Original Article

Setting up and assessing a therapeutic education program for asthmatic patients

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Abstract:

BACKGROUND: Asthma is a major public health issue. It remains uncontrolled, despite the availability of effective treatments. Appropriate education programs are required to improve the situation. The study aims to design and assess an educational program based on asthma patients' perceived needs.

MATERIALS AND METHODS: A cross-sectional prospective study was conducted in the pulmonology department of the Hassan II University Hospital in Fez. A convenience sample of asthma patients, whether hospitalized or not, was recruited. Two hundred and twenty adult asthma patients completed an educational needs survey (ENS). An asthma knowledge questionnaire for adult patients was used to assess the program on the criterion of improving asthma knowledge. Data collected by ENS was analyzed by standard descriptive statistics. The Student's T test for paired samples was used to compare the means of the Asthma Knowledge Questionnaire scores before and after therapeutic education.

RESULTS: Most patients were married and residing in urban areas. The illiteracy rate was 50%. One patient was a regular smoker. 125 patients (56.82%) reported non-compliance to treatment. The pathophysiology of asthma (chronic airway inflammation, bronchial hyperreactivity, and bronchial obstruction), causes and complications, treatment (inhalation technique), asthma attacks and environmental management, lifestyle, and psychological support were the patients' main perceived educational needs. Based on these findings, an instructional program was created and evaluated with 30 patients. After the program, asthma knowledge increased significantly.

CONCLUSION: Our results suggest that an educational intervention can improve asthma knowledge.

Keywords:
Asthma, health behavior, health education programs, learning, needs assessment, program evaluation, therapeutic education

Introduction

Asthma is a chronic disease with serious public health consequences. It affects people of all ages, and its prevalence, also treatment costs, and burden on patients and society, are rising. According to the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD), asthma affected 262 million people in 2019, resulting in 461,000 deaths. Asthma was responsible for 21.6 million Disability-Adjusted Life Years (DALYs), or 20.8% of all DALYs caused by chronic respiratory diseases.[1]

Morocco lacks a national asthma registry.[2] According to the Ministry of Health, the overall prevalence of tuberculosis, asthma, and chronic lung disease is 1.8%.[3] Asthma prevalence in people of all ages ranges between 10% and 20%, according to some

studies.[4,5] This prevalence is always linked to poor symptom control.[6]

Although treatments are now available to control symptoms in many cases, the situation is far from ideal. Asthma remains uncontrolled, according to several recent studies,[7,8] with serious repercussions for patients' quality of life and the disease's direct and indirect costs.[9,10] This finding is related to patient knowledge, health behaviors, false beliefs, and negative attitudes toward medications.[11]

Aside from being costly and complex, asthma treatment requires patient self-administration of one or more medications to optimize asthma symptom control and reduce the risk of exacerbations while minimizing medication side effects. This is difficult to achieve without therapeutic patient education (TPE), which assists patients in developing or maintaining disease-management skills.

Our study's purpose was to develop an educational program tailored to Moroccan asthma patients' perceived needs to improve their knowledge and assist them in managing their disease effectively.

The reasoned action approach (RAA) is an integrative model for predicting and changing human social behavior that we employ in this study.[7] According to the reasoned action model, the intention is determined by three conceptual determinants: attitudes, subjective norms, and perceived control. This perceptual level is founded on three types of beliefs: behavioral beliefs, normative beliefs, and control beliefs. Background factors, as defined by Fishbein and Ajzen, influence beliefs [Figure 1].

Adopting this approach would thus encourage patients to adhere to the program, potentially leading to changes in health behavior. It is noteworthy that no previous study has developed program content that meets Moroccan asthma patients' real perceived needs and expectations.

Materials and Methods

Study design and setting
We conducted a prospective cross-sectional study in the pneumology department of Hassan II University Hospital in Fez (North Central Morocco) in 2022.

Study participants and sampling
A convenience sample of asthma patients, whether hospitalized or not, was recruited. Patients met the following criteria for inclusion: 1) asthma confirmed by functional and/or clinical exploration for at least six months, 2) age 18 or older, and 3) no other pulmonary or disabling pathologies.

We determined the sample size by referring to the total number of asthmatic patients followed in the pneumology department of the Hassan II University Hospital in 2021, which was 498 patients. The study enrolled 220 patients who met the eligibility criteria and consented to participate. They completed a questionnaire to determine their educational needs. The data analysis was used to set up a therapeutic education program for adult asthmatic patients. After establishing the program, we chose 30 patients at random from among the 220 participants to evaluate this TPE program.

Data collection tool and technique
An educational needs survey (ENS) was used to assess patients' educational needs. It included both open and closed questions. Patients were able to respond to open questions about comorbidities, triggers, and educational needs. If the response options indicated did not adequately reflect the desired response, a residual category "other" was added to each multiple-choice question in the closed questions.

