The Impact of Pharmacist and Respiratory Therapist Collaboration on Medication Adherence and Symptom Control in Asthma Patients

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Abstract

Background: Poor medication adherence and improper inhaler technique are major barriers to effective asthma management. This study aimed to evaluate the impact of collaboration between pharmacists and respiratory therapists on improving medication adherence, symptom control, and lung function in asthma patients.

Methods: A prospective interventional study was conducted in a tertiary hospital involving 100 asthma patients. The intervention group (n = 50) received pharmacist-led medication counseling and respiratory therapist-guided inhaler technique training, while the control group (n = 50) received standard care. Outcomes included medication adherence (MMAS-8), asthma control (ACT), inhaler technique, and lung function (FEV1).

Results: The intervention group showed significant improvements in medication adherence (MMAS-8 score: 5.8 to 7.2, $p < 0.001$), asthma control (ACT score: 15.3 to 20.1, $p < 0.001$), and inhaler technique (45% to 85% correct use, $p < 0.001$). Lung function also improved in the intervention group (FEV1: 70.4% to 78.1%, $p = 0.001$). Fewer hospitalizations were reported in the intervention group compared to the control group (10% vs. 24%, $p = 0.039$).

Conclusion: Collaboration between pharmacists and respiratory therapists significantly improves medication adherence, asthma control, and patient outcomes. This interdisciplinary approach should be integrated into routine asthma management to optimize care.

Keywords: Asthma, medication adherence, inhaler technique, interdisciplinary collaboration, pharmacists, respiratory therapists, lung function, asthma control

Introduction

Asthma is a chronic respiratory condition that affects over 300 million people worldwide and is characterized by episodes of airway inflammation, bronchoconstriction, and increased mucus production. Effective management of asthma requires adherence to prescribed medications, particularly inhaled corticosteroids and bronchodilators, to control symptoms and prevent exacerbations (Reddel, 2018). Despite the availability of effective treatments, poor medication adherence remains a significant challenge, leading to suboptimal asthma control, increased hospitalizations, and reduced quality of life (McQuaid, 2018).

Medication adherence in asthma patients is often influenced by a range of factors, including the complexity of the treatment regimen, the patient's understanding of the disease, and the perceived need for daily

medication when symptoms are not always present (Giraud & Roche, 2002). Inhaler technique also plays a critical role in ensuring the efficacy of asthma medications, yet many patients demonstrate improper use, which further compromises disease control (Price et al., 2018). This highlights the need for targeted interventions to improve both adherence and inhaler technique.

Pharmacists and respiratory therapists are well-positioned to play a crucial role in addressing these challenges. Pharmacists provide medication counseling, monitor adherence, and help overcome barriers to effective treatment through patient education and follow-up (Bunting &Cranor, 2006). Respiratory therapists, on the other hand, specialize in assessing and teaching correct inhaler technique and monitoring respiratory function, which is essential for ensuring that patients achieve optimal therapeutic outcomes (Wolf et al., 1996). Together, their collaborative efforts can improve medication adherence and symptom control in asthma patients, thereby reducing the risk of exacerbations and improving overall quality of life.

This study aims to evaluate the impact of collaboration between pharmacists and respiratory therapists on medication adherence and symptom control in asthma patients. By examining how these healthcare professionals can work together to support patients, this research will provide insights into how interdisciplinary approaches can improve asthma management and patient outcomes.

Literature Review

1. Asthma Management Challenges

Asthma is a chronic inflammatory airway disease characterized by variable airflow obstruction, causing symptoms such as wheezing, shortness of breath, chest tightness, and coughing (Reddel,2018). Despite advances in pharmacotherapy, achieving optimal asthma control remains a challenge. According to the World Health Organization (WHO), asthma contributes to approximately 250,000 annual deaths globally, many of which are preventable through better disease management (Aziz and Iqbal, 2018). Poor asthma control is often attributed to two key factors: poor medication adherence and improper inhaler technique (McQuaid, 2018).

2. Medication Adherence in Asthma

Medication adherence, particularly with inhaled corticosteroids, is critical to controlling asthma symptoms and preventing exacerbations (McQuaid, 2018). However, research shows that up to 50% of asthma patients do not adhere to their prescribed medication regimens, leading to poorly controlled symptoms, increased healthcare utilization, and diminished quality of life (Giraud & Roche, 2002). Common barriers to medication adherence include patients' misunderstanding of the importance of daily treatment, fear of side effects, cost of medications, and a lack of perceived benefit when symptoms are mild (George et al., 2016).

