

## The effect of teach-back education on foot self-care among patients with type II diabetes mellitus

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### Abstract

**Background and Aim:** Foot problems are common among patients with diabetes mellitus. In most cases, these problems finally result in amputation. The aim of this study was to investigate the impact of teach-back education on foot self-care among patients with type II diabetes.

**Methods:** This controlled quasi-experimental study was conducted on 70 patients with type II diabetes referring to Birjand Diabetes Clinic, Birjand, Iran. Patients were randomly and equally assigned to the teach-back and the control groups. The study data were collected via the Orem's nursing assessment form and a researcher-made foot self-care behaviors questionnaire. Based on patients' educational needs and self-care deficits, foot self-care educations were provided personally and face-to-face to patients in the teach-back group in two to three sessions. Each session lasted 25–30 minutes. Patients in the control group received only the educations which were routinely provided in the study setting. The study questionnaires were recompleted through interviewing participants seven days and also one and three months after the intervention. The analysis of the study data was performed via the SPSS software (v. 16.0). The study groups were compared regarding patients' demographic characteristics and foot self-care behaviors scores by conducting the Chi-square, the Fisher's exact, and the independent-samples t test. In addition, within-group comparisons were performed by doing within-group analysis of variance and the Bonferroni's post hoc test at a significance level of 0.05.

**Results:** The results of within-group analysis of variance and the Bonferroni's post hoc test showed that in the teach-back group, the mean score of foot self-care at seven days and one and three months after the intervention was significantly higher than pretest readings ( $P < 0.001$ ). Moreover, all of the three pretest-posttest mean differences of self-care scores in the teach-back group were significantly greater than the control group ( $P < 0.001$ ).

**Conclusion:** One and three months after the study intervention, the mean score of foot self-care in the teach-back group was significantly higher than both the pretest readings in the same group and the control group. These findings imply that teach-back education is effective in enhancing information retention. Using this technique in larger-scale studies is recommended for improving patients' self-care ability.

**Key Words:** Diabetes Mellitus; Type 2; Self Care; Education; Teach-Back Communication

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## Introduction

Diabetes mellitus (DM) is a serious, chronic, non-contagious condition which is estimated to turn into a major cause of disability and death worldwide during the next 25 years (1). High prevalence of obesity and tobacco use, improved life expectancy, and the aging of the population have significantly increased the prevalence of DM. In 2010, 285 million people suffered from DM and it has been estimated that this value will increase to 439 million by 2030 (2). According to the latest statistics provided by the Iranian Diabetes Society, seven million Iranians are currently suffering from DM (3). Moreover, the World Health Organization reported that in 2012, 1.5 million people died in the world due to DM and it is estimated that DM will turn into the seventh leading cause of death by 2030 (4).

One of the commonest complications and biggest causes of disability among patients with DM is foot problems. Previously, most diabetic patients died due to diabetic ketoacidosis and infections while currently DM-related deaths result chiefly from complications such as diabetic foot (5). Statistics show that 15% of diabetic patients develop diabetic foot disease and 14–24% of them finally need lower extremity amputation due to related complications (6). In the United States of America, 80000 cases of amputation are performed annually for diabetic patients secondary to severe foot ulcers. On average, annual healthcare costs of a non-infectious foot ulcer is 8000 US dollars. This value for infectious foot ulcers and ulcers that finally result in amputation is equal to 17000 and 45000 US dollars, respectively. Therefore, DM imposes huge financial burdens on societies (7). In a seven-year study for determining the risk factors of amputation among patients with type II DM, Lehto et al. (1996) found that continuous fluctuations of blood sugar, high serum levels of HgbA<sub>1c</sub>, and the length of suffering from DM double the risk of amputation (8).

Proper foot care and self-care are of paramount importance to the outcomes of diabetic patients. For

instance, complications of foot ulcers such as amputation can be prevented through engaging in self-care activities while improper foot care can impair the function of peripheral nerves and vessels, inflict ulcers, cause infection, and result in deep tissue necrosis and amputation in case of being left untreated (9). Although DM is a chronic, untreatable condition, it can be controlled effectively (10). Therefore, active and continued participation in self-care activities can prevent or postpone the acute and the chronic complications of DM (10, 11). However, studies showed that Iranian diabetic patients have poor adherence to self-care activities. For instance, Jafarian and Heydari (2000) found that 8.51% of their participants had no regular schedule for self-care and only 27% of them performed foot self-care activities (12). Janmohammadi et al. (2009) also reported that 37% of their participants had followed no professional advice on foot care (5).