The study survey instrument included five domains: (1) demographic and socio-professional data, (2) biomedical dimension of the disease (asthma age, evolution, severity, and comorbidities), (3) Cognitive dimension (The patient
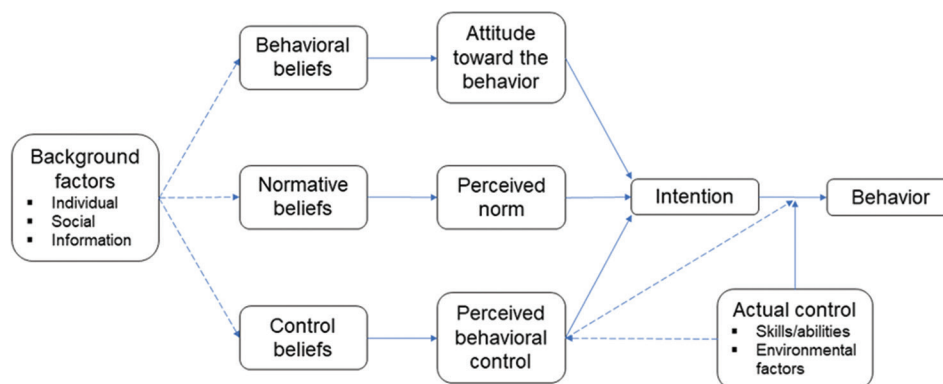

Figure 1: Simplified presentation of the reasoned action model[12]

being educated is already aware of his disease. What he knows is made up of what he has learned from his own experience as well as what others have taught him), (4) psycho-affective dimension (stress situation, crisis reactions, and attitudes) and (5) educational topics of interest.

A single trained investigator administered the questionnaire to patients. Because half of them were not attending school, the investigator read, explained the questions to patients, and reported their answers. Even those who attended school preferred that the investigator read the questions to them and report their responses.

Editing the program
The data collected were analyzed so that the multidisciplinary study team could establish an educational diagnosis and design an educational program [Figure 2].

Teaching methods
Transformative learning theory was chosen (Jack Mezirow (1991)) in this study as it is recognized as the dominant theory in the field of adult education.[13] During this process, learners analyze their previous and current understanding to achieve belief adjustment and behavior.[14] The teaching methods used during the educational sessions included group discussion, interactive presentation, teach-back intervention, and weekly experiences

Assessment of the TPE program
The evaluation of the TPE program was performed in two stages. First, three experts validated the program. In the lack of Moroccan guidelines, the validation was performed following the TPE's High Authority of Health's quality standards.[15] Second, we conducted a before-after pilot study with a random sample of 30 patients among the 220 participants in the study.[16,17]
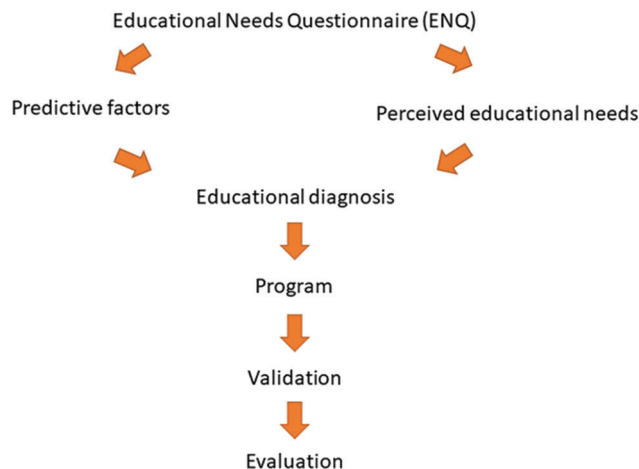

Figure 2: Stages of the study

The program was assessed according to the criteria of increasing asthma knowledge among patients. We used the Asthma Knowledge Questionnaire for Adult Patients (QCA-PA),[18] to assess patients' asthma knowledge before and after the TPE program. It consists of 54 questions divided into four sections: Asthma pathophysiology, trigger factors, diagnosis and management, and treatment. The scores were categorized as "correct answer/incorrect answer". A response of "don't know" was deemed incorrect. A correction key was used to correct the questionnaire. A score of "1" was assigned to each correct answer and a "0" to each incorrect answer. The total score ranges from 0 to 54.[19]

Data analysis
IBM SPSS Statistics 25 software was used to analyze the collected data. For the data collected by the educational needs questionnaire, we used standard descriptive statistics (mean, standard deviation, percentages, and frequencies). We used the Student's T test for paired samples to compare the means of the Asthma Knowledge Questionnaire scores before and after therapeutic education.

Ethical considerations
The study was approved by the local ethics committee under number 15/2022. Before the survey, each participant signed a written consent for participating in the study as well as communicating outcomes. Furthermore, the following considerations were guaranteed: voluntary participation; anonymity; confidentiality, and potential for harm.

Results

Socio-demographic profile
Our population's socio-demographic profile (N = 220) is characterized by an average age of 48.43 ± 15.43 years. With a female dominance of 71.81%, the majority of patients (71.36%) are married, 40.90% are housewives, 27.27% are unemployed, and 22.73% have a paid profession. Only 7.27% of the 220 patients had a higher education level, while 50% had no schooling. In terms of residence, 77.73% of patients live in urban areas [Table 1].

Clinical profile
Participants' clinical profile [Table 2] was characterized by a mean BMI of 26.93 ± 4.45 kg/m². Only one patient was an active smoker, and 37 patients (16.82%) are passive smokers. The most common asthma triggers in the patient population were dust, strong odors, smoke, and cold, accounting for 71.82%, 70.45%, 68.63%, and 36.36%, respectively [Table 3]. 102 patients (46.36%) had at least one asthma attack in the previous six months, 72 (32.73%) were admitted to the emergency room at least once, and 5 (2.27%) were hospitalized.