Pharmacists play a vital role in overcoming these barriers by providing medication counseling, addressing patient concerns, and offering strategies to improve adherence (Bunting &Cranor, 2006). Several studies have demonstrated that pharmacist-led interventions significantly improve medication adherence and asthma outcomes. For example, the Asheville Project showed that patients who received regular medication therapy management from pharmacists exhibited improved asthma control, fewer hospitalizations, and better adherence compared to those who did not receive pharmacist interventions (Bunting &Cranor, 2006). This highlights the impact that pharmacists can have on long-term asthma management.

3. InhalerTechnique and Symptom Monitoring

Correct inhaler technique is essential for the effective delivery of asthma medications. However, research indicates that more than 60% of asthma patients use their inhalers incorrectly, reducing the therapeutic efficacy of inhaled medications (Price et al., 2018). Improper inhaler use leads to poor asthma control and can exacerbate symptoms, leading to an increased risk of hospitalizations and emergency room visits (Giraud & Roche, 2002).

Respiratory therapists are uniquely positioned to address this issue by assessing patients' inhaler techniques, providing education on proper use, and regularly monitoring lung function to assess disease control (Wolf et al., 1996). Studies have shown that patients who receive hands-on training from respiratory therapists on inhaler use demonstrate significant improvements in technique and symptom control (Dalcin et al., 2011). Regular monitoring of respiratory symptoms and lung function through spirometry allows respiratory therapists to identify early signs of deterioration and recommend timely interventions, further supporting optimal asthma management.

4. Interdisciplinary Collaboration in Chronic Disease Management

Interdisciplinary collaboration has become a cornerstone of chronic disease management, particularly in asthma, where multiple healthcare professionals can contribute to improved outcomes. Collaboration between pharmacists and respiratory therapists allows for a comprehensive approach to patient care, combining medication management with respiratory assessments (Mangione-Smith et al., 2005). By working together, these professionals can address the dual challenges of medication adherence and inhaler technique, which are often the most significant barriers to achieving asthma control (Dalcin et al., 2011).

A systematic review of interdisciplinary care models for asthma patients found that such collaborations significantly improved clinical outcomes, including reduced emergency room visits, fewer hospitalizations, and improved symptom control (Mangione-Smith et al., 2005). These findings underscore the importance of integrating pharmacists and respiratory therapists into asthma care teams to provide holistic, patient-centered management.

5. Impact of Collaboration on Patient Outcomes

Numerous studies have demonstrated the positive impact of collaborative care between pharmacists and respiratory therapists in improving asthma management. For instance, a study by Hesso et al. (2016) found that pharmacist-led asthma management programs, when combined with respiratory therapist interventions to improve inhaler technique, led to better asthma control and increased patient satisfaction. The study highlighted the role of both healthcare professionals in providing education, support, and follow-up care, contributing to long-term adherence and improved health outcomes.

Additionally, a meta-analysis of asthma management programs showed that patients who received both medication therapy management from pharmacists and respiratory support from respiratory therapists had better outcomes than those managed by either discipline alone (George et al., 2016). This synergy between pharmacists and respiratory therapists ensures that both the pharmacological and respiratory aspects of asthma care are optimized, leading to improved adherence, fewer exacerbations, and enhanced quality of life for patients.

The literature highlights the significant challenges in managing asthma, particularly in terms of medication adherence and inhaler technique. Pharmacists and respiratory therapists play critical roles in addressing these issues through patient education, medication management, and respiratory monitoring.

Interdisciplinary collaboration between these healthcare professionals has been shown to improve clinical outcomes, reduce healthcare utilization, and enhance the overall quality of life for asthma patients. This study aims to further explore the impact of collaboration between pharmacists and respiratory therapists on medication adherence and symptom control in asthma patients.

Methodology

Study Design

This was a prospective interventional study conducted in the outpatient asthma clinic of a tertiary care hospital. The primary objective was to evaluate the effects of pharmacist and respiratory therapist collaboration on medication adherence and symptom control in asthma patients. The study involved a baseline assessment of patient adherence, followed by an intervention that combined pharmacist-led medication counseling with respiratory therapist-guided inhaler technique training and respiratory symptom monitoring.

Study Setting and Population

The study was conducted at the asthma outpatient clinic of a tertiary hospital, where asthma patients regularly visit for routine management and follow-up care. Patients eligible for inclusion were diagnosed with asthma and currently prescribed inhaled medications (e.g., inhaled corticosteroids, long-acting beta-agonists). Patients with a history of poor medication adherence or frequent asthma exacerbations were specifically targeted for this intervention.

Inclusion Criteria:
- Adults aged 18 years or older with a confirmed diagnosis of asthma.
- Patients on regular inhaled asthma medications (e.g., inhaled corticosteroids, bronchodilators).
- Patients with self-reported adherence issues or frequent symptoms (Asthma Control Test score ≤19).
- Ability to provide informed consent.

Exclusion Criteria:
- Patients with a diagnosis of chronic obstructive pulmonary disease (COPD) or other chronic lung diseases.
- Patients with severe cognitive impairments that could affect their ability to engage with the intervention.
- Patients who declined to participate.

A total of 100 patients were enrolled in the study, with 50 assigned to the intervention group (pharmacist and respiratory therapist collaboration) and 50 to the control group (standard care without interdisciplinary intervention).

Intervention: Collaborative Approach

Patients in the intervention group participated in joint consultations with pharmacists and respiratory therapists. The key components of the intervention included:

- Pharmacist's Role:
  - Conducted detailed medication reviews for each patient, assessing adherence using the Morisky Medication Adherence Scale (MMAS-8).
  - Provided personalized education about the importance of adherence, potential side effects, and solutions to overcome barriers such as cost or fear of side effects.

  - Addressed patient concerns about medications and provided strategies to improve adherence, including creating reminders or simplifying medication regimens if necessary.

- Respiratory Therapist's Role:
  - Assessed each patient's inhaler technique using a standardized checklist, identifying common errors such as incorrect inhalation technique, failure to hold breath after inhalation, and improper priming of inhalers.
  - Provided personalized inhaler technique training, with repeated practice and demonstration to ensure correct use.
  - Monitored asthma symptoms using the Asthma Control Test (ACT) and spirometry to measure lung function (e.g., FEV1, FEV1/FVC ratio).
  - Educated patients on the importance of symptom monitoring and trigger avoidance, with follow-up assessments at 1, 3, and 6 months.

- Control Group: Patients in the control group received standard asthma care, which included routine check-ups with their healthcare provider but without the collaborative intervention from the pharmacist and respiratory therapist.

Data Collection
Data were collected at baseline and during follow-up visits at 1 month, 3 months, and 6 months. The following variables were recorded:

- Demographics: Age, gender, duration of asthma, comorbidities, and medication regimen.
- Medication Adherence: Measured using the Morisky Medication Adherence Scale (MMAS-8) at baseline and at each follow-up point.
- Asthma Control: Evaluated using the Asthma Control Test (ACT), which assessed symptom frequency, rescue inhaler use, and nocturnal symptoms.
- Inhaler Technique: Assessed by respiratory therapists using a standardized checklist, with scores based on the number of correct steps performed during inhaler use.
- Lung Function: Measured via spirometry (FEV1, FEV1/FVC) at each visit to monitor changes in respiratory function.

Outcome Measures
- Primary Outcome:
  - Improvement in medication adherence, as measured by the MMAS-8 score, from baseline to the 6-month follow-up.
- Secondary Outcomes:
  - Improvement in asthma symptom control, as measured by the ACT score.
  - Reduction in the frequency of asthma exacerbations (measured by patient self-reports of emergency room visits or hospitalizations).
  - Improvement in inhaler technique, measured by the standardized checklist.
  - Changes in lung function as measured by spirometry.

Data Analysis
Data were analyzed using SPSS. Descriptive statistics (mean, standard deviation) were used to summarize baseline characteristics of the study population. Comparative analysis between the intervention and control groups was performed using the following methods:

- Paired t-tests to assess within-group changes in medication adherence (MMAS-8) and asthma control (ACT) scores from baseline to 6 months.
- Independent t-tests to compare the mean differences in adherence and symptom control between the intervention and control groups at each follow-up point.
- Chi-square tