat analysis of the DPP/DPPOS. *Diabetes Care* 35:723-730.
6. American Diabetes Association (2010) Standards of medical care in diabetes-2010. *Diabetes Care* 33 Suppl 1: S11-61.
7. U.S. Preventive Services Task Force (2008) Screening for type 2 diabetes mellitus in adults: U.S. preventive services task force recommendation statement. *Ann Intern Med* 148: 846-854.
8. Siu AL (2015) Screening for abnormal blood glucose and type 2 diabetes mellitus: U.S. Preventive Services Task Force recommendation statement. *Ann Intern Med* 163: 861-868.
9. Bullard KM, Ali MK, Imperatore G, Geiss LS, Saydah SH, et al. (2015) Receipt of glucose testing and performance of two US diabetes screening guidelines, 2007-2012. *PLoS One* 10: e0125249.
10. Albu J, Sohler N, Matti-Orozco B, Sill J, Baxter D, et al. (2013) Expansion of electronic health record-based screening, prevention, and management of diabetes in New York City. *Prev Chronic Dis* 10: E13.
11. Wagner EH, Grothaus LC, Galvin MS, McGregor M, Artz K et al. (2001) Chronic care clinics for diabetes in primary care: a system-wide randomized trial. *Diabetes Care* 24: 695-700.
12. Stellefson M, Dipnarine K, Stopka C (2013) The chronic care model and diabetes management in US primary care settings: a systematic review. *Prev Chronic Dis* 10: E26.
13. Montori VM, Tweedy DA, Vogelsang DA, Schryver PG, Naessens JM, et al. (2002) Performance of the provider satisfaction inventory to measure provider satisfaction with diabetes care. *Endocr Pract* 8: 191-198.
14. Albu JB, Sohler N, Lu R, Li X, Young E, et al. (2017) An interrupted time series analysis to determine the effect of an electronic health record-based intervention on appropriate screening for type 2 diabetes in urban primary care clinics in New York City. *Diabetes Care* 40: 1058-1064.
15. Bond GE, Rechholtz L, Bosa C, Impert C, Barker S (2012) Program evaluation of Sea Mar's Chronic Care Program for Latino and Caucasian patients with type 2 diabetes: Providers and staff perspectives. *J Multidiscip Healthc* 5: 241-248.
16. Suter E, Hyman M, Oelke N (2007) Measuring key integration outcomes: a case study of a large urban health center. *Health Care Manage Rev* 32: 226-235.

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17. Sperl-Hillen J, O'Connor PJ, Ekstrom HL, Rush WA, Asche SE, et al. (2014) Educating resident physicians using virtual case-based simulation improves diabetes management: A randomized controlled trial. Acad Med 89: 1664-1673.
 18. Quinn CC, Clough SS, Minor JM, Lender D, Okafor MC, et al. (2008) WellDoc mobile diabetes management randomized controlled trial: Change in clinical and behavioral outcomes and patient and physician satisfaction. Diabetes Technol Ther 10: 160-168.
 19. Talbot P, Dunbar MJ (2011) Nova Scotia Prediabetes Project: Upstream screening and community intervention for prediabetes and undiagnosed type 2 diabetes. Chronic Dis Inj Can 32: 2-11.