Currently, numerous strategies are used by nurses worldwide for self-care education and health promotion among diabetic patients. These strategies include individual and group education, group counseling, online and computer-based education, educational camps and clubs, phone education and follow-up, and education through home visits by community health nurses (10). Factors which need to be considered once choosing an educational strategy are its effectiveness, flexibility, simplicity, accessibility, and its potentiality for quality improvement (13, 14). Patient-centered educational strategies can produce longer-term effects (15). One of the interactive educational strategies (16) approved by healthcare organization is teachback whose aim is to enhance the understanding and the retention of information (17). Teach back is used to narrow the communicative gap between healthcare providers and patients. Through teach back, patients' knowledge is enhanced through a series of chain courses (16). While employing teach-back education, an instructor teaches materials to a patient in a very simple language and without using medical jargons.

Then, the patient is asked to repeat the materials in his/her own language. The instructor then evaluates patient's learning and re-educates him/her to ensure the complete understanding of the materials (13, 14, 17, 18). Teach back is a direct educational strategy which is implemented through face-to-face, personal contact. It also uses eye contact, body language (19), and reiteration and is continued until the intended patient acquires a complete understanding of the materials (18). Such techniques enhance the effectiveness of this strategy (18).

DM is a condition which should be managed mainly through self-care and it is not practically possible to monitor patients throughout the day and night in healthcare settings. On the other hand, conventional educational strategies are no longer effective for these patients (10, 19). Accordingly, this study was undertaken to investigate the impact of teach-back education on foot self-care among patients with type II DM.

## Methods

This controlled quasi-experimental study was conducted on 70 patients with type II DM who referred to Birjand Diabetes Clinic, Birjand, Iran. We used the findings of a previous study (20), a confidence level of 0.95, and a power of 0.90 for sample size calculation and found that eighteen patients were necessary for each study group. However, to improve the precision and the power of the study and also to compensate probable attrition, we recruited 35 patients to each group (20). The inclusion criteria were having an age of 30–55 years and a history of DM for at least one whole year, being able to read and write Persian, having participated in no DM-related educational courses, and being afflicted by neither type I DM, gestational DM, advanced renal failure, cerebrovascular accidents, myocardial infarction, malignant tumors, nor psychiatric, psychological, speech, or hearing problems which could negatively affect self-care ability.

Patients were recruited conveniently from Birjand Diabetes Clinic. The aims of the study were explained to the participants and written consent was obtained from them. They were randomly allocated to the control and the teach-back groups through daily drawing method. Accordingly, each day, we wrote the names of the groups on two pieces of paper, put them in a bag, and draw one of them randomly from the bag. The first patient in that day was allocated to the group drawn from the bag while the second patient was allocated to the other group. Other patients were alternately allocated to the groups.

Two questionnaires were used for data collection. The first one was the self-care needs assessment questionnaire developed by Memarian (1997) based on the Orem's nursing assessment form. The validity and the reliability of this questionnaire had been established in previous studies (16, 21). The second data collection tool was a researcher-made foot self-care behaviors questionnaire which was developed based on the Summary Diabetes Self-Care Activity Measure (22). This questionnaire contains six questions and assesses patient's adherence to foot self-care behaviors in recent seven days. Each behavior is scored 0–7, resulting in a total score of 0–42. The internal consistency of this questionnaire was established by a Cronbach's alpha of 0.71 while its face and content validity were confirmed by five medical-surgical, management, and community health nursing faculty members affiliated to Birjand University of Medical Sciences, Birjand, Iran. In the current study, a score of less than 70% showed that the intended patient needed education and hence, he/she was included in the study.

In the teach-back group, patients' educational needs were assessed and determined by using the Orem's nursing assessment form. Then, an educational program was developed based on the determined educational needs and self-care deficits. Educations were provided personally and face-to-face in two to three sessions each of which lasting 25–30 minutes. At the end of each session, several questions about the

provided educations were asked from the patient. For instance, How should you cut your nails? How should you warm your feet in winter? If the patient provided correct answers, the session was ended; otherwise, education provision was continued until the patient acquired a complete and accurate understanding of the materials. Patients in the control group received solely educations which were routinely provided in the study setting. Finally, the patients were invited to re-complete the foot self-care behaviors questionnaire seven days and one and three months after the intervention (henceforth referred to as posttest 1, 2, and 3, respectively). Questionnaires were completed by using the interview method.

The analysis of the study data was performed via the SPSS software (v. 16.0). The study groups were compared regarding patients' demographic characteristics and foot self-care behaviors scores by conducting the Chi-square, the Fisher's exact, and the

independent-samples t tests. Moreover, within-group comparisons were performed by using within-group analysis of variance (ANOVA) and the Bonferroni's post hoc test at a significance level of 0.05.