Table 1: Socio-demographic profile of patients

	Number (%) (n=220)
Age	
[18; 40]	60 (27.27)
[40; 60]	97 (44.09)
Age ≥60	63 (28.64)
Sex	
Female	158 (71.81)
Male	62 (28.19)
Level of education	
Unschooled	110 (50.00)
Primary school level	53 (24.09)
Secondary school level	41 (18.64)
higher education	16 (7.27)
Family status	
Single	38 (17.27)
Married	157 (71.36)
Divorce	8 (3.64)
Widower	17 (7.73)
Occupation	
No occupation	60 (27.27)
Student	10 (4.55)
Retirement	10 (4.55)
Employee	50 (22.73)
Housewife	90 (40.90)
Residence	
Rural	49 (22.27)
Urban	171 (77.73)

Table 2: Clinical profile of patients

	Number (%) (n=220)
BMI Kg/m^2	
BMI <25	75 (34.09)
25≤ BMI <30	98 (44.55)
BMI ≥30	47 (21.36)
Smoking status	
Active Smoker	1 (0.45)
Passive smoker	37 (16.82)
Ex-smoker	33 (15.00)
Non-smoker	149 (67.73)
Duration of illness	
1 to 3 years	58 (26.36)
4 to 6 years old	40 (18.18)
7 to 9 years old	22 (16.82)
10 years or more	100 (38.64)
Controller medication	
None	7 (3.18)
ICS	62 (28.18)
Low/medium dose of (ICS + LABA)	37 (16.82)
High dose of (ICS + LABA)	106 (48.18)
ICS + LABA + LAMA/OCS	8 (3.64)
Number of comorbidities	
0	20 (9.09)
1	64 (29.09)
2 and more	136 (61.82)

BMI=body mass index; ICS=Inhaled Corticosteroids; LABA=Long-acting beta 2-agonists; LAMA=long-acting muscarinic antagonists; OCS=oral Corticosteroids

The average duration of asthma in the population was 10.58 ± 9.60 years [Table 2].

Regarding controller medication, 7 (3.18%) patients received no treatment, 62 (28.2%) received inhaled corticosteroids (ICS), 37 (16.8%) received low or medium doses of corticosteroids with long-acting 2-mimetic (LABA), 106 (48.2%) received high doses of (ICS + LABA), and 8 patients (3.6%) received oral corticosteroid therapy or Long-acting muscarinic antagonists in addition to the combination (LAMA). Finally, while 20 patients (9.09%) had no comorbidity, the remaining patients had at least one, with a maximum of four [Table 2].

Cognitive and behavioral profile

A criterion-referenced approach was used to evaluate asthma knowledge. The evaluation focused on background knowledge and revealed four categories: inadequate 7 (3.11%) patients, unsatisfactory 123 (55.91%) patients, reasonable 55 (25.00%) patients, and satisfactory 35 (15.91%) patients [Table 4]. Two scenarios were used to assess health behaviors. The first was an asthma attack, which indicated that the patient's behavior is predictable and responsive to the attack. The second situation was treatment adherence; we found that 125 patients (56.82%) did not take their medication as prescribed. Medication costs (73.60%), an absence of symptoms (27.20%), and attitudes toward medication were the most commonly mentioned reasons.

Educational needs perceiving by asthmatic patients

In descending order of importance, study participants' perceived educational needs were divided into five themes [Table 5]. The first focused on the disease including its pathophysiology, causes, and complications. The second topic was asthma treatment, which included side effects, medication mode of action, and inhalation technique. The third was about asthma attacks: triggers and their removal, and attack management. The fourth and final was about lifestyle and psychological support.

The educational diagnosis

The analysis of the patient's sociodemographic, clinical, and cognitive-behavioral profiles, as well as their perceived educational needs, enabled us to develop a collective educational diagnosis. It's composed of three components the interventional model, the goals to be achieved, and the TPE program content. We chose the adult learning theory and, more particularly, the transformative learning model as the interventional framework.[20] We then established three main objectives: (1) increasing patients' knowledge and understanding; (2) improving patients' skills regarding their illness and environment; and (3) increasing their

Table 3: Asthma attack and triggers

	Number (%) (*n*=220)
Domestic Exposure and Triggering Factors	
Smoke	151 (68.63)
Passive smoking	37 (16.81)
Strong odors	155 (70.45)
Dust	158 (71.82)
Pollen	20 (9.09)
Animals	29 (13.18)
Sunlight or ventilation problems	22 (10.00)
Cold	80 (36.36)
Emotion	34 (15.45)
Effort	13 (5.90)
Number of asthma attacks during the last six months	
0	118 (53.64)
1	29 (13.18)
2	41 (18.64)
3 and more	32 (14.53)
Number of hospitalizations during the last six months	
0	215 (97.73)
1	5 (2.27)
Number of emergency room admissions in the last six months	
0	148 (67.27)
1	23 (10.45)
2	29 (13.18)
More than 2	20 (9.08)

Table 4: Cognitive-behavioral profile of Asthma

	Number (%) - (*n*=220)
Categories of cognitive scores	
Insufficient	7 (3.11)
Unsatisfactory	123 (55.91)
Medium	55 (25.00)
Satisfying	35 (15.91)
Responses to the crisis	
Adapt the treatment (take reliever medication)	220 (100.00)
Ventilate the room: open the windows/door	53 (24.09)
Go to the emergency room if symptoms persist	116 (52.72)
Perceived compliance	
Yes	95 (43.18)
No	125 (56.82)
Reasons for poor compliance	
No symptoms	34 (27.20) *
Lack of means (expensive drugs).	92 (73.60) *
Complicated use of treatment (inhalation technique)	1 (0.80) *
Tired daily use.	5 (4.00) *
Oversight	9 (7.20) *
Sprayophobia/corticophobia	4 (3.20) *
Negative beliefs about prescribed drugs	21 (16.80) *

*The % is to be calculated for the 125 patients who answered no to perceived compliance

self-awareness. Knowledge was related to the disease and its treatment, and skills were related to self-care, coping, and control.

