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Evaluation of the Effectiveness of Teach-back Training on Asthma Control Indicators

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Background: Asthma is one of the most common chronic diseases that cause respiratory problems. Different training programs can effectively alleviate its symptoms and minimize the complications. This study aimed to determine the effect of a training program on asthma control.

Materials and Methods: This interventional study was performed on patients referred to clinics affiliated with Shiraz University of Medical Sciences. Cases were selected by convenience sampling and divided into two intervention and control groups, each consisting of 29 patients. Before the training program, data were collected using an asthma control questionnaire and a spirometry test, and they were analyzed using statistical tests and software.

Results: The results showed that after the intervention, the mean of all spirometry test indices and asthma control scores of the questionnaire increased in the experimental group. Alterations in the mean scores of the clinical manifestations and spirometry indices (FEV1, FVC, FEV1/FVC, and FEF25%-75%) before and after the intervention in the experimental group were significant. After the intervention, all spirometry indices were increased in the experimental group compared to the control group ($p<0.05$).

Conclusion: The results showed the effectiveness of teach-back training in managing asthmatic patients. Therefore, this intervention can be used as an effective method to control asthma along with other methods such as exercise and medications.

Key words: Asthma; Teach-back; Spirometry indices; Asthma control

INTRODUCTION

The prevalence of chronic diseases has increased globally, becoming a significant problem for people with these diseases. Asthma is one of the most common chronic diseases and is estimated to affect 300 million people worldwide (1). This disease affects all people, including children and the elderly, and its prevalence in different countries varies from 1% to 28%. The diagnosis and treatment of asthma is a health concern in most parts of the world, and many people die due to the consequences of this disease every year. Asthma causes inflammation, irritability, and airway spasm. It is also characterized by attacks of shortness of breath, wheezing, cough, and chest pain (2, 3).

Asthma cannot be cured, but it can be controlled by different interventions and treatments. Although asthma management is highly dependent on medications, non-pharmacological methods also play an essential role in controlling it. On the other hand, medications have several side effects, which are of great concern and limit their application. (4)

Patients' education and enhancing their awareness of the management strategies is the cornerstone of asthma control. Generally, educating patients is one of the most successful treatment methods that can lead to maintaining and improving the health of patients (5). Potential abilities can be enhanced by teaching instead of focusing on the patient's existing disabilities. In addition, empowering patients to take care of themselves can reduce treatment costs, improve quality of life, and increase the level of daily activities (6).

One of the most effective methods to improve the effectiveness of education is the teach-back method. The teach-back training method enhances the knowledge and self-care abilities of patients with chronic diseases. This method requires patients to explain what a health care provider has taught them in their own language. The advantages of this method include improving patients' relationships with the treatment staff, increasing patient safety, better assessment of their conditions, and effectiveness in people with low literacy levels (7-10). Therefore, several studies have been conducted to investigate the effectiveness of the teach-back training approach. According to the studies by White et al. (11) and Brown et al. (12), as an educational approach, this method leads to the improvement of self-care skills and reinforce the quality of instructions presented during the patients discharge. Studies by Dastoom et al. (13) showed that this method could reduce the rate of readmission in patients with heart failure. The results showed that this training approach could increase self-care skills in patients with heart failure, diabetes, and dialysis. Also, the results of Mahramus et al's study showed that 98.3% of nurses are qualified to use the return method in teaching patients the principles of self-care (14).

Spirometry is commonly used to diagnose asthma, chronic obstructive pulmonary disease, and other respiratory disorders. This test measures the amount of air you can inhale and exhale. It also measures the speed of breathing (15, 16).

As the exacerbation of asthma symptoms and frequent referrals to medical centers is very common nowadays, this study was conducted to determine the effectiveness of the teach-back training method as a management strategy for asthma control and improvement in patients' respiratory parameters.

MATERIALS AND METHODS

The present study was an experimental and single-blinded clinical trial performed on ambulatory asthma patients referred to clinics affiliated with Shiraz University of Medical Sciences in 2020. In this study, the statistician was not aware of the grouping of the patients .Moreover, before any analysis, they completed informed consent based on the Shiraz University of Medical Sciences ethics committee requirements.

Sixty-two patients with asthma were eligible and willing to participate in the study. Four patients were excluded from the study due to unwillingness to continue participating, infectious lung diseases, incomplete questionnaires, and hospitalization. Finally, 58 patients were included. In the intervention group, one patient was excluded due to unwillingness to continue participating, and one was excluded because of an incomplete questionnaire. In the control group, one patient was excluded due to infectious lung disease, and one was excluded because of hospitalization.

The study's sample size was determined based on the study of Urek et al. (17). According to the standard deviation of the mentioned study and the statistical formula suggested for two-arm trial, an optimal sample size of 23 patients per group was estimated. However, considering 20% sample attrition, 29 patients were selected per group. Then, random assignment of individuals to the intervention and control groups using the random blocking method and four blocks was carried out.

Inclusion criteria included:1) 18 to 60 years of age 2) with moderate and severe asthma (symptom period more than two weeks, nocturnal symptoms 3 to 4 times a month, and FEV1≥80%) to moderate (daily symptoms period, nocturnal symptoms more than once a week, and 60%≥FEV1≥80%), 3-) that at least one year has passed since the diagnosis of their disease, 4) the desire of participate in the research and filling out the informed the consent form, 5) having not participated in similar programs for the past six months, 6) capacity of making phone calls. Exclusion criteria included: 1) the inability to continue cooperation in the study, 2) not participating in training sessions, 3) the diagnosis of another chronic disease, 4) having a degree in medical sciences. The data collection tools in this study included a demographic questionnaire, asthma control test, and lung function test (spirometry).

The asthma control test was based on the Global Initiative for Asthma (GINA) criteria. It allows asthmatic patients 12 years of age and older to assess their asthma control status over the previous four weeks. This questionnaire consists of five questions in the areas of the duration of impediment at work, school, and home due to asthma (question number one), the frequency of shortness of breath attacks (question number two), sleep disturbance (question number three), using relief inhalers such as salbutamol inhaler aerosol (question number four), and asthma control assessment that had determined the respiratory status of the individual in the last four weeks (question number five). The score of each question is based on a score of 1 to 5, with a score of 1 indicating poor disease control and a score of 5 indicating good disease control, a total score of 19 and above indicating asthma control, and a score equal to 19 and below indicating lack of asthma control. The reliability of this test has been reported in various credible studies (ICC=0.94), and its validity has been confirmed based on the correlations between asthma control tests and other asthma improvement measures (1, 18).

The method was that a meeting was held in the presence of all participants (both test and control groups) for whom the necessary explanations about the purpose of the research, the numbers and times of the sessions, how to complete the questionnaire, and the spirometry test were explained. Then, the participants completed the asthma control test questionnaire, and a technician performed the spirometry test.

In the intervention group, patients were provided with individual return training in three sessions of approximately 60 minutes each at one-day intervals. The assigned tutorials were presented face-to-face, in simple language, without specific medical terms, using PowerPoint and practical techniques. At the end of the training sessions, a training booklet related to that session was presented to the patients. Before each session, questions were asked about the patient's knowledge, and after each training session, the patients were asked questions again to assess their learning. The correct answer to these questions at the end of each session was the basis for completing the training in that session. The score of the return training was determined in such a way that if the patient answered 75% of the questions correctly, the training was considered effective; otherwise, the training would continue. For further guidance and support in the intervals between sessions during the 8-week follow-up period, the possible confusion of the intervention group was answered by telephone for about 10 minutes per the patient's needs (Table 1).

For the spirometry test, weight (in kilograms) and height (in centimeters) were measured while standing without shoes. Then, after explaining the method of performing spirometry by the technician to the patients, the spirometry test was performed in a sitting position with a nose clamp. Also, the following conditions were observed before the

spirometry test for each patient: having at least 10-15 minutes of rest in a sitting position, not having used bronchodilators for at least 8 to 12 hours, having not eaten for at least 3 hours, and wearing comfortable clothes.

Table 1. Training sessions provided for patients and caregivers

Session	Content
1	Familiarity with the patient and his caregiver; Explanation of asthma, disease triggers and allergens; Familiarity with common therapeutic drugs, side effects and the correct way to use them; Ways to prevent infection and asthma attacks.
2	Review the topics of the previous session briefly; Teaching proper breathing techniques and coughing; Motivational conversation to quit smoking and prevent smoking; Diet and complementary nutrition; Exercise in asthma; The correct way to deal with acute conditions.
3	Learning to use asthma and nebulizer; Familiarity with the flow-meter and how to use it; Evaluate the patient to perform the correct techniques; An overview of the contents of the previous sessions and answering the remaining ambiguities of the patient and his caregiver.

Four and eight weeks after the intervention, the asthma control questionnaire was completed again by the participants in both groups, and a spirometry test was performed for each patient. Then the results were analyzed using the independent t-test, paired t-test, chi-square, repeated measures, and Pearson correlation coefficient in SPSS software version 20. Also, the significance level in this study was considered 0.05 to interpret the results.

RESULTS

Based on the repeated measures test results, the mean score of asthma control test was different for groups, time, and time/groups. Due to the significant P-value of the group variable (P=0.001), the asthma control score was considered statistically significant between the intervention and control groups (P <0.05). However, the time and time/group variables showed no significant effect on the asthma control score (P<0.05). In other words, time had no effect on asthma control test scores (Table 2) (Figure 1).

The Friedman test was used to evaluate the mean scores of spirometry indices before, and four weeks and eight weeks after the intervention in the intervention group after checking their normality and abnormality. The results showed that the mean scores of all spirometry indices in the intervention group before, and four weeks and eight weeks after the intervention were statistically significant, and were not the same (P<0.05). This meant that the teach-back training approach had significantly improved all scores of the spirometry indices in the intervention group (Table 3).

In the control group, all spirometry indices except FEF25%-75% showed a normal distribution. Repeated measurement tests were performed to compare their mean scores, while the Friedman test was used for the variable FEF25%-75%. The test results indicated that the mean scores of FVC and FEV1 variables in the first second did not vary substantially and were similar (P> 0.05). However, the mean scores of FEV1/FEV1 and FEF25%-75% did differ considerably and were not identical (P 0.05) (Table 4).

Table 2. Comparison of the mean score of asthma control test in the control and intervention groups before, 4 weeks and 8 weeks after the intervention in the study samples

Groups	P-Value			Time					
	Time/Groups	Groups	Time	8 weeks after the intervention		4 weeks after the intervention		Before intervention	
				Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean
Intervention	0.575	0.001	0.124	3.51	20.03	4.02	17.34	4.24	14.37
Control				3.64	13.03	3.69	13.41	3.80	14.86

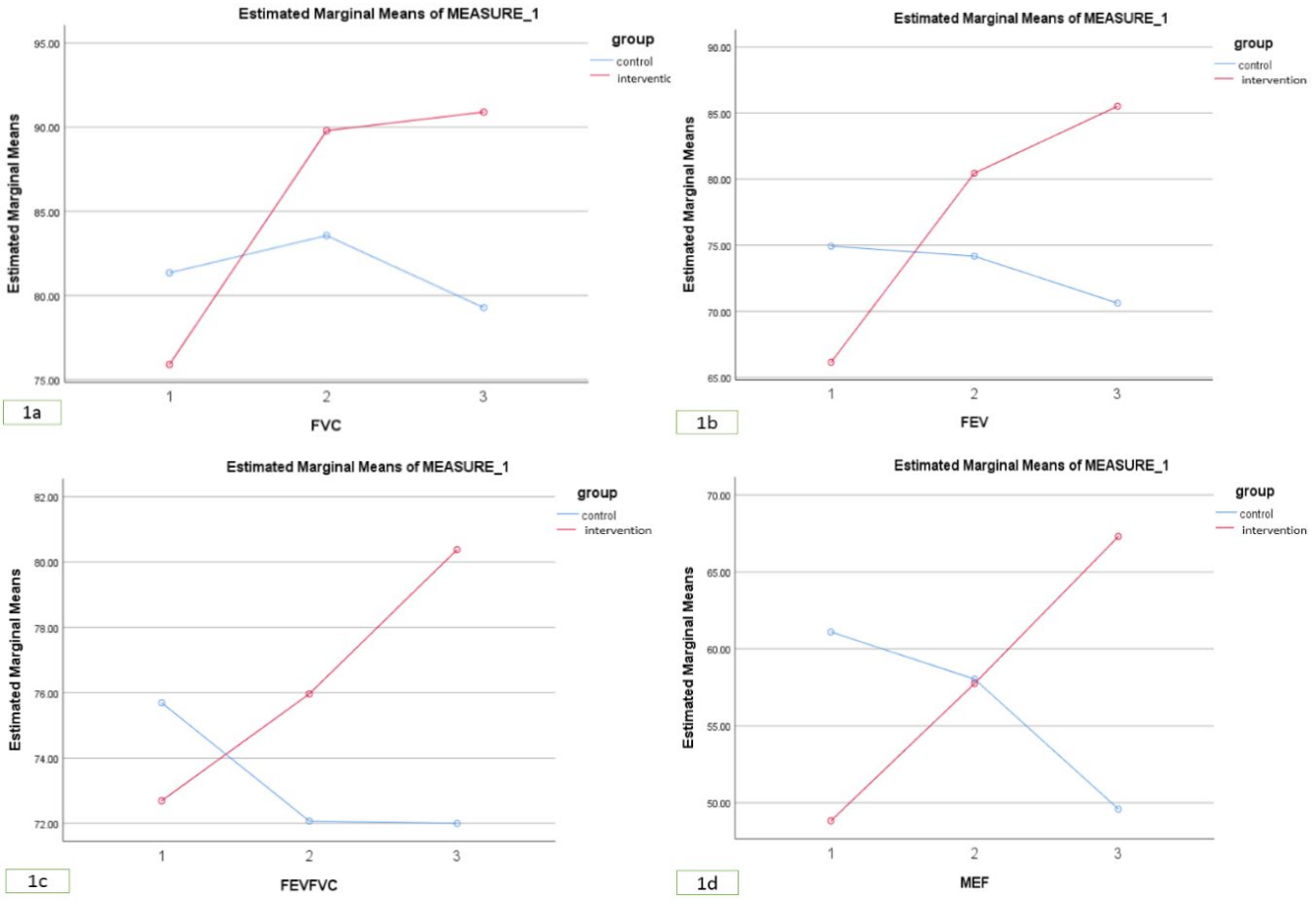

Figure 1. The trend of changes in the mean score of asthma control test in the intervention group (before intervention=14.37, 4 weeks after intervention=17.34, and 8 weeks after intervention=20.03) more than the control group (before intervention=14.86, 4 weeks after the intervention=13.41, and 8 weeks after the intervention=13.03) which indicates the effect of the intervention on this group (P=0.001).

Table 3. Comparison of mean scores of spirometry indices in the intervention group before, 4 weeks and 8 weeks after the intervention in the study units

Spirometry index scores	P-Value	Time					
		8 weeks after the intervention		4 weeks after the intervention		Before intervention	
		Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean
FVC	<0.001	20.60	20.03	22.12	89.79	22.52	75.89
FEV1	<0.001	21.03	85.51	20.90	80.44	22.53	66.13
FEV1/FVC	0.004	13.99	80.37	12.71	75.96	12.71	72.68
FEF25%-75%	0.0014	28.92	67.31	29.92	57.75	31.77	48.82

Table 4. Comparison of mean scores of spirometry indices in the control group before, 4 weeks, and 8 weeks after the intervention

Spirometry index scores	P-Value	Time					
		8 weeks after the intervention		4 weeks after the intervention		Before intervention	
		Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean
FVC	0.351	18.46	79.27	20.32	83.55	22.63	81.34
FEV1	0.145	22.78	70.62	22.76	74.17	23.69	74.93
FEV1/FVC	0.013	12.95	72.00	14.87	72.06	12.71	72.68
FEF25%-75%	0.044	28.82	49.58	32.30	58.03	35.20	61.10

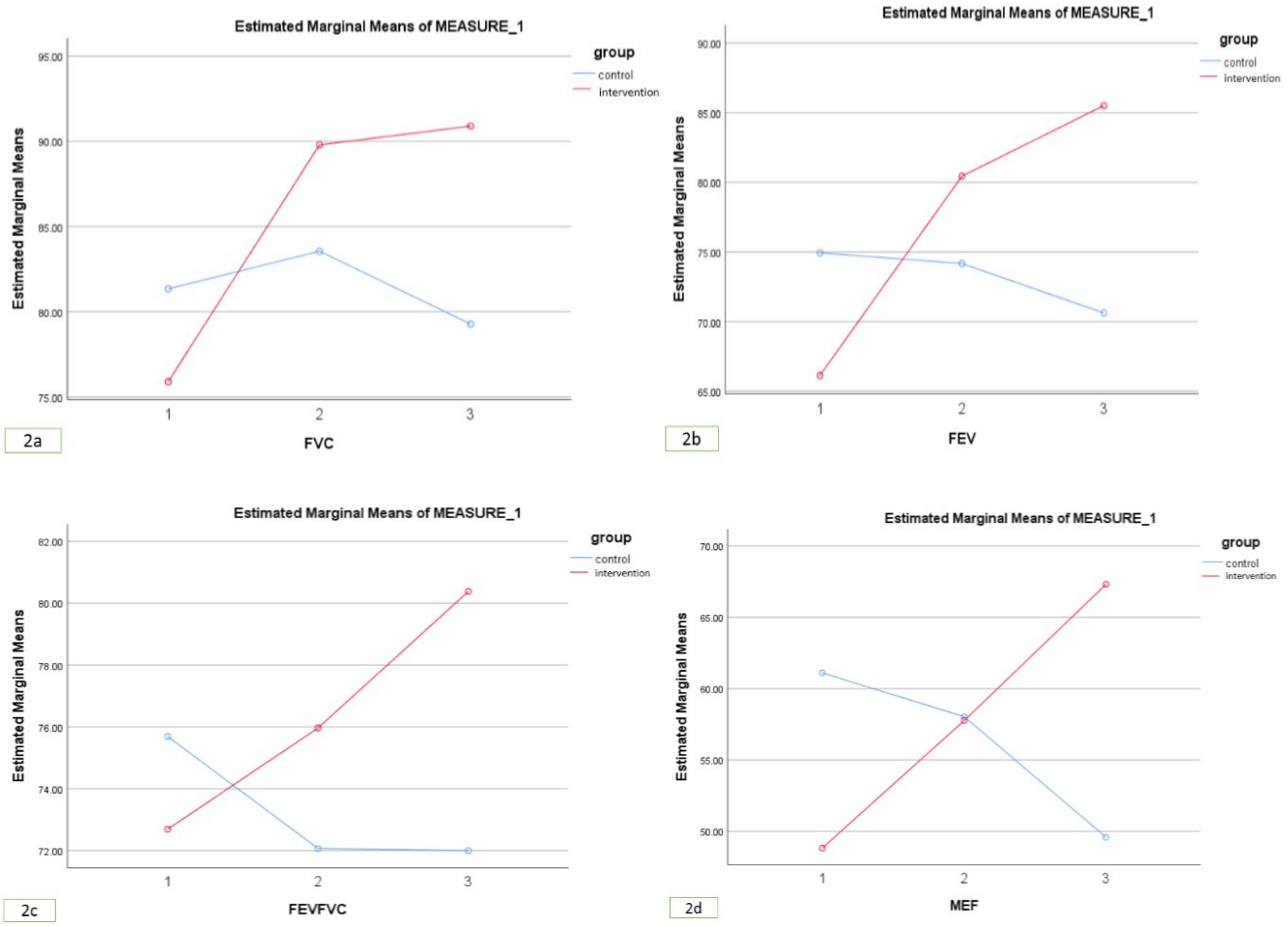

Figure 2. Mean changes in respiratory score in the intervention and control groups before, 4 weeks and 8 weeks after the intervention

Based on the results, there was a statistically significant difference in the respiratory indices between the control and intervention groups only eight weeks after the intervention. According to the results tabulated in the tables, the intervention group was under control compared to the control group. In other words, the effect of the teach-back training given overtime on the studied indicators has been determined.

As can be seen in Figure 2, the trend of changes in the mean score of the FVC index of the intervention group was increasing before (mean score=75.89), four weeks (mean score=89.79), and eight weeks after the intervention (mean score=90.89), which indicates the effectiveness of the intervention in this group. The control group's FVC index improved four weeks after the intervention, but the index score decreased eight weeks after the intervention, and asthma was not under control.

FEV1 index in the intervention group, in the four weeks (mean score=80.44) and eight weeks after the intervention (mean score=85.51), had an upward trend, indicating the intervention's effectiveness in this group. Also, changes in the FEV1 in the control group decreased at four weeks and eight weeks after the intervention. This means that in the control group, asthma was not controlled.

The trend of changes in the mean score of the FEV1/FVC of the intervention group in 4 weeks (mean score=75.96) and eight weeks after the

intervention (mean score=80.37) had an upward trend, indicating the effectiveness of the intervention in this group. Also, the trend of change in the mean score of the FEV1/FVC of the control group at four weeks and eight weeks after the intervention was decreasing. This means that in the control group, asthma was not under control.

The changes in the mean score of FEF25%-75% of the intervention group at four weeks (mean score=57.75) and eight weeks after the intervention (mean score=67.31) had an upward trend, indicating the effectiveness of the intervention in this group. Also, the trend of changes in the mean score of this index in the control group was downward at four weeks and eight weeks after the intervention. This means that asthma was not controlled in the control group.

DISCUSSION

This study investigated the effectiveness of a teaching program on asthma control. The study's results showed that the teach-back training program could control asthma and change all spirometry indices after the training program.

In this study, all spirometry indicators of clinical manifestation scores significantly increased, which is consistent with improving the disease symptoms and its management. Consistently, research findings investigating the advantages of a training program at an asthma primary care site showed that asthma self-care was improved. However, in a study by Arıkan-Ayyıldız et al. (20), the clinical manifestation scores did not significantly differ before and after the intervention. The reasons for this difference in the results can be differences in the number of training program sessions (one-hour training sessions), the age of the participants (5-18 years), the style of delivering the training sessions, or the educational content offered. It may have caused confusion or hindered their application in their everyday lives. (19-21).

Kotwani and Chhabra investigated the effectiveness of patient education on asthma control in India. The results showed that standard treatment guidelines improved asthma control in the second week. The changes became even more significant in the fourth week and this trend continued rising until the 12th week (P<0.0001). The results of this study were congruent with our findings (22).

Legorreta et al. examined the effectiveness of an asthma management program. They observed that after the intervention, the mean PEF values in the two intervention and control groups were significantly different, which was consistent with the results of the present study (23).

Contrary to the present study's findings, Shames et al. showed inefficacy of a proposed curriculum on FEV1 and PEF indices. Although the main reason for the discrepancy between these two studies' results is unclear, it seems that the living environments, lifestyles, and patients' encounters with environmental substances may be the most important reasons (6).

Habibi et al. conducted experimental studies in Isfahan to determine the efficiency of a training program on asthma control. Data was collected using an asthma control questionnaire and a spirometry test before and one month after the intervention. The results showed that the mean scores of the asthma control test questionnaire increased after the intervention in the experimental group, and this was statistically significant (P <0.005) (24). This result is consistent with the findings of the present study. In their study, the means of all spirometry indices increased after the intervention in the experimental group (P<0.05). The mean scores of spirometry indices before and after the intervention in the experiment group had a statistically significant difference (P<0.05). This result is consistent with the results of the present study. Also, after the intervention, all spirometry indices except FEF25%-

75% in the experimental group increased compared to the control group (P<0.05). However, in the present study, all spirometry indices of the test were raised in the intervention group compared to the control group (P<0.05).

Implications for Practice

This study showed that the teach-back training program was effective in the management of asthma and improved spirometry indices, which play an essential role in respiration. The educational program of this study can be used in the centers that provide routine asthma care to increase the level and quality of services offered to patients. Nursing managers should inform staff about the importance and learning of these training methods by holding training courses.

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Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

REFERENCES

1. Nathan RA, Sorkness CA, Kosinski M, Schatz M, Li JT, Marcus P, et al. Development of the asthma control test: a survey for assessing asthma control. ***J Allergy Clin Immunol*** 2004;113(1):59-65.
2. Cabana MD, Slish KK, Evans D, Mellins RB, Brown RW, Lin X, et al. Impact of Physician Asthma Care Education on patient outcomes. ***Health Educ Behav*** 2014;41(5):509-17.
3. Varmaghani M, Farzadfar F, Sharifi F, Rashidian A, Moin M, Moradi-Lakeh M, et al. Prevalence of Asthma, COPD, and Chronic Bronchitis in Iran: A Systematic Review and Meta-analysis. ***Iran J Allergy Asthma Immunol*** 2016;15(2):93-104.
4. Rodrigues CD, Pereira RP, Dalcin Pde T. Effects of an outpatient education program in patients with uncontrolled asthma. ***J Bras Pneumol*** 2013;39(3):272-9.
5. Press VG, Arora VM, Shah LM, Lewis SL, Charbeneau J, Naureckas ET, et al. Teaching the use of respiratory inhalers to hospitalized patients with asthma or COPD: a randomized trial. ***J Gen Intern Med*** 2012;27(10):1317-25.
6. Shames RS, Sharek P, Mayer M, Robinson TN, Hoyte EG, Gonzalez-Hensley F, et al. Effectiveness of a multicomponent self-management program in at-risk, school-aged children with asthma. ***Ann Allergy Asthma Immunol*** 2004;92(6):611-8.
7. 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.
8. Hong YR, Cardel M, Suk R, Vaughn IA, Deshmukh AA, Fisher CL, et al. Teach-Back Experience and Hospitalization Risk Among Patients with Ambulatory Care Sensitive Conditions: a Matched Cohort Study. ***J Gen Intern Med*** 2019;34(10):2176-84.
9. Talevski J, Wong Shee A, Rasmussen B, Kemp G, Beauchamp A. Teach-back: A systematic review of implementation and impacts. ***PLoS One*** 2020;15(4):e0231350.
10. Hasanpour Dehkordi A, Ebrahimi-Dehkordi S, Banitalebi-Dehkordi F, Salehi Tali S, Kheiri S, Soleimani Babadi A. The effect of teach-back training intervention of breathing exercise on the level of dyspnea, six-minutes walking test and FEV1/FVC ratio in patients with chronic obstructive pulmonary disease; a randomized controlled trial. ***Expert Rev Respir Med*** 2021;15(1):161-9.
11. White M, Garbez R, Carroll M, Brinker E, Howie-Esquivel J. Is "teach-back" associated with knowledge retention and hospital readmission in hospitalized heart failure patients? ***J Cardiovasc Nurs*** 2013;28(2):137-46.
12. Brown MM, Mack KM, Guzzetta CE, Tefera E. The feasibility of using teach-back to reinforce discharge instructions and its influence on the number of 30-day readmissions of heart

failure patients. ***Heart & Lung: The Journal of Cardiopulmonary and Acute Care*** 2014;43(4):379.

13. Dastoom M, Elahi N, Baraz S, Latifi SM. The effects of group education with the teach-back method on hospital readmission rates of heart failure patients. ***Jundishapur Journal of Chronic Disease Care*** 2016;5(1).
14. Mahramus T, Penoyer DA, Frewin S, Chamberlain L, Wilson D, Sole ML. Assessment of an educational intervention on nurses' knowledge and retention of heart failure self-care principles and the Teach Back method. ***Heart Lung*** 2014;43(3):204-12.
15. Abraham ML. An asthma annual spirometry testing quality improvement project. 2020.
16. Akhoon N, S Brashier DB. A study to monitor errors in use of inhalation devices in patients of mild-to-moderate bronchial asthma in a tertiary care hospital in Eastern India. ***Perspect Clin Res*** 2022;13(1):17-24.
17. Urek MC, Tudorić N, Plavec D, Urek R, Koprivc-Milenović T, Stojić M. Effect of educational programs on asthma control and quality of life in adult asthma patients. ***Patient Educ Couns*** 2005;58(1):47-54.
18. Farzin D, Sharifpour A, Mansouri SN, Aliyali M, Abedi S. Efficacy of ginger in patients uncontrolled on standard moderate asthma treatment. ***Journal of Mazandaran University of Medical Sciences*** 2012;21(1):137-40.
19. Boulet LP, Boulay MÈ, Gauthier G, Battisti L, Chabot V, Beauchesne MF, et al. Benefits of an asthma education program provided at primary care sites on asthma outcomes. ***Respir Med*** 2015;109(8):991-1000.
20. Arıkan-Ayyıldız Z, Işık S, Çağlayan-Sözmen Ş, Anal Ö, Karaman Ö, Uzuner N. Efficacy of asthma education program on asthma control in children with uncontrolled asthma. ***Turk J Pediatr*** 2016;58(4):383-8.
21. Crowley C. An Educational Intervention to Improve Healthcare Provider Confidence and Utilization of the Teach-Back Method When Providing Patient Education on Inhaler Technique. 2020.
22. Kotwani A, Chhabra SK. Effect of patient education and standard treatment guidelines on asthma control: an intervention trial. ***WHO South East Asia J Public Health*** 2012;1(1):42-51.
23. Legorreta AP, Leung KM, Berkbigler D, Evans R, Liu X. Outcomes of a population-based asthma management program: quality of life, absenteeism, and utilization. ***Ann Allergy Asthma Immunol*** 2000;85(1):28-34.
24. Habibi Y, Yousefi H, Ghafari S. The Effect of Self-Care Training Program on Asthma Control. ***Journal of Health and Care*** 2018;20(3):207-14.