## Results

Seventy patients (35 patients in each group) participated in this study. Before the intervention, the study groups did not differ significantly from each other regarding patients' demographic characteristics (Table 1).

The pretest mean score of foot self-care in the control group was significantly higher than the teach-back group. However, seven days and one and three months after the intervention (i.e. at posttests 1, 2, and 3), this score in the teach-back group was significantly higher than the control group (Table 2).

**Table 1: Participants' demographic characteristic**

Variables		Control group (N=35)	Teach-back group (N=35)	$\chi^2$	t value	P value
Age (Years)		50.06±5.62	51.79±4.18	-	1.61	0.11
Gender N (%)	Female	26(74.3)	27(77.1)	0.078	-	0.78
	Male	9 (25.7)	8(22.9)	-	-	-
Marital status* N (%)	Married	34(97.1)	33(94.3)	0.34	-	1
	Other	1(2.9)	2(5.7)	-	-	-
Educational status N (%)	Illiterate	8(22.9)	9(25.7)	0.082	-	0.96
	Diploma	22(62.9)	21(60)	-	-	-
	Higher than diploma	5(14.3)	5(14.3)	-	-	-

\*The Fisher's Exact Test

**Table 2: The mean scores of foot self-care in four measurement time-points (before, seven days, and one and three months after the intervention)**

Variables	Groups		The results of the independent- samples t test
	Teach-back group (N=35) (Mean±SD)	Control group (N=35) (Mean±SD)	
Foot care score before the intervention	12.31±7.49	16.82±9.75	P=0.03
Foot care score seven days after the intervention	32.28±5.10	16.37±9.72	P<0.001
Foot care score one month after the intervention	30.34±5.80	17.80±8.15	P<0.001
Foot care score three months after the intervention	29.34±6.29	19.17±8.69	P<0.001

Table 3: Comparing the pretest-posttest mean differences of foot care scores

Variables	Groups		The results of the independent-samples t test
	Teach-back group (N=35) (Mean±SD)	Control group (N=35) (Mean±SD)	
Pretest-posttest (seven days) mean difference of foot care score	19.97±7.67	-0.45±0.70	P<0.001
Pretest-posttest (one month) mean difference of foot care score	18.02±8.14	0.97±2.94	P<0.001
Pretest-posttest (three month) mean difference of foot care score	17.02±8.56	2.34±3.38	P<0.001

The within-group ANOVA revealed that in the teach-back group, self-care mean score differed significantly across the four measurement time-points ( $P<0.001$ ). The results of the Bonferroni's post hoc test showed that pretest mean score of foot self-care was significantly lower than the mean scores of the posttests 1, 2, and 3 ( $P<0.001$ ). Moreover, foot self-care mean score at posttest 1 was significantly higher than the mean scores of posttests 2 and 3. Finally, the mean score of the posttest 2 was also significantly greater than the mean score of posttest 3.

The results of the within-group ANOVA also showed that in the control group, there was at least one significant difference in the mean score of foot self-care across the four measurement time-points ( $P=0.003$ ). Further analysis by conducting Bonferroni's post hoc test showed that the mean score at posttest 1 was significantly lower than the mean scores at pretest, posttest 2, and posttest 3. Moreover, the mean score at posttest 2 was significantly lower than posttest 3 mean score ( $P<0.05$ ). Although the mean score of foot self-care in the control group increased significantly at posttest 3, within-group pairwise comparisons (between pretest and posttest 1, pretest and posttest 2, and pretest and posttest 3) revealed that increases in the teach-back group were more significant.

## Discussion

The aim of this study was to investigate the impact of teach-back education on foot self-care among patients with type II DM. Study findings indicated that the mean score of foot self-care in the teach-back group

significantly increased compared with both the pretest readings and the control group. Oshvandi et al. (2014) also reported that teach-back education was effective in enhancing diabetic patients' self-care ability (16). Lincoln et al. (2008) and Wu et al. (2007) also found that foot self-care education positively affected patients' self-care behaviors and performance (23, 24). In addition, Hajbagheri and Alinaghipoor (2012) and Mahmoodi (2005) reported that foot care education significantly enhanced diabetic patients' adherence to self-care programs (25, 26).