Educational program

We developed an asthma patient education program that both reflected the educational diagnosis and met the educational needs of the patients. The program was created using several reference frameworks.[21-23] Table 6 summarizes the program.

Program evaluation

We assessed the program by comparing patients' knowledge scores, as measured by the Adult Asthma Knowledge Questionnaire (QCA-PA), before and after the TPE program. There was a significant difference ($P = 0.0001$) between patients' mean scores before and after participation in the TPE program [Table 7].

Discussion

The educational diagnosis and the intervention framework

The study population (N = 220) was characterized by a mean age of 48.43 ± 15.43 years, 50% had never attended school and only 22.73% had a remunerated occupation. The clinical profile revealed a mean BMI of 26.93 ± 4.45 kg/m² with a high level of exposure to asthma triggers. In the previous 6 months, 46.36% of patients had at least one asthma attack and 32.73% had been admitted to the emergency department at least once. The average duration of asthma in the population was 10.58 ± 9.60 years. 3.18% of the patients did not undergo any treatment, 28.2% were receiving inhaled corticosteroids, and the others were taking a combination (ICS + BALA). Finally, 90.01% had at least one comorbidity. Patients' responses to exacerbations were punctual and reactive to the crisis, rather than preventive. Only 15.91% of patients had satisfactory knowledge of asthma.

In terms of medication adherence, 56.82% of patients did not follow their prescriptions.

Our patient's clinical profiles reveal several predictors of poor disease control. Undoubtedly, previous research has supported the impact of comorbidities,[24,25] triggers exposure, and obesity[26] on asthma control. Furthermore, the majority of participants demonstrated insufficient compliance. Other studies have confirmed this finding.[13,14,27] Regarding the level of knowledge about the disease, it was found to be insufficient for good asthma management. Similar results were revealed by other studies.[28-30]

The therapeutic profile of our participants allows us to classify more than half (51.8%) as levels 4 and 5, which means severe persistent asthma that is not controlled with the previous level of treatment. Besides, 32.80% is the proportion of severe asthma found in the survey

Table 5: Educational needs perceived by asthma patients

Perceived needs	Number (%) (*n*=220)
Asthma disease	208 (94.54)
Asthma treatment	198 (90.00)
Asthma attack	176 (80.00)
Asthma patient's lifestyle	166 (75.45)
Psychological support	80 (36.36)

conducted in the Maghreb countries (Morocco; Algeria, and Tunisia).[31]

The designs and implementation of the TPE program require an interventional educational framework tailored to the patient's characteristics, allowing for the achievement of the set objectives and fitting into the study's theoretical framework: The Reasoned Action Approach (RAA). Transformative Learning, an interventional framework based on adult learning theory, was chosen for this purpose. Such a framework empowers patients to direct their education, proves how this education can help them make positive changes in their daily lives, provides a collaborative and supportive environment, and allows them to check their progress.

Transformative learning is a learner-centered approach to developing new skills and confidence in new roles and relationships.[32] It is a theory that explores and comprehends how adults learn and change as a result of their learning. This learning and change have three dimensions: (1) psychological, which is concerned with changes in self-awareness; (2) cognitive and convictional, which is concerned with revisions in knowledge and belief systems; and (3) behavioral, which is concerned with behavioral changes and lifestyle.[33] These three dimensions conform to the main objectives outlined in the educational diagnosis.

Transformative learning, developed by Jack Mezirow (1991), is the dominant theory in the field of adult education.[34] According to Mezirow (2011), it is a ten-step or experience-based process. It starts with a perplexing quandary, such as a medical diagnosis. Learners re-examine their previous and current understanding during this process to arrive at a revision of beliefs and a behavior change.[35] This interventional framework fits well with the study's theoretical framework: The Reasoned Action Approach. It provides a perspective through which we can address patients' educational needs and consider their experiences with their disease and its treatments. Transformative learning, on the other hand, entitles us to guide patients in their understanding of the learning and change processes they encounter at various points in their lives, as well as to offer opportunities for patients to re-examine their attitudes and beliefs about the disease and to construct new cognitions and behaviors

suitable for disease self-management. These theory-based educational programs have shown very promising results in the prevention of unhealthy behaviors.[36,37] In our case, this will be crucial in preventing exacerbations and highlighting symptoms.

Editing the program
Introductory session
This session aims to keep participants actively engaged and motivated. They must understand that therapeutic education is patient-centered and built on a partnership between the educator and the patient,[38] as well as the complementarity of professional expertise and the patient's experience with their disease.[39] Although TPE sessions are held in a group setting, the educational approach is tailored to the patient's specific needs, ensuring a better understanding of their thought patterns and feelings.

Therapeutic patient education sessions
Discussion Group
The focus group is a peer-to-peer sharing situation. It aims to place the participants in a self-reflection situation on their own beliefs. This interest in beliefs in the Theory of Reasoned Action (TRA) is well justified. Behavioral medicine research has shown that patients' dysfunctional beliefs about their illness can harm symptom development and treatment success.[40] Experimental studies have shown that interventions to change people's illness beliefs have a positive effect on their quality of life[41] and illness-related disability.[42] We see the emergence of beliefs during the discussion group in two ways: verbally articulated and conveyed during speaking, and infra-cognitive when it occurs in response to ideas brought up by peers during the conversation.

The presentation
The presentation has three objectives: (1) affective and emotional, in which the patient must feel personally challenged, motivated, and satisfied with the educator's interpersonal relationship. This gives the patient and the educational process as a whole confidence[43]; (2) to provide scientific knowledge to assist the patient in learning new skills, exploring beliefs, and developing new frames of reference.[44] The third role is to provide knowledge through simulations when measuring peak expiratory flow (PEF) or correct inhaler use. Bandura calls this the active mastery experience.[45] Patients gain confidence in their ability to perform the requested behavior after successfully experiencing it. The role of the educator is not to impose a change in the patient's beliefs, but rather to provide scientific knowledge and know-how while allowing them to confront what they learn with their cognitions and decide whether or not to change their beliefs and perceptions. A sense of self-determination improves self-esteem and self-efficacy[46] and thus patients' perceived control.[45]

Table 6: Therapeutic education program for asthmatic patients

Session	Goals	Conduct of the session	Pedagogical approach
1	Evaluate patients' pre-acquired knowledge.	assessment of patients' asthma knowledge	The QCA-PA*
	- Explain the goals of TPE and its benefits for the patient ;	Presentation of the ETP program.	Interactive presentation
	- Describe the steps in the program assembly process ;		
	- Identify the patients' roles in this arrangement.		
	Promote patient involvement	Consensual validation of the program by patients	Discussion
	support patient motivation		
2	- Express their representations and experiences with the disease	The patient's representation of asthma	- Brainstorming
	- Discover the subjectivity of representations of asthma by comparing their knowledge		- Guided discussion
	- Provide scientific knowledge on asthma	information on asthma	- Interactive presentation
	- Recognize the symptoms indicating the evolution of the respiratory state towards an asthma attack;		- PEF measurement
	- Correctly measure peak expiratory flow (PEF);		- Simulation
	- React to deterioration in respiratory condition		
	- Assess on-site learning;	Teach-back intervention	Formative evaluation with feedback
	- Explore behavioral change intentions.		
3	Identify the start of changes in the patient's behavior.	Weekly Experience	- Brainstorming
			- Guided discussion
	- Share one's attitudes with peers;	Attitudes toward the drugs used	- Discussion
	- Share their perspectives and experiences with treatment.		
	- Recognize negative attitudes toward treatment		
	- Differentiate Controller from reliever medication	Pharmacological treatment	- Interactive presentation
	- Recognize undesirable effects of medication		- Simulation
	- use a metered dose inhaler correctly		
	- Adapt treatment according to needs		
	- React to the asthma attack		
	- Evaluate on-site learning	Teach-back intervention	Formative evaluation with feedback
	- Explore opportunities to change negative attitudes		
4	Assess the patient's behavioral change	Weekly Experience	-Brainstorming
			- Guided discussion
	Act on the presence of asthma triggers	Prevention of domestic and occupational exposure	- Interactive presentation
	Determine the most important prevention elements to incorporate into the patient's experience over the next week.	work team	Brainstorming
	- Assess on-site learning	Teach-back intervention	Formative evaluation with feedback
	- Explore behavioral change intentions.		
5	Check the patients' integration of the items on the common list into their previous week's experiences.	Weekly Experience	- Brainstorming
			- Guided discussion
	- Have your medication on hand	Lifestyle	- Interactive presentation
	- Get the required vaccinations		- Discussion
	- Take a healthy and balanced diet		
	- Observe treatment		
	- Manage stress/relaxation		
	- Assess on-site learning	Teach-back intervention	Formative evaluation with feedback
	- Explore behavioral change intentions.		
6	Assess acquired knowledge	Individual cognitive assessment	The QCA-PA*
	Examine patients' cognitive-behavioral integration abilities.	Discussion of the disease, treatment, and patient experiences.	Discussion
	Assess patient satisfaction with program content, delivery, and interpersonal relationships during training	Program evaluation	Collective interview

*QCA-PA: The Asthma Knowledge Questionnaire for Adult Patients[18]

Teaching back: Knowledge acquisition

Teach-back intervention is a type of formative evaluation. It ensures that the patient has acquired the necessary knowledge to assist them in developing a personal awareness of why and how to make the change. It entails asking patients to explain in their own words what the educator has just explained to them. The educator then clarifies any misconceptions and double-checks

comprehension. Teaching back has been shown to improve knowledge, skills, and self-care abilities in chronic illness patients.[47,48]

The weekly experience

The weekly experience is a session in which patients share their weekly experiences. These interactions focus on their interaction with the skills and knowledge learned in the previous TPE session. This experience reflects the desired behavior change. For example, when patients report that they used their inhaler correctly or were able to adjust their treatment to their specific needs, this reflects perceived control and an intention to improve their treatment adherence. This is also true when other patients report that they experienced too few asthma symptoms in the last week as a result of avoiding trigger-exposure sites. Of course, not all patient reports will be positive, but the weekly experience session will inform us how much the patient intends to change his behavior. Moreover, the sharing of patients' experiences will lead to the development of a new of knowledge, enabling some of them to comprehend the disease and find an explanation for what is happening to them rather than remaining silent and considering it as an isolated phenomenon, subjective as it isn't referenced.[49]

Assessment session

The evaluation session enables the educator to ensure that the set goals are met and that the patient is satisfied, which influences the participant's motivation, beliefs, attitudes, and perceived control.[50] It influences patients' adoption of healthy behaviors and improves overall self-management of their condition.

Program evaluation

We noted an improvement in asthma patients' knowledge after the TPE sessions. After participating in the TPE program, the average score increased from 37.60 ± 5.99 to 49.70 ± 2.38 (P = 0.0001) [Table 7]. Also, several other studies have shown that patient education can improve patient knowledge.[14,51,52]

We chose patients' asthma knowledge as a TPE program evaluation criterion for two reasons. Firstly, improving asthma knowledge is an objective of the educational program. Furthermore, it is accessible immediately after program administration. Secondly, Knowledge is one of the contextual factors that influence intentions and

behavior indirectly through behavioral, normative, or controlling beliefs in the reasoned action model.[12]

According to Fishbein and Ajzen (2010), beliefs reflect individuals' knowledge about a given topic. As a result, knowledge measures, which are essentially measures of beliefs, should be linked to behavioral performance. Finally, because knowledge is a component of beliefs[53] and attitudes,[54,55] we can highlight the importance of selecting knowledge evolution as a criterion for assessing the TPE program. However, knowledge cannot predict or significantly change behavior on its own.[56]

Generally, evaluating educational interventions raises specific methodological issues due to the complexity of the interventions.[57] Educational interventions are complex in nature, and the situations and environments in which they are delivered are equally so. It was observed, notwithstanding, that many previous studies used measurable and quantitative criteria to assess the effectiveness of educational interventions.[58]

Study limitations

Although the program extends over six weeks, behavioral change is a long-term process and requires support for asthma patients. Moreover, the program was designed using an average profile of asthma patients. It would be interesting to administer the program to a large enough population and compare the results obtained according to age, education level, and comorbidities to develop more tailored TPE programs.

Conclusion

The goal of this study was to develop a therapeutic education program for asthma patients using a model that included an overall theoretical framework, The Reasoned Action Approach, and an interventional framework, Transformative Learning Theory. Our program included three types of sessions: an introductory session to encourage patient motivation and active participation in the program, four TPE sessions with a variety of learning approaches, and an assessment session to ensure participant satisfaction with the TPE program. The pilot study to evaluate the TPE program for Moroccan asthma patients revealed a significant improvement in participants' asthma knowledge.

Table 7: Comparison of knowledge score means before and after the TPE

	Mean±SD	*P*
QCA-PA score before TPE	37.60±5.99	0.0001
QCA-PA score after TPE	49.70±2.38	

QCA-PA: Questionnaire de connaissances sur l'asthme destiné aux patients adultes (Asthma Knowledge Questionnaire for Adult Patients

Conflicts of interest

There are no conflicts of interest.

References

1. Vos T, Lim SS, Abbafati C, Abbas KM, Abbasi M, Abbasifard M, *et al*. Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: A systematic analysis for the Global Burden of Disease Study 2019. Lancet (London, England) 2020;396:1204.

2. Benjelloun A, Ait Nasser K, Janah H, Benchanna R, Bouchentouf R. Particularité des patients asthmatiques au Sahara: Exemple de la région de Guelmim Oued Noun, Maroc. Rev Fr Allergol 2021;61:177-83.

3. Ministère de la Santé. Enquête Nationale sur la Population et la Santé Familiale (ENPSF-2018) 2018. [Internet]. 2019 [Last accessed on Dec 17, 2022];Available from: https://www.sante.gov.ma/Documents/2020/03/Rapport%20ENPSF%202018%202i%C3%A8me%20%C3%A9dition.pdf.

4. Nejjari R, Elaissaoui Y, Tebaa A, Rachida SB. 5PSQ-091 Asthma in the Moroccan population. Eur J Hosp Pharm 2019;26(Suppl 1):A243.

5. Masjedi M, Ainy E, Zayeri F, Paydar R. Assessing the prevalence and incidence of asthma and chronic obstructive pulmonary disease in the eastern mediterranean region. Turk Thorac J 2018;19:56-60.

6. Rida J, Moubachir H, Bouchriti Y. Asthma in Morocco: Retrospective analysis of case characteristics reported by hospital units. J Med Health Stud 2021;2:124-9.

7. Devillier P, Ghasarossian C, Terrioux P, Schiratti M, Leutenegger E. Observance du traitement de fond dans l'asthme persistant de l'adulte en pratique courante. Rev Mal Respir 2018;35:269-78.

8. Pavord ID, Mathieson N, Scowcroft A, Pedersen R, Isherwood G, Price D. The impact of poor asthma control among asthma patients treated with inhaled corticosteroids plus long-acting β2-agonists in the United Kingdom: A cross-sectional analysis. NPJ Prim Care Respir Med 2017;27:17.

9. Czira A, Turner M, Martin A, Hinds D, Birch H, Gardiner F, *et al*. A systematic literature review of the burden of illness in adults with uncontrolled moderate/severe asthma. Respir Med 2022;191:106670.

10. Nunes C, Pereira AM, Morais-Almeida M. Asthma costs and social impact. Asthma Res Pract 2017;3:1.

11. Riznat M. Retentissement de l'asthme sur la qualité de vie de l'enfant asthmatique. Etude prospective à propos de 126 cas. [Thesis]. [Morocco]:, Mohammed V university; 2017.

12. Fishbein M, Ajzen I. Predicting and Changing Behavior the Reasoned Action Approach. New York: Psychology Press; 2009.

13. Abazari P, Jafari T, Sabzghabaee A. How much elderly people of Isfahan are adherent to their drug therapy regimens? J Educ Health Promot 2017;6:12.

14. Hatami H, Dehkordi AH, Tali SS, Lotfizadeh M, Ganji H. The effect of educational program (based on BASNEF model) on quality of life and adherence to treatment in patients with myocardial infarction in Shahrekord, Iran. J Educ Health Promot 2022;11:39.

15. Haute Autorité de Santé. Education thérapeutique du patient (ETP) [Internet]. Haute Autorité de Santé 2013. Available from: https://www.has-sante.fr/jcms/r_1496895/fr/education-therapeutique-du-patient-etp. [Last accessed on 2022 Dec 17].

16. Johanson GA, Brooks GP. Initial scale development: Sample size for pilot studies. Educ Psychol Meas 2010;70:394-400.

17. Whitehead AL, Julious SA, Cooper CL, Campbell MJ. Estimating the sample size for a pilot randomized trial to minimize the overall trial sample size for the external pilot and main trial for a continuous outcome variable. Stat Methods Med Res 2016;25:1057-73.

18. Beaurivage D, Boulay ME, Frenette E, Boulet LP. Développement et validation d'outils de mesure des connaissances du patient: Le modèle du Questionnaire de connaissances sur l'asthme destiné aux patients adultes (QCA-PA). Rev Mal Respir 2016;33:350-64.

19. Beaurivage D. Développement et validation du Questionnaire de connaissances sur l'asthme destiné aux patients adultes (QCA-PA). Rev Mal Respir 2016;33:350-64.

20. Mezirow J, Taylor EW. Transformative Learning in Practice: Insights from Community, Workplace, and Higher Education. 1st edition. San Francisco, CA: Jossey-Bass: 2009.

21. WHO Regional Office for Europe, Copenhague. Education Thérapeutique du Patient [Internet] 1998. [Last accessed on Dec 11, 2022] Available from: https://www.euro.who.int/__data/assets/pdf_file/0009/145296/E93849.pdf.

22. Agence Nationale d'Accréditation et d'Évaluation en Santé (ANAES). Éducation Thérapeutique du Patient Asthmatique Adulte et Adolescent [Internet]. 2001. [Last accessed on Nov 20, 2022];Available from: https://www.has-sante.fr/upload/docs/application/pdf/asthme.rap.pdf.

23. Global Initiative for Asthma. Global Strategy for Asthma Management and Prevention [Internet]. 2020. [Last accessed on Nov 17, 2022] Available from: https://ginasthma.org/wp-content/uploads/2022/07/GINA-Main-Report-2022-FINAL-22-07-01-WMS.pdf.

24. Ahsino F, Zegmout A, Souhi H, Elouazzani H, Rhorfi I, Abid A. Comorbidités associées à l'asthme: Quel impact sur le contrôle? Rev Fr Allergol 2021;61:298.

25. Turrin M, Rizzo M, Bonato M, Bazzan E, Cosio MG, Semenzato U, *et al*. Differences between early and late-onset asthma: Role of comorbidities on symptom control. J Allergy Clin Immunol Pract 2022;10:3196-203.

26. Guilleminault L. Asthme et obésité de l'adulte. Méd Malad Métab 2022;16:89-97.

27. Reach G. Comment l'ETP peut-elle être une réponse à la non-observance ? In: Éducation Thérapeutique. Elsevier. Paris, France: 2020. p. 155-67.

28. Ozturk AB, Ozyigit Pur L, Kostek O, Keskin H. Association between asthma self-management knowledge and asthma control in the elderly. Ann Allergy Asthma Immunol 2015;114:480-4.

29. Adjoh KS, Gbadamassi AG, Kouanfack Djifack HR, Adambounou TAS, Aziagbe AK, Efalou P. Connaissances sur le traitement de l'asthme et observance thérapeutique chez les patients asthmatiques suivis par les pneumologues à Lomé. Rev Malad Respir Actual 2020;12:182.

30. Sharifi L, Pourpak Z, Heidarnazhad H, Bokaie S, Moin M. Asthma knowledge, attitude, and self-efficacy in Iranian asthmatic patients. Arch Iran Med 2011;14:315-20.

31. Jniene A, El Fassy Fihry MT, Mahraoui C, Benyounes A, Douagui H, Tritar F, *et al*. Diagnostic et prise en charge de l'asthme sévère dans 3 pays du Maghreb. Rev Fr Allergol 2017;57:298-301.

32. Tsimane TA, Downing C. A model to facilitate transformative learning in nursing education. Int J Nurs Sci 2020;7:269-76.

33. Elbanna RMH, Sileem AE, Bahgat SM, Ibrahem GA. Effect of bronchial asthma education program on asthma control among adults at Mansoura district. Egypt J Chest Dis Tuberc 2017;66:561-9.

34. Biasin C. Transformative learning: Evolutions of the adult learning theory. Phronesis 2018;7:5-17.

35. Mezirow J. Transformative Dimensions of Adult Learning. Jossey-Bass. San Francisco: 1991.

36. Sabouri M, Shakibazadeh E, Mohebbi B, Tol A, Yaseri M, Babaee S. Effectiveness of an educational intervention using the theory of planned behavior on health care empowerment among married reproductive-age women: A randomized controlled trial. J Edu Health Promot 2020;9:293.

37. Shahmohamadi F, Hoseini M, Matbouei M, Nasiri M. The effect of educational intervention based on the theory of planned

behavior aimed at mothers on osteoporosis prevention behaviors in lower secondary school female students. J Educ Health Promot 2022;11:15.

38. Global Initiative for Asthma. Global Strategy for Asthma Management and Prevention [Internet]. 2022 [Last accessed on Dec 18, 2022];Available from: https://ginasthma.org/gina-reports.

39. Haute Autorité de Santé. Démarche centrée sur le patient Information, conseil, éducation thérapeutique, suivi [Internet]. [Last accessed on Dec 18, 2022] 2015;Available from: https://www.has-sante.fr/jcms/c_2040144/fr/demarche-centree-sur-le-patient-information-conseil-education-therapeutique-suivi.

40. Kube T, Rozenkrantz L. When beliefs face reality: An integrative review of belief updating in mental health and illness. Perspect Psychol Sci 2021;16:247-74.

41. Broadbent E, Ellis CJ, Thomas J, Gamble G, Petrie KJ. Can an illness perception intervention reduce illness anxiety in spouses of myocardial infarction patients? A randomized controlled trial. J Psychosom Res 2009;67:11-5.

42. Rief W, Shedden-Mora MC, Laferton JAC, Auer C, Petrie KJ, Salzmann S, *et al*. Preoperative optimization of patient expectations improves long-term outcome in heart surgery patients: Results of the randomized controlled PSY-HEART trial. BMC Med 2017;15:4.

43. Golay A, Lagger G, Giordan A. Une éducation thérapeutique en quatre dimensions pour diminuer la résistance au changement des patients obèses. Méd Malad Métab 2007;1:69-76.

44. Arlinghaus KR, Johnston CA. Advocating for behavior change with education. Am J Lifestyle Med 2017;12:113-6.

45. Bandura A. Self-Efficacy: The Exercise of Control. Worth Publishers New York: 1997.

46. Crescioni AW, Baumeister RF, Ainsworth SE, Ent M, Lambert NM. Subjective correlates and consequences of belief in free will. Philos Psychol 2016;29:41-63.

47. Talevski J, Wong Shee A, Rasmussen B, Kemp G, Beauchamp A. Teach-back: A systematic review of implementation and impacts. PLoS One 2020;15:e0231350.

48. Ha Dinh TT, Bonner A, Clark R, Ramsbotham J, Hines S. The effectiveness of the teach-back method on adherence and self-management in health education for people with chronic disease: A systematic review. JBI Database System Rev Implement Rep 2016;14:210-47.

49. Noël-Hureaux E. De l'expérience singulière médiatisée de la maladie à la construction de savoirs expérientiels. Rech Soins Infirm 2019;138:65-74.

50. Hagger MS, Chatzisarantis NLD, Harris J. From psychological need satisfaction to intentional behavior: Testing a motivational sequence in two behavioral contexts. Pers Soc Psychol Bull 2006;32:131-48.

51. Ghazavi Z, Iranpor R, Hemate Z, Hasanpor M, Alidosti M. An examination of the effect of health promotion plan in high school students' on knowledge and performance on peers suffering from asthma in high schools of district 3 in Esfahan, 2010. J Edu Health Promot 2012;1:33.

52. Bastami F, Mostafavi F, Hassanzadeh A. Effect of educational intervention on knowledge, perceived benefits, barriers and self-efficacy regarding AIDS preventive behaviors among drug addicts. J Educ Health Promot 2015;4:90.

53. Ernest P. The knowledge, beliefs, and attitudes of the mathematics teacher: A model. J Educ Teach 1989;15:13-33.

54. Chaiken S. Attitude Formation : Function and Structure. In : Smelser NJ, Baltes PB, editors. International Encyclopedia of the Social & Behavioral Sciences [Internet]. Oxford : Pergamon; 2001 [Last accessed on Jul 26, 2023]. p. 899-905. Available from : https://www.sciencedirect.com/science/article/pii/B0080430767017587.

55. Maio G, Haddock G. The Psychology of Attitudes and Attitude Change. SAGE Publications Ltd. California: 2009.

56. Ogden J. Health Psychology: A Textbook. 5th ed. Maidenhead: Open University Press; 2012.

57. Boutron I, Altman DG, Moher D, Schulz KF, Ravaud P; CONSORT NPT Group. CONSORT Statement for randomized trials of nonpharmacologic treatments: A 2017 update and a CONSORT extension for nonpharmacologic trial abstracts. Ann Intern Med 2017;167:40-7.

58. Haute Autorité de Santé. Indicateurs dans le champ de l'éducation thérapeutique du patient [Internet]. 2014. [Last accessed on Nov 10, 2022];Available from: https://www.has-sante.fr/upload/docs/application/pdf/2014-06/indicateurs_etp_v2.pdf.