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AN UPDATE ON VARIOUS COUNSELING APPROACHES FOR IMPROVING ASTHMA MANAGEMENT

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Background : *Asthma poses a significant public health concern, impacting individuals across various age groups. The improper utilization of pressurized metered-dose inhalers (pMDI) stands out as a primary contributor to the challenges in managing asthma. Effective counseling for patients with asthma, both adults and children, regarding the correct use of pMDIs has demonstrated substantial improvements in asthma symptom control. This, in turn, leads to better clinical outcomes for individuals dealing with asthma. Various counseling methods are at the disposal of healthcare professionals, each exerting a unique impact on the overall management of asthma.* ***Materials and methods:*** *This study comprises a structured review of existing literature on asthma management for both adults and children. The focus is on counseling methods for patients with asthma, exploring the diverse types available, and the assessment of asthma symptom control through follow-up questionnaires.* ***Search strategy*** *: Electronic databases were searched using three searching tools were used; medical literature databases like* ***PubMed ,Mendeley and Google scholar*** *were searched for published articles about asthma counseling. Using the following searching words "Asthma"," Asthma counseling", Verbal counseling " , "Advanced counseling " ,"Asthma control" and "Pressurized metered dose inhalers". , the data was extracted from the publications including, publication details, methodologies, interventions, study designs, key results and outcomes. A two stages were done, the 1st stage includes systematic reviews on asthma counseling and management, the 2nd sage includes the original researches about asthma counseling.* ***Conclusion:*** *Asthma counseling emerges as a fundamental element in the effective management of asthma for both adults and children. Various counseling strategies have consistently demonstrated significant improvements in overall asthmatic status and clinical outcomes*

Keywords: *asthma; asthma counseling; advanced counseling; asthma control test; asthma control questionnaire; pressurized metered dose inhalers*

INTRODUCTION

Asthma

Asthma, a chronic lung disease affecting individuals of all ages, necessitates educational interventions to ensure proper use of inhalers, as prescribed [1].

Asthma definition

A prevalent challenge faced by diverse individuals is asthma, a chronic inflammatory disorder of the airways characterized by a reversible obstruction, inflammation, and hyperresponsiveness of the airways[2].

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Adult asthma

Asthma is a prevalent chronic lung disease, impacting around 235 million people globally. It manifests as reversible, intermittent airway obstruction triggered by inflammation. Over the past decade, there has been a substantial 50% rise in global asthma prevalence, attributed to shifts in low-income conditions. This imposes a significant burden on individuals, their families, communities, and health systems[3]. Asthma symptoms can vary among adults, and several factors contribute to the severity of adult asthma, including elevated IgE levels, eosinophilia, obesity, smoking, and low socioeconomic status [4, 5] .Despite advances in our understanding of the etiology and management of asthma, the prevalence of the disease is predicted to increase by 100 million people by 2025[6]. Inadequate management of asthma imposes a substantial financial burden on the government and healthcare system. In the United States alone, an annual expenditure of 5.35 billion dollars is allocated to treat the condition in this population[6].

Children asthma

Children with asthma undergo physical and psychological changes that affect their overall health and well-being. Childhood asthma poses a substantial global public health challenge, with complications being more prevalent in affected children[7]. Elevated anxiety levels in both children and their caregivers may result in noncompliance with treatment plans, jeopardizing symptom control[7] . Therefore, it is crucial to emphasize counseling for child asthma, aiming to improve asthma control, decrease emergency room or urgent care visits, and enhance school attendance[7]. The primary means of administering asthma medications is through inhalation devices[8].Physicians and other healthcare providers should consistently educate children on the correct usage of their inhalation devices and address any errors that may arise to ensure the effective administration of medication. Many children struggle to use their inhalers correctly[9]. Inhaled medications play a crucial role in asthma treatment. To attain the intended therapeutic benefits, it is essential to use the appropriate device correctly. The selection of inhaled medications should be customized to meet the patient's requirements, be user-friendly, cost-effective, and minimize oropharyngeal deposition and systemic side effects[9]. Researchers and clinicians frequently employ the Asthma Control Questionnaire (ACQ) to evaluate the effectiveness of pediatric asthma treatments. Quality of life measures are considered indicators of how much a patient's illness interferes with their ability to function on various levels, including social, emotional, and physical functioning[10].Consequently, the aim is to determine whether treating asthma enhances patients' ability to function and manage their long-term conditions. Medical professionals treating pediatric asthma use these outcome measures to formulate a treatment plan and administer asthma medicine.

While some studies have identified associations, there isn't a strong correlation between children's quality of life (QOL) and the severity of their asthma. Several studies have indicated that there isn't always a consistent relationship between children's QOL assessments and symptoms of poorly controlled asthma, such as wheezing and disruptive nighttime awakenings that interfere with daily activities. Inconsistencies in how asthma severity is assessed may impact the relationship between asthma severity and child QOL, including symptoms, activity limitation, night waking, and pulmonary function tests[11]. Assessment of asthma severity is often conducted by the patient, caregiver, or physician in accordance with published guidelines for asthma management[12]. Pressurized metered-dose inhalers (pMDIs) with salbutamol are considered the standard medication for asthma due to their rapid local action, lower side effect profile compared to oral counterparts, and cost-effectiveness per dosage[13]. These inhalers are widely used in asthma treatment because of their consistent dosage and easy administration[13].Despite being a common method for managing asthma, one of the main drawbacks of pMDIs is the frequent occurrence of poor inhalation technique. Numerous studies indicate that most patients make errors in over 20% of the steps, and 80–90% of patients make at least one error[10, 11]. A prevalent mistake is not maintaining a steady inhalation during device use[14].The primary reason for improper pMDI handling is

insufficient patient education and counseling by the healthcare team before pMDI use[15]. Continuous patient education contributes to improved clinical outcomes, effective aerosol medication delivery to the lungs, and enhanced asthma management[15].

Asthma Epidemiology

The enormous costs associated with managing asthma and chronic obstructive pulmonary disease (COPD) impact healthcare providers and patients globally [14]**.** Asthma affects over 24 million people worldwide, encompassing both adults and children [16]. In 2018, out of the 24 million individuals who experienced asthma attacks, 11 million had one or more attacks, and 87% of these incidents were attributed to by incorrect inhaler use. [16].

Asthma risk factors

It has become evident that asthma involves a significant immune system component, in addition to the acute episodes that typically manifest as wheezing and occasionally result in irreversible declines in lung function. Various immune cells and mediators play distinct roles. While not always present, a discernible correlation exists between atopy and asthma. Asthma is more common in atopic individuals, and specific allergies contribute significantly to this prevalence[17].However, not everyone who is atopic develops asthma, and not all individuals with asthma exhibit markedly higher allergic reactions.

Dysregulated immunity seems to play a role in the development of asthma, characterized by increased serum immunoglobulin E (IgE) levels, excessive mast cell release of allergic mediators, eosinophil infiltration into the lungs, inflammation in the airways, and distorted T helper 1 (Th1) and Th2 responses. One approach to managing asthma over the long term involves reducing chronic inflammation in the lungs through the use of anti-inflammatory drugs, such as inhaled glucocorticoids. Twin and family-based research suggests that asthma is a complex hereditary condition[17]. Various genetic and environmental factors influence how the disease manifests clinically and the associated phenotypes, including atopy, elevated IgE, and bronchial hyperresponsiveness [17]. It is widely believed that the interplay between genes and the environment contributes to the development of asthma [17].

Risk factors

There are many asthma' environmental risk factors e.g. Tobacco, Pollution and, Obesity and Also there are some **o**ccupational risk factors e.g. Microbes, Hygiene hypothesis, and Stress. Genetics: Epigenetics[18].

The global initiative for asthma (GINA) recommendation (2020 report) highlights that one of the risk factors for asthma exacerbation is the use of an incorrect inhaler technique[2].

Asthma diagnosis

Symptoms

The symptoms of asthma may vary between children and adults. In children, asthma severity is linked to factors such as lung function, medication use, a neutrophil phenotype, and long-term low socioeconomic status. Conversely, in adults, asthma exacerbation is associated with high IgE, eosinophilia, obesity, smoking, or a low socioeconomic status.[4, 5].

Pulmonary Function Tests

Various tests are available to assess lung function, measuring the capacity to inhale and exhale air and the degree of lung obstruction. These tests help in categorizing obstructive lung disease into various severity classes and can be utilized to monitor the effectiveness of respirable medications. [17].

Spirometry

Spirometry is a rapid and straightforward procedure that involves measuring the rate and volume of a patient's exhaled gas using a spirometer, as illustrated in **Fig.** 1 [19] To determine the amount of air exhaled within a specific timeframe, the patient should take a full inhalation and then exhale through the spirometer mouthpiece. The patient should be positioned in a way that allows them to sit comfortably during this procedure[20].

Fig. 1: One Flow Tester screen spirometer. [19]

The forced expiratory volume in one second (FEV1) is the volume of air, expressed in liters, that a patient is compelled to exhale in a single second after taking a full breath [21].
The forced vital capacity (FVC) is the total amount of air that a patient can be forced to exhale after a full inhalation.The ratio of FEV1 to FVC provides a measure of lung restriction and obstruction, aiding in the diagnosis of interstitial lung diseases. Typically, this ratio has a value greater than 80% [22, 23].A spirometer can be utilized to assess the degree of lung obstruction or, post-bronchodilator therapy, to differentiate between obstructive and restrictive lung diseases, as well as between asthma and COPD [22, 24].