Our findings also showed that seven days and one and three months after the study intervention, the mean score of foot self-care in the teach-back group was significantly higher than the control group. These findings denote the effectiveness of teach-back education in enhancing the retention of the educations. Oshvandi et al. (2014) also found that one month after teach-back education, foot self-care score in their experimental group was significantly better than the control group (16). Cross and Newcombe (2001) implemented a fourteen-day self-care education program with a three-month follow-up period and reported that the program was effective in preventing diabetic foot disease and enhancing patients' foot care performance (27). Vatankhah et al. (2009) also found face-to-face foot care education effective in improving diabetic patients' knowledge and motivation and modifying their foot care behaviors (28). The similarity between our study and Vatankhah and colleagues' study is that in both studies, educations were provided through face-to-face method. The findings reported by

Sharifirad et al. (2005 and 2006) and Patout et al. (2000) were also congruent with our findings (9, 29, 30).

Previous studies have shown that 40%–80% of medical information provided to patients is immediately forgotten and about half of the remaining information is understood and memorized erroneously. One way for mitigating these problems and improving physician-patient communication is teach-back education. It is a direct and active teaching method which promotes lifelong learning through involving learners in self-learning (31). Psychological investigations have also shown that frequent repetition of certain information in the mind facilitates short- and long-term learning and also accelerates and enhances the retention of information (32). Teach back also employs repetition technique. Seemingly, it was this technique which enhanced information retention and performance improvement among the participants of the present study.

## Conclusion

Study findings indicated that one and three months after the intervention, the mean score of foot self-care in the teach-backgroup was significantly higher than both the pretest readings in the same group and the control group. These findings imply that teach-back education is effective in enhancing information retention. Using this technique in larger-scale studies is recommended for improving patients' self-care ability.

One study limitation was that the study data were collected by using self-report questionnaire and hence, we were unable to directly observe patients' foot self-care activities. Moreover, the study questionnaire evaluated patients' self-care activities during the last seven days. Thus, the data gathered by using this questionnaire might have been subjected to recall bias. Daily evaluation checklists are recommended for assessing patients' self-care performance.

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## References

1. Ding CH, Teng CL, Koh CN. Knowledge of diabetes mellitus among diabetic and non-diabetic patients in Klinik Kesihatan Seremban. *Med J Malaysia*. 2006; 61(4): 399-404.
2. Shaw JE, Sicree RA, Zimmet PZ. Global estimates of the prevalence of diabetes for 2010 and 2030. *Diabetes Res Clin Pract*. 2010; 87(1): 4-14.
3. Beiranvand S, Fayazi S, Asadzaker M, Latifi SM. Survey of the foot care status in type II diabetic patients: application of the theory of Planned Behavior. *Journal of Clinical Nursing and Midwifery*. 2014; 3(2): 57-66. [Persian]
4. Diabetes. 2014. World Health Organization. Available at: <http://www.who.int/mediacentre/factsheets/fs312/en/> Accessed Januray 14, 2014.
5. Janmohammadi N, Moazezi Z, Ghobadi Golafshani P, Hadadi Razieh, Montazeri M, Montazeri M. Evaluation of the risk factors of diabetic foot ulcer and its treatment in diabetic patients, Babol, North of Iran. *Iranian Journal of Endocrinology and Metabolism*. 2009; 11(2): 121-5. [Persian]
6. Singh N, Armstrong DG, Lipsky BA. Preventing foot ulcers in patients with diabetes. *JAMA*. 2005; 293(2): 217-28.
7. faramarzi H, Bagheri P, bahrapour A, halimi L. The comparison of prevalence of diabete and hypertension between rural areas of Fars and rural area of EMRO region. *Iranian Journal of Endocrinology and Metabolism*. 2011; 13(2): 157-64. [Persian]
8. Lehto S, Rönnemaa T, Pyörälä K, Laakso M. Risk factors predicting lower extremity amputations in patients with NIDDM. *Diabetes Care*. 1996; 19(6): 607-12.
9. Sharifirad G, Hazavehie SMM, Mohebi S, Rahimi MA, Hasanzadeh A. The effect of educational programme based on Health Belief Model (HBM) on the foot care by type II diabetic patients. *Iran J Endocrinol Metab*. 2006; 8(3): 231-9. [Persian]
10. Ghotbi N, Maddah SSB, Dalvandi A, Arsalani N, Farzi M. The effect of education of self care behaviors based on family-centered empowerment model in type II diabetes. *Journal of Shahid Beheshti School of Nursing & Midwifery*. 2014; 23(83): 43-50. [Persian]
11. Jordana DN, Jordanc JL. Self-care behaviors of Filipino-American adults with type 2 diabetes mellitus. *J Diabetes Complications*. 2010; 24(4): 250-58.

