

***"ENHANCED CARE PLAN FOR A 45-YEAR-OLD FEMALE WITH ASTHMA:
FOCUSING ON SPIROMETRY AND ASTHMA MANAGEMENT"***

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Section 01: Introduction to Your Patient

The patient is 45-year-old woman with asthma diagnosis. She regularly has wheezing, dyspnea and coughing attacks that trigger seasonal allergies and physical activities. Although she takes inhaled corticosteroids (ICS) and a long-acting beta-agonist (LABA), she still has intermittently controlled asthma, and the symptoms appear more frequently at night. The home setup is that the patient stays in a semi-detached house with the partner, and has access to informal support membership. Her condition at times restricts her to work and she is also employed full-time financially (Subedi, 2025). Spirometry is extremely important as a tool to assess her lung condition, progression of the illness, and modifying the course of her treatment to vastly improve her symptom burden and quality of life.

Tools, Tests, and Procedures

Spirometry was used to evaluate the asthma of the patient when it comes to measuring of FEV1 (Forced Expiratory Volume after 1 second) and FVC (Forced Vital Capacity). Spirometry showed diminished FEV1 and FEV1/FVC ratio, which is symptomatic of airflow impairment indicative of asthma (Springer Publishing Company, 2023). The patient was responsive to treatment with bronchodilator reversibility being a characteristic feature of asthma since it was proved through post-bronchodilator spirometry (Mykhailovska et al., 2023). Lung functions will be monitored through regular spirometry which is essential in determining the need of an adjustment in medication and asthma control.

Enhanced Care Plan

Prevention of exacerbations, the improvement of airway clearance, and decreased symptoms of asthma are the substantial nursing needs. The patient will need help with correct use of the inhaler and in taking medications since this is the way to make sure that prescribed medications are provided in the most efficient way especially ICS and LABA (Segreti et al., 2024).

Nursing Diagnosis (be specific about what the nursing needs are)	Goals (what is hoped to be achieved as a result of interventions?)	Interventions (what is the plan of care and treatment?)
1. Ineffective airway clearance due to airway	1. Improve airway clearance to help the patient breathe more	1. Administer nebulised bronchodilators (salbutamol, 2.5mg) and ipratropium (0.5mg) every 4

inflammation and bronchoconstriction.	easily during daily activities (e.g., walking, exercising).	hours to bronchodilate the airways and improve airflow. Monitor the spirometry results to assess effectiveness.
2. Impaired gas exchange due to reduced lung function and airway obstruction.	2. To maintain oxygen saturation above 90% at rest and during physical activity.	2. Administer oxygen therapy as prescribed (e.g., 2L/min via nasal cannula) to maintain oxygen saturation levels and reduce the risk of hypoxia. Regular spirometry to monitor lung function and adjust oxygen therapy accordingly.
3. Anxiety and stress related to asthma exacerbations and management.	3. To reduce anxiety and help the patient manage asthma symptoms with better coping mechanisms.	3. Provide psychosocial support, including reassurance and coping strategies for managing asthma-related anxiety. Offer resources for asthma education and stress management techniques.
4. Ineffective medication management due to improper inhaler technique or non-adherence.	4. To optimize medication adherence and ensure correct inhaler use.	4. Educate the patient on proper inhaler technique. Provide instructions on using ICS and LABA effectively. Monitor adherence through regular spirometry and follow-up, adjusting medication as needed.

Section 2: Discussion

This section requires an in-depth critical analysis related to the pathophysiology, diagnostic tools, and management.

Pathophysiology of Asthma in a 45-Year-Old Female Patient

The respiratory system includes the lower and upper airways, the lungs, and muscles related to the respiratory system, which is set to be an efficient gas exchange system. The bronchioles, alveoli and the airways help move air going in and out of the lungs and this causes normal gas exchange (Ritchie et al., 2024). The trachea, bronchi and alveolar sacs make sure that there is effective transfer of oxygen to the blood and also elimination of carbon dioxide. As the processes depend on the fine balance between ventilation and perfusion, alveoli are a significant part of the exchange.

Physiological Changes Due to Asthma

In this case of a 45-year-old woman suffering asthma, inflammation of the wall of the airways is the most characteristic feature of the disease that leads to bronchoconstriction and the production of a lot of mucus. In asthma, the bronchial lining swells during an asthma attack and the smooth muscle tone rises due to which narrowing of the airways occurs (Olson and Kelm, 2023). It is realised that the immune response is characterised by activation of T-helper cells, mast cells, and eosinophils, producing pro-inflammatory mediators like histamines and leukotrienes, and cytokines, which carry the exacerbation of bronchoconstriction and airway obstruction (Mykhailovska et al., 2023). In the case of this patient, it is probable that the patient has developed asthma or has gotten an exacerbation as a result of environmental factors, which could be allergens or environmental pollution. Both bronchospasm (smooth muscle constriction) and mucus hypersecretion occur as a result of the overall physiological change that leads up to the typical symptoms of wheezing, coughing, and shortness of breath.

Predisposing Factors Contributing to Asthma

Here, the fact that the genetic background of the patient is also atopy, implying the genetic predisposition to allergic disease, should be influential, given the instance of asthma/allergies in the family (Mykhailovska et al., 2023). There may also be environmental triggers e.g. exposure of the person to dust mites, pet dander, which may increase the symptoms of asthma. In addition, the

patient may have a history of smoking or long-time exposure to second-hand smoking which would also have contributed to the condition (Jo et al., 2023). More females are predisposed to asthma and it tends to exacerbate with hormonal changes like menopause and because of that, this demographic is of great significance in such a case.

Presentation of Asthma and Related Symptoms

The common symptoms of asthma include shortness of breath, chest tightness, and wheezing. The symptoms can be provoked by exposing this patient to allergens, physical activity, or viral infections in this patient, resulting in airways resistance (Gatagat et al., 2023). The spirometry tests would probably demonstrate a lower Forced Expiratory Volume in one second (FEV1) and a lower FEV1/FVC ratio, which characterises airflow limitation. A main consequence of the use of a bronchodilator is a reversible FEV1, which is a major indicator of positive diagnosis of asthma as compared to chronic obstructive pulmonary disease (COPD) because the reversibility is little in the latter (Jo et al., 2023). In case of this patient, some of the tests that would be critical in making the diagnosis and differentiating it with other obstructive airway diseases would be the bronchodilator reversibility tests.

Progression of Asthma and Diagnostic Challenges

Asthma may have a fluctuating course. Depending on the kind of patient, symptoms can be managed through proper care or it might turn out to be more chronic and extreme. Factors that may contribute to progression of asthma in this 45-year-old patient include failure to have good management or exposure to more triggers and thus subsequently increasing exacerbations when compared to the past, as well as possible airway remodelling, which over the years involves a thickening of bronchial walls (Capaldi et al., 2023). This may lead to chronic deterioration of the lung power in case it is not treated properly. The problem with the diagnosis of asthma, especially of adult-onset asthma, is that it is hard to differentiate between this disease, and other diseases with similar manifestation (Gatagat et al., 2023). Wheezing and shortness of breath found in the patient are similar to those of COPD, GERD or even vocal cord dysfunction. In a case where the patient has a history of smoking, it may not be easy to distinguish between asthma and COPD, but the spirometry is one of the most important methods of diagnosing the condition to detect airway obstruction which is reversible (Davidoff, 2025). Decreased FEV1/FVC ratio and jumped in the

post-bronchodilator result would be strong evidentiary base to include asthma diagnosis as compared to other chronic conditions.

Diagnostic Tools, Tests, and Procedures

For this 45-year-old female patient with suspected asthma, a range of diagnostic tools is used to confirm the diagnosis and determine appropriate management. This tool includes spirometry, for asthma patients (Jo et al., 2023). This tool contributes critical information to the patient's care, considering her clinical history, age, and presentation.

Justification for the Choice of Diagnostic Tools

Spirometry is a crucial examination in ascertainment of asthma diagnosis in this patient since she has history of wheezing and dyspnea on an episodic basis. It evaluates forced expiratory volume in 1 second (FEV1), forced vital capacity (FVC), and gives necessary information about airflow obstruction (Mykhailovska et al., 2023). This will often reflect entrapment in FEV1/FVC ratio due to narrowing of the airways in asthma. The reversibility of the airflow limitation using a bronchodilator (improvement of FEV1 by more than 12 percent and 200 mL) is the characteristic feature of asthma and makes it stand out among chronic obstructive pulmonary disease (COPD). This is of particular importance in the case of this patient since the patient experience intermittent symptoms and has a bronchodilator reversibility exam important to determine if the symptoms are allergy or irritant cause (Olson and Kelm, 2023). Reversibility will then be tested by determining whether airway obstruction is successfully relieved after using bronchodilator medication which is common to asthma but not in the conditions such as COPD.

Another helpful diagnostic feature to use is FeNO (exhaled nitric oxide). An elevated level of FeNO shows eosinophilic inflammation of the airways that is typical of allergic asthma (Segreti et al., 2024). Since this patient may have the history of allergic rhinitis, it will be vital to measure FeNO as it will help understand the extent of inflammation and how to proceed with treatment, namely determine whether an inhaled corticosteroid is needed to suppress inflammation. Finally, skin prick tests are also prescribed in the cases when a particular allergen should be determined, e.g., dust mites, pollen, or pet dander (Springer Publishing Company, 2023). A main step in addressing these allergies is identifying these triggers to put in place avoidance measures towards the allergens and also evaluating an immunotherapy regime as an option during treatment.

Challenges in Conducting These Tests

Although they are effective, a number of issues are likely to crop up when administering these tests. In the case of spirometry, the patient can experience excessive difficulty with the correct practice or the difficulty with effort especially when the asthma symptoms are present briefly or easily (Ritchie et al., 2024). The capacity of the patient to comply with instructions and carry out the tests in the right manner is important to the attainment of the right results. Moreover, spirometry might give false negatives or inconsistent results in case she has a mild exacerbation or her state is not quite stable. A repetition of the test or changing the time frame of assessment may become a necessity (Subedi, 2025). This test may not be as reliable in the instance of bronchodilator reversibility testing wherein the patient is trying to test bronchodilator reversibility when acute exacerbation of asthma is present.

It may be a good idea in such instances, to delay the test until symptoms settle. Additionally, bronchodilators may not react effectively on the patient on the extreme side of inflammation and this may make it hard to interpret (Segreti et al., 2024). Pharmacological act of medications such as bronchodilator or steroids may affect FeNO measurement and reduce the substance level giving false assurance. Ideally, this patient is not supposed to use these medications at least 12 hours before the test (Mykhailovska et al., 2023). When the patient is using antihistamines or other medication, skin prick tests might not be forthcoming at all since it might influence the outcome of the tests. It is important to ensure that she avoids these drugs before testing.

Significance of the Results and Alignment with Best Practices

All these tests will determine how to treat the patient. The use of spirometry and bronchodilator reversibility fulfills NICE guidelines and GINA guidelines that warrant the use of those tests as a method of diagnosing asthma and determining its severity (Capaldi et al., 2023). The low ratio of FEV1/FVC and the high post-bronchodilator improve point to asthma and will cement that inhaler treatment should be given in terms of bronchodilators and corticosteroids. FeNO test will facilitate the evaluation of the extent of eosinophilic inflammation that can influence the determination of using or not inhaled corticosteroids (Davidoff, 2025). Skin prick tests can establish the specific allergens that have triggered the reaction and therefore should be

controlled as part of the environment and perhaps treated with immunotherapy as in the best practice today.

Innovative Tools and Their Effectiveness

New technologies such as the Impulse Oscillometry (IOS) and induced sputum analysis have a great potential in the diagnosis and care of asthma (Davidoff, 2025). Impulse Oscillometry is non-invasive, and it is a measure of airway resistance that involves no forced exhalation. It can be helpful in patients who cannot carry out spirometry correctly. Nevertheless, it is not very widespread even in ordinary clinical practice (Gatagat et al., 2023). This inflammatory phenotype of asthma can also be determined with the help of induced sputum analysis, which consists in obtaining sputum samples to evaluate the numbers of eosinophils. It has great potential but is most frequently employed in the research environment and is not a widespread diagnostic procedure.

Management of Respiratory Disease

Spirometry is critical in the diagnosis and long-term course of this 45-year-old girl who has reasons to consider that she has asthma. In clinical management, spirometry is a critical device in the evaluation of asthma, in that it is utilised to objectively evaluate lung functioning, which further assists in the establishment of asthma, level of severity of airflow restriction, and treatment assessment (Olson and Kelm, 2023).

Use of Spirometry in Asthma Diagnosis

Diagnosis of asthma is the initial part in managing asthma and spirometry is one of the main diagnostic weapons that is used in the assessment of lung function. This patient, who has a history of wheezing and shortness of breath, has probably the variable airflow obstruction which is the hallmark of asthma (Ritchie et al., 2024). In spirometry, one measures the FEV1 (Forced Expiratory Volume in one second) and FVC (Forced Vital Capacity). In asthma, FEV1 gets decreased normally because of constricting the airways. The lower value of the FEV1/FVC ratio will also show less value compared to expected to show obstruction of airways. Notably, obstruction, in asthma, is reversible (Mykhailovska et al., 2023). This is confirmed by the use of post-bronchodilator spirometry. Upon the administration of a bronchodilator the spirometry will indicate a substantial rise in the FEV1 (more than 12 percent and 200 mL), which would be diagnostic of asthma (Segreti et al., 2024). This is particularly relevant to such patient because it

acts as a discriminative factor between asthma and other COPD-like diseases, which are chronic respiratory disorders that do not respond to reversibility of airflow limitations.

Challenges in Conducting Spirometry

However, spirometry has its drawbacks and despite its efficacy, it is not without its challenges (Olson and Kelm, 2023). The major challenges include how to make the patient cooperate particularly in a patient who could be presenting with some of the symptoms like shortness of breath and fatigue. In the case of this patient, a 45-year-old woman, it is possible that achieving maximum effort in the measurement of spirometry can be problematic to a large extent, particularly in cases where the patient was having some mild symptoms or fear concerning the test (Gatagat et al., 2023). The correct methodology is vital in achieving the results and it is crucial that the patient must be well coached on the methodology. Also, severely ill asthmatics will rarely pass the test since they will probably get broncho constricted and run out of strength. That is why the time of a test is critical. Spirometry is used best in the body when the patient is relatively stable in the asthma condition (Mykhailovska et al., 2023). The test can be used even when the exacerbation is active but under such conditions, the results would not be accurate and this should be discouraged (Ritchie et al., 2024). The other problem is the ignorance of the patient on the proper way to go about the test. Spirometry can give normal results in a patient with mild or intermittent asthma which would be erroneous when the test is taken during a term of symptom control (Davidoff, 2025). A better result can be ensured by making sure that the patient records the test when they have an asthma exacerbation or when they have worsened symptoms (e.g. in response to an exposure to allergens).

Spirometry's Role in Monitoring Treatment Effectiveness

Once the diagnosis is made of asthma based on spirometry, it will be of great significance in determining how successful the plan of the treatment is. The objective of asthma treatment is the accomplishment of good symptom control and spirometry may be utilized to quantify this control objectively (Segreti et al., 2024). A follow up with regular spirometry can help in monitoring the changes in FEV1, to make sure that the airway obstruction is getting better or remained stable as per the prescribed treatment method. ICS and LABAs are likely to be included in the treatment regimen of the given patient (Jo et al., 2023). Therefore, the spirometry should be offered on a regular basis in order to evaluate the effectiveness of these drugs in reducing airway

inflammation and improving lung functions (Ritchie et al., 2024). Monitoring of peak expiratory flow (PEF) at home and occasional spirometry in the clinic may also be useful in introducing some continuous information about the effectiveness of the treatment regime in controlling the condition of asthma (Gatagat et al., 2023). On the basis of spirometry assessment of continuing or deteriorating airway obstruction, it may be necessary to alter the treatment regimen, e.g. by titrating upwards the dose of ICS or by adding LABAs.

Conclusion

This patient who is a 45-year-old female with asthma has portrayed a clear picture that spirometry is important in both the diagnosis and management of asthma. The new care regimen and interview have shed light on the manner in which spirometry can be employed in diagnosing asthma by presenting low FEV values relative to FVC and with reversible airway impediment subsequent to the treatment with bronchodilators. Spirometry should be the key element of both the primary diagnosis and long-term monitoring of treatment since the patient experiences his or her symptoms intermittently, and he or she could be exposed to the allergens. This strategy is congruent with GINA and NICE standards, which underline a reliance on spirometry as the key perosis of the inability to determine asthma control as well as change a treatment strategy.

Although literature on spirometry is quite sound, there still is a gap to be bridged with regard to determining the effects of how to maximize the use of spirometry in instances of mild or intermittent cases of asthma, particularly in adult-onset asthma. In such patients as this patient, who might have minimal or sporadic symptoms, that patient might not realize how to make an accurate interpretation of spirometry findings when symptom free. The clinical practice in the future must aim at individualising the testing intervals of spirometry to maximize the effectiveness of diagnosis and treatment. Future experiments on newer forms of spirometry, e.g., home spirometry or mobile health to monitor the real time lung control in asthmatics could be more continuous in monitoring the severity of the asthma especially those with mild asthma. Furthermore, the idea of combining spirometry with the biomarker tests should also be pursued since it can enhance currently implemented personalised care plans.

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