Spirometry serves purposes beyond COPD and asthma, extending to the evaluation of lung function before surgery or in scenarios where exposure to chemicals might lead to potential lung damage. [25].The normal range of spirometry values varies among individuals due to factors like height, gender, and age. Abnormal spirometry values indicate airway obstruction, predicted when the FEV1/FVC ratio falls below 70% of the expected value for a given gender, age, and height, along with a low FEV1 value. In conditions causing lung scarring, such as interstitial lung diseases, lung fibrosis, and other restrictive diseases, the FEV1/FVC ratio exceeds 70%, and the FVC is lower than the normal expected value [26].

Spirometry results are reliant on the patient's effort and may be inaccurate if the patient doesn't operate the device correctly or experiences medical conditions like chest or abdomen pain, leading to reduced effort. To mitigate errors, spirometry should be performed three times, considering the average or best result [22, 27].

Asthma management

The primary objectives of asthma treatment are to reduce exacerbations, maintain a high quality of life, and adhere to global asthma management guidelines, thereby improving pharmaco-economic aspects [17]. Various inhalation devices, each with unique dosage forms, optimal inhalation rates, and patient tolerance, are available [17].

Asthma treatment

Pharmaceutical treatment is considered the most crucial and successful course of action for the majority of asthma cases[28]. The treatment of asthma follows a step-by-step approach, adjusting the dosage of a medication or adding a new medication until asthma is under control. This approach considers both the side effects of medications and the control of the disease. The severity of asthma should be assessed before initiating asthma management, as determining the stage of asthma is a crucial factor in selecting the appropriate medication.

Intermittent (Step 1): Patients at this stage are recommended to use selective beta-2 agonist medications on an as-needed basis to relieve symptoms. Patients experiencing bronchoconstriction during exercise should administer an inhaled beta-2 agonist

formulation ten minutes before initiating their exercise regimen.Mild persistent asthma (Step 2): The management guidelines for mild persistent asthma advocate long-term therapy. Hence, it is crucial to differentiate between mild intermittent asthma and mild persistent asthma (Lung and Institute, 2007). Low-dose inhaled corticosteroids (ICS) are the recommended choice for symptom relief during long-term control therapy.Additional medications, such as cromoglycates, theophylline, and leukotriene receptor antagonists, should be considered alongside inhaled corticosteroids (ICS) for managing mild persistent asthma. Moreover, the use of a short-acting beta-2 agonist prior to exercise and during symptomatic episodes may be warranted, contingent on the specific circumstances. For the management of moderate persistent asthma (Step 3), a combination of medium- or low-dose inhaled corticosteroids (ICS) with long-acting beta-2 agonists (LABA) is recommended. Opting for low-dose ICS alongside LABA is preferred over increasing the ICS dose [25].In this stage, additional medications such as leukotriene modifiers or theophylline may be considered in conjunction with low-dose ICS. Moving to severe persistent asthma (Step 4, 5, and 6), the strategy involves using LABA with ICS in Step 4. If control is not attained, the escalation of corticosteroid dose is advised in Step 5. In cases where the control group does not exhibit a response to anti-IgE therapy, Omalizumab may be considered as an alternative. For asthmatic patients unresponsive in Steps 4 and 5, daily oral glucocorticoids are recommended. Continuous use of oral glucocorticoids becomes a viable option in Step 6. Following the initiation of asthma medication, it is essential to assess patients' ability to control both their asthma symptoms and lung function. The initial step in the assessment process involves gathering pertinent information from the patient, encompassing details of their medical history over the preceding four weeks, their current forced expiratory volume in one second (FEV1), and conducting risk assessments [29].In cases where the patient's condition is well controlled, therapy may be tapered down to mitigate potential drug side effects. However, if the patient's condition remains inadequately controlled, advancing to the next stage of care is advisable [29].

Pressurized metered dose inhalers

Inhalers constitute the primary treatment modality for asthma [30].Ensuring therapeutic efficacy necessitates the correct utilization of the inhalation technique, as the medication must reach the lungs effectively [17]. The inhalation route serves as the foundation for an effective treatment strategy for ambulatory asthmatics, offering a swifter onset of action and fewer potential side effects compared to systemic routes of administration. [2, 23, 27, 31]. Various inhalation devices exhibit differences in medication formulations, patient tolerance, and device-specific factors [2, 23, 31].

Pressurized metered dose inhalers composition

As shown in **Fig.** 2[30], Pressurized Metered Dose Inhalers (pMDIs) stand out as the most extensively employed aerosol-generating devices, thanks to their portability and multi-dosing system. They prove highly suitable for a broad spectrum of patients [29, 32]. Due to the challenge younger children face in using PMDIs correctly, these devices can be employed in conjunction with an extension, commonly known as spacers. Spacers facilitate additional time and space for effective drug inhalation in this population [33].The medication destined for inhalation is housed within a canister, along with additional ingredients like a propellant, surfactant, and lubricant, all under pressure. The canister features a metering valve, and it is securely positioned downward in the actuator. Pressing the bottom of the canister releases the pre-metered aerosol dose from the pMDI. Propelled by gas pressure, the propellant carrying the inhalable drug traverses the actuator nozzle, forming a cloud of minute droplets. The pMDI releases particles of various sizes, with prior research indicating that larger particles tend to settle in the oropharynx [34, 35]. Approximately 10% of the drug remains in the pMDI actuator and mouthpiece, while 75-80% is deposited in the upper respiratory system, and 10-15% reaches the deeper regions of the patient's respiratory system from a puff containing 100 µg of the inhaled drug, such as salbutamol sulfate in Ventolin [36, 37].

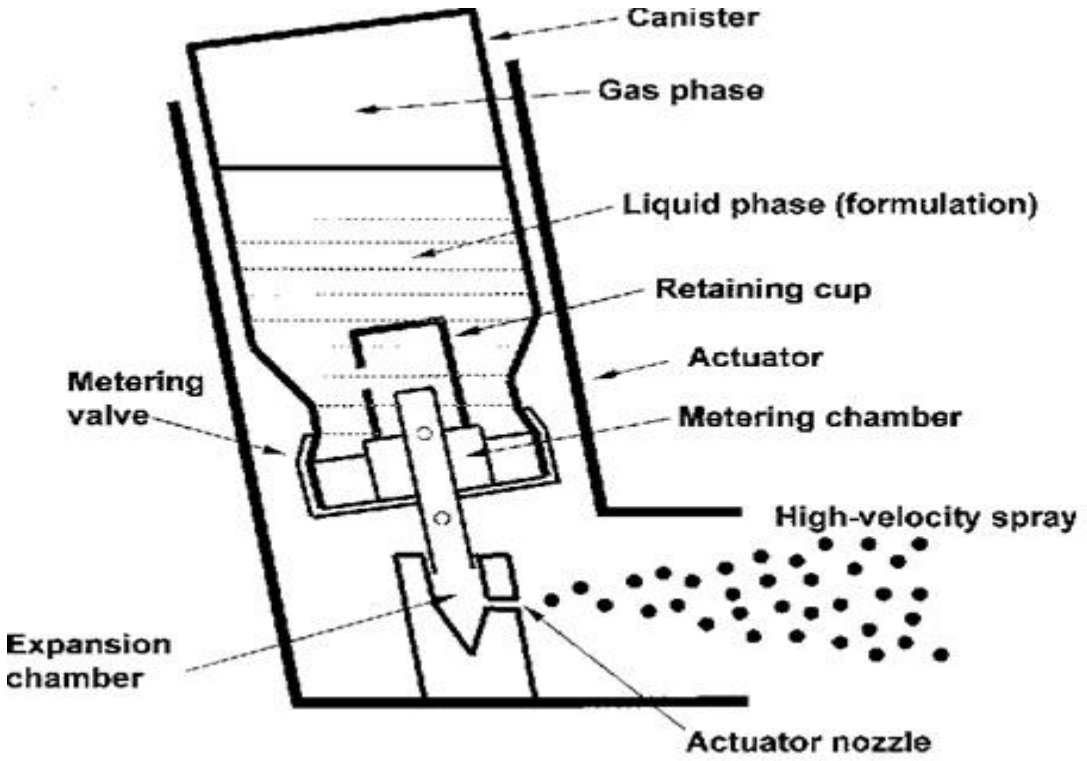

Fig. 2: Schematic of typical pressurized metered-dose inhaler. [30]

Numerous factors, including the physical and chemical characteristics of the propellant, the gas pressure within the Pressurized Metered Dose Inhaler (pMDI) canister, the design of the valve and outlet nozzle, the drug formulation, and the configuration of the mouthpiece connected to the pMDI, collectively influence the aerosol particle size generated by the pMDI [36, 38]. The size of aerosol particles generated by the Pressurized Metered Dose Inhaler (pMDI) is determined by two primary variables: the duration needed for propellant evaporation and the distance traveled by the aerosol post-release from the pMDI [39].Historically, chlorofluorocarbons (CFCs) were the most commonly used propellants in pMDIs. However, environmental concerns arose in 1974 due to the increasing frequency of CFC emissions, leading to detrimental effects on the ozone layer [40]. To safeguard the ozone layer, the Montreal Protocol instituted a ban on the use of chlorofluorocarbons (CFCs) in 1987, encompassing all forms, including their use in PMDIs. Hydrofluorocarbons (HFCs), being ozone-friendly, have since replaced CFCs as propellants in the pharmaceutical industry , including their utilization in pMDIs [41, 42].Priming an inhaler after use is unnecessary unless it remains unused for more than two weeks [34].

Pressurized metered dose inhalers steps of administration and drawbacks

PMDIs are recognized as reliable and user-friendly devices; however, concerns persist regarding incorrect patient inhalation techniques, which have been shown to adversely impact disease management [2, 32]. Despite being one of the most widely utilized aerosol-generating devices with portability and a multi-dosing system, the pMDI, if not used correctly, may result in inadequate drug deposition in the lungs and an increased risk of drug deposition in the buccal cavity and oropharynx. These issues can lead to undesired local side effects and an overall poor response to treatment [43]. A notable limitation of therapy delivered via PMDIs is the potential for suboptimal inhalation technique, stemming from difficulties in synchronizing the patient's inhalation with the aerosol discharge from the device [43].There is a critical need for comprehensive patient education on the proper inhalation technique, given that less than 10% of patients currently utilize their PMDIs correctly. [44-46].A vital aspect of Pressurized Metered Dose Inhaler (pMDI) usage involves

the deliberate inhalation of the released aerosol, done slowly and deeply for a minimum of five seconds. Rapid inhalation of the dose from the device can lead to insufficient drug deposition in the lungs and an increased deposition in the oropharyngeal area [43]. The optimal lung deposition for the drug is achieved at an inspiratory flow rate of 30 to 60 L/min through the pMDI [43]. Notably, a recently developed smartphone app designed to gauge the duration of optimal inhalation flow may offer assistance in this regard [43].The limitations of Metered Dose Inhalers (MDIs) have long been acknowledged, with the patient's inhaler technique significantly influencing drug distribution, as observed in the literature [47]. A prevalent issue reported by patients with MDIs is the lack of synchronization or coordination between actuation and inhalation.The principal drawback of therapy administered through Metered Dose Inhalers (MDIs) is the prevalent issue of suboptimal inhalation technique, stemming from difficulties in coordinating the patient's inhalation with the aerosol released by the device. With only 10% of patients utilizing MDIs correctly, there is a critical need for comprehensive patient education to ensure the adoption of the optimal inhalation technique [17].

The Principal disadvantages associated with pressurized metered dose inhalers.

Device related dis advantages

For pMDI, the medicine canister is not shaken thoroughly before releasing the aerosol. Before inhaling, the mouthpiece of the device is not removed.

Patient related dis advantages

- The patient either breathes through their nose or inhales air before or after aerosol delivery.
- The patient exhales either before or during the aerosol delivery.
- •If the patient presses the canister multiple times, more than one dose is released in a single breath.The device does not coordinate the delivery of aerosol with patient inhalation, and there is no simultaneous administration.
- The patient's inhalation flow is excessively fast. The patient's inhalation was interrupted by the "Freon effect," which is the early cessation of breathing brought on by the propellant's cold sensation in the upper airways (the mouth and the throat).

Asthma counseling

Adequate counseling and training, along with effective self-management of breathing devices, ensure treatment adherence[17]. Regular instruction on the proper use of prescription medication devices, like PMDIs, for patients with asthma, increases the likelihood of improved lung function and optimal long-term control, enhancing satisfaction and reducing morbidity[2]. Good adherence and compliance reduce the incidence of exacerbations, constituting nearly 40% of all associated medical costs[2]. Teaching the technique-determining step in pMDI inhalation training can be challenging[32]. Consistent counseling is crucial for enhancing obstructive lung disease management and treatment outcomes[43]. Consistent counseling has been proven to improve treatment outcomes and aid in controlling obstructive lung diseases[2]. Questionnaires can serve as effective tools for monitoring the efficacy of counseling in asthma management [17].Recent test results indicate that, by identifying primary Inhalation Flow Rate (IFR) flaws in the inhalation method, instructional materials have been developed to enhance counseling. These aids, considered as supplements to conventional Metered Dose Inhaler (MDI) verbal counseling, educate individuals by emitting an audible sound when the IFR is within the required range. Furthermore, the duration of inhalation is a crucial factor in ensuring that the lungs receive a significant portion of the emitted dose. Several recently developed smartphone applications are available for measuring the correct inhalation flow duration.

Inadequate inhalation technique, exemplified by inappropriate use of MDIs, significantly affects disease control[48]. It is estimated that up to 94% of these people misuse their MDIs, compared to 84% of patients who abuse dry powder inhalers[14, 49]. Previous research underscores the significance of education and training in improving patients' proficiency with aerosol therapy [50]. Verbal

counseling, instructing individuals on proper MDI usage, significantly enhanced asthma management. However, a challenge emerged as many subjects struggled to maintain the correct breathing technique and were prone to forgetting their training shortly after counseling [51]. Despite receiving instruction on standard inhaler techniques, numerous patients continue to misuse their inhalers [51].

Asthma counseling types

The categories of asthma counseling include traditional verbal asthma counseling, advanced asthma counseling and advanced verbal asthma counseling [35].

Traditional verbal asthma counseling

Verbal instruction is provided at chest clinics [35] To ensure the accurate use of the pMDI, traditional verbal training consists of 11 steps as shown in **Fig.** 3[52].

The accurate use of MDIs through verbal counselling plays a crucial role in enhancing asthma control[16, 35].Many of these steps are theoretically straightforward for patients to complete and easy for instructors to assess. They involve actions such as exhaling before inhaling the aerosol, shaking the device, and correctly positioning the Pressurized Metered Dose Inhaler (pMDI) in the patient's mouth[35].Unfortunately, verbal instruction alone is insufficient to rectify coordination errors, especially in chest clinics and with older patients, regarding the correct Pressurized Metered Dose Inhaler (pMDI) technique[43].

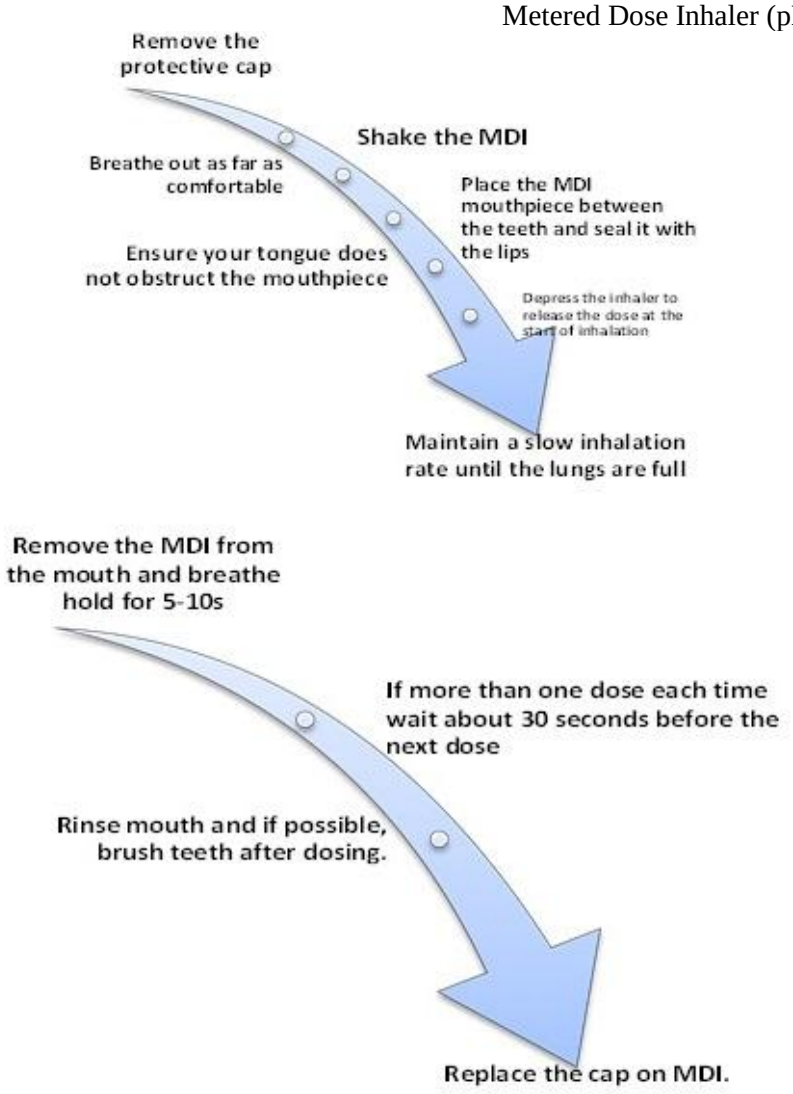

Fig. 3: Steps of p MDI use. [52]

Advanced asthma counseling

Incorrect inhalation technique is a prevalent cause of diminished lung function following MDI use. Combining traditional verbal counseling with an MDI training tool and a smartphone app has been shown to decrease the occurrence of inhaler technique errors and enhance Forced Expiratory Volume (FEV) [43].

Verbal counseling significantly contributes to asthma control when patients are instructed on correct MDI usage. Unfortunately, a substantial number of patients fail to retain their training and do not consistently employ the correct inhalation technique after instruction [43].Saeed et al. reported a reduction in the frequency of incorrect inhaler technique use through the combined utilization of an MDI training device, a smartphone application, and traditional verbal counseling [53]. In the comparison between this combined approach and traditional verbal counseling alone, all analyzed metrics exhibited significant improvements. These included outcomes related to lung function, indicating a consistent enhancement in lung function with the incorporation of add-on devices to the MDI and smartphone applications during verbal counseling [43].The utilization of the Trainhaler smartphone application by children with asthma has demonstrated a noteworthy reduction in the overall number of inhalation technique errors[50]. Additionally, there was a notable improvement in inhalation time, as measured by the Trainhaler app on smartphones [39]. Elgendy et al. emphasized the significance of patient education on inhaler usage and its impact on reducing the overall number of asthma presentations. They highlighted the value of consistent care and reinforcement to patients. Ongoing counseling holds the potential to enhance an individual's quality of life by improving lung health [54]. Mahmoud et al. found that the integration of smartphone applications and training tools with traditional verbal counseling significantly improved pulmonary function and decreased the frequency of breathing technique errors, compared to verbal counseling alone [55]. Sobh et al. conducted further research, revealing a greater impact of both add-on devices—Flo-Tone and Clip-Tone with their smartphone applications—when compared to verbal counseling alone. Additionally, in comparison to verbal counseling alone, these add-on devices were found to enhance lung deposition[56].

Advanced verbal asthma counseling

Combining verbal counseling on Pressurized Metered Dose Inhaler (pMDI) administration and error correction with advanced counseling through a smartphone application has been proposed as an effective approach [43].

International review about asthma and p MDI use counseling

The main objective of our review was to assess the effectiveness of three different asthma counseling strategies on asthma symptoms control .

Several studies talked about the superiority of advanced counseling on the traditional verbal counseling[35, 39, 44, 52,56], the previously mentioned studies showed the great impact of advanced counseling on the improvement of the overall asthmatic status .

Asthma counseling questionnaires

Asthma Control Test

Monitoring the effectiveness of asthma treatment can be achieved through lung function testing and the Asthma Control Test (ACT) [43]. The Global Initiative for Asthma (GINA) guidelines, a recent set of asthma treatment recommendations, emphasize that asthma severity is less critical than achieving both short- and long-term asthma control [47]. For individuals with uncontrolled asthma, the GINA guidelines recommend adjusting their dosage for improved asthma management. GINA states that "it is reasonable to assume that most asthmatic patients can and should maintain control of the condition." Despite the guidelines, a substantial number of adults and children with asthma still do not have their condition adequately managed [42, 57].Several methods have been developed to assess the level of asthma control and guide therapy [40, 41]. ACT is an example, consisting of a five-item questionnaire that proves useful in identifying poorly controlled asthma in adults and adolescents as young as 12 years old [90]. Additionally, a seven-item Childhood ACT (C-ACT) has recently been approved for use with

children aged 4 to 11[40, 41]. For both questionnaires, a score cutoff point of 19 has been established to indicate uncontrolled asthma.

Asthma control questionnaire

The Asthma Control Questionnaire (ACQ), widely recognized globally, comprises seven questions addressing symptoms, the use of rescue medication, and lung function [58]. Additionally, a simplified version with five or six items has been validated[40]. Although the ACQ's use among youths aged 6 to 16 has only recently been validated,[40]. its use with children is not well-established. Nevertheless, in clinical research, the C-ACT, ACT, and ACQ have all been extensively used.

While the Global Initiative for Asthma (GINA) guidelines provide a definition of asthma control, the most reliable assessment often relies on a single outpatient visit, expressed as scores between 1 and 5 (well-controlled), or categorized into three control statuses (uncontrolled, partly controlled, or controlled)[40-43, 47, 57, 58].

Despite this, numerous studies show that both patients and clinicians frequently overstate the level of control and progress achieved during therapy[59]. Several studies involving young participants assessed the ACT or ACQ in relation to asthma control as defined by GINA criteria. Three studies utilized the ACQ[59], and one used the ACT [60]. To date, there has been no research comparing the C-ACT and ACT with GINA criteria in children. This study aims to assess the effectiveness of the ACT and C-ACT in identifying uncontrolled asthma in children based on GINA recommendations.

Types of asthma questionnaire

The Asthma Control Questionnaire (ACQ) proves to be a reliable tool for assessing the primary therapy goal, which includes reducing symptoms, managing activity limitations, utilizing short-acting β2 agonists, and addressing adult airway narrowing[61].Composite asthma-control indicator questionnaires have proven to be valuable tools aiding patients and clinicians in evaluating the degree of asthma control[61]. These surveys involve patients recalling and describing the frequency of symptoms, their activity levels, any restrictions faced, and the usage of inhalers over time (Table 1)[52]. These approaches align with evidence supporting the significance of symptom frequency and bronchodilator usage as key indicators of asthma management, current impairment, and the future risk of asthma development [61]. Ozoh, O.B., et al. assert that the Asthma Control Questionnaire (ACQ) exhibits good evaluative and discriminative characteristics, making it a reliable tool for assessing asthma control [62].

Table 1: Different types of Asthma Control tests and questionnaires.[52]

	ACQ-5,6,7 (Five, six or seven-item Asthma Control Questionnaire)	**ACT** (Asthma Control Test)	**GINA** (Global Initiative for Asthma)
Age range	≥ 11	≥ 12	≥ 6
Questions	5, 6, or 6 + spirometry	5	4
Domains	Nocturnal awakenings Limitation of activity Morning symptoms Shortness of breath Wheezing Reliever use (ACQ-6,7) Spirometry (ACQ-7)	Activity limitation Shortness of breath Awakening Reliever use Self-assessed control	Daytime symptoms Night time symptoms Reliever use Activity limitation
Duration	Prior week	Prior 4 weeks	Prior 4 weeks
Scoring	> 1.5 Poorly controlled 0.75-1.5 'Grey zone' 0-0.75 Well controlled	5-15 Very poorly controlled 16-19 Not well controlled 20-25 Well controlled	3-4 Uncontrolled 1-2 Partly controlled 0 Well controlled

Conclusion

The improper use of pMDIs is identified as a leading factor in asthma management failure. Asthma counseling, considered the cornerstone for both adults and children, has proven strategies that significantly enhance overall asthmatic status and clinical outcomes. However, verbal instruction alone is insufficient to correct coordination errors, especially in chest clinics and among older patients. Integrating an MDI training tool and a smartphone app with traditional verbal counseling effectively reduces inhaler technique errors and increases Forced Expiratory Volume (FEV). The smartphone applications based counseling as in the case of the advanced and the advanced verbal counseling showed a significant better asthma clinical outcomes and pulmonary functions improvement than the verbal only based counseling. Consistent instruction on proper prescription medication device use, such as pMDIs, enhances the likelihood of improved lung function and optimal long-term control, contributing to increased patient satisfaction and reduced morbidity.

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أساليب الاستشارة المختلفة لتحسين إدارة الربو

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الخلفية: يشكل الربو مصدر قلق كبير على الصحة العامة، حيث يؤثر على الأفراد عبر مختلف الفئات العمرية. يبرز الاستخدام غير السليم لأجهزة الاستنشاق بالجرعات المقننة المضغوطة (pMDI) كمساهم رئيسي في التحديات التي تواجه إدارة الربو. لقد أظهرت الاستشارة الفعالة للمرضى الذين يعانون من الربو، البالغين والأطفال على حد سواء، فيما يتعلق بالاستخدام الصحيح لأجهزة pMDI تحسينات كبيرة في السيطرة على أعراض الربو. وهذا بدوره يؤدي إلى نتائج سريرية أفضل للأفراد الذين يتعاملون مع الربو. تتوفر طرق الاستشارة المختلفة تحت تصرف المتخصصين في الرعاية الصحية، ولكل منها تأثير فريد على الإدارة الشاملة للربو.

المواد والأساليب: تتضمن هذه الدراسة مراجعة منظمة للأدبيات الموجودة حول إدارة الربو لكل من البالغين والأطفال. وينصب التركيز على طرق تقديم المشورة للمرضى الذين يعانون من الربو، واستكشاف الأنواع المتنوعة المتاحة، وتقييم السيطرة على أعراض الربو من خلال استبيانات المتابعة.

استراتيجية البحث: تم البحث في قواعد البيانات الإلكترونية باستخدام ثلاث أدوات بحث؛ تم البحث في قواعد بيانات الأدبيات الطبية مثل PubMed وMendeley وGoogle Scholar عن مقالات منشورة حول استشارات الربو. استخدام كلمات البحث التالية "الربو" و"استشارة الربو" و"الإرشاد اللفظي" و"الإرشاد المتقدم" و"السيطرة على الربو" و"أجهزة الاستنشاق ذات الجرعات المقننة". تم استخراج البيانات من المنشورات بما في ذلك تفاصيل المنشور والمنهجيات والتدخلات وتصميمات الدراسة والنتائج الرئيسية والنتائج. تم إجراء مرحلتين، المرحلة الأولى تتضمن مراجعات منهجية حول استشارات الربو وإدارته، والمرحلة الثانية تتضمن الأبحاث الأصلية حول استشارات الربو.

الاستنتاج: الاستشارة في مجال الربو تظهر كعنصر أساسي في الإدارة الفعالة للربو لكل من البالغين والأطفال. لقد أظهرت استراتيجيات الاستشارة المختلفة باستمرار تحسينات كبيرة في حالة الربو الشاملة والنتائج السريرية.