12. Jafarian N, Heydari A. The study of the role of health beliefs for insulin injection compliance in diabetes patients referred to Hamadan diabetic research center in 1998. *Scientific Journal of Hamadan University of Medical Science*. 2001; 7(4): 54-9. [Persian]
13. Howie-Esquivel J, White M, Carroll M, Brinker E. Teach-Back is an effective strategy for educating older heart failure patients. *J Card Fail*. 2011; 17(8): S103.
14. Wilson FL, Baker LM, Nordstrom CK, Legwand C. Using the teach-back and Orem's Self-care Deficit Nursing theory to increase childhood immunization communication among low-income mothers. *Issues Compr Pediatr Nurs*. 2008; 31(1): 7-22.
15. Shirazi M, Anoosheh M, Rajab A. The effect of self care program education through group discussion method on knowledge and practice in diabetic adolescent girls referring to Iranian Diabetes Society. *Iranian Journal of Medical Education*. 2011; 10(5): 982-93. [Persian]
16. Oshvandi HK, Jokar M, Khatiban M, Keyani J, Yousefzadeh MR, Sultanian AL. The effect of self care education based on teach back method on promotion of self care behaviors in type II diabetic patients: a clinical trial study. *Iranian journal of diabetes and metabolism*. 2014; 13(2): 131-44. [Persian]
17. Nasiri A, Poodineh Moghadam M. Effect of an educational plan based on Teach-Back method on hemodialysis patients' self-care deficits. *Modern Care J*. 2012; 9(4): 344-54. [Persian]
18. Sudore RL, Schillinger D. Interventions to improve care for patients with limited health literacy. *J Clin Outcomes Manag*. 2009; 16(1): 20-9.
19. Hasanzadeh F, Shamsoddini S, Moonaghi H, Ebrahimzadeh S. A comparison of face to face and video-based education on attitude related to diet and fluids adherence in hemodialysis patients. *Ofogh-e-Danesh*. 2011; 17(3): 34-43. [Persian]
20. Jalilian F, Zinat motlagh F, Solhi M. Effectiveness of education program on increasing self management among patients with type 2 diabetes. *Journal of Ilam University of Medical Sciences*. 2012; 20(1): 26-34. [Persian]
21. Memarian R. Application of Nursing Concepts and Theories. Tehran: Tarbiat Modarres University; 1999. [Persian]
22. Toobert DJ, Hampson SE, Glasgow RE. The summary of diabetes self-care activities measure. *Diabetes Care*. 2000; 23(7): 943-50.
23. Lincoln N, Radford K, Game F, Jeffcoate W. Education for secondary prevention of foot ulcers in people with diabetes: a randomised controlled trial. *Diabetologia*. 2008; 51(11): 1954-61.
24. Wu SC, Driver VR, Wrobel JS, Armstrong DG. Foot ulcers in the diabetic patient, prevention and treatment. *Vasc Health Risk Manag*. 2007; 3(1): 65-76.
25. Adib-Hajbaghery M, Alinaghipoor T. The effects of lecture and multimodal methods of teaching on healing rate of diabetic foot ulcer and patients' compliance with care recommendations. *Iran Journal of Nursing*. 2012; 25(77): 1-11. [Persian]
26. Mahmoodi A. The effect of self-care programe on foot healing in diabetic patients. *Journal of Shahrekord University of Medical Sciences*. 2005; 7(3): 61-8. [Persian]
27. Cross H, Newcombe L. An intensive self care training programme reduces admissions for the treatment of planer ulcer. *Lepr Rev*. 2001; 72: 276-84.
28. Vatankhah N, Khamseh ME, Jahangiri Noudeh Y, Aghili R, Baradaran HR, Safai Haeri N. The effectiveness of foot care education on people with type 2 diabetes in Tehran, Iran. *Prim Care Diabetes*. 2009; 3(2): 73-7.
29. Sharifirad Gh, Hazavehi MM, Baghianimoghadam MH, Mohebi S. The effect of a health belief model based education program for foot care in diabetic patients type II in Kermanshah Iran (2005). *Int J Endocrinol Metab*. 2007; 5(2): 82-90.
30. Patout CA Jr, Birke JA, Horswell R, Williams D, Cerise FP. Effectiveness of a comprehensive diabetes lower-extremity amputation prevention program in a predominantly low-income African-American population. *Diabetes Care*. 2000; 23(9): 1339-42.
31. Bradke PM, Brinker E, Peter D, Robinson P. To reduce heart failure readmissions use the teach-back method. *Patient Education Management*. 2011; 18(10): 109-20.
32. Guyton A, Hall J. Textbook of Medical Physiology. 12<sup>nd</sup> ed. Translated by: Ghasemi A, Mohammadi M. Tehran: Khosravi Publisher; 2011. [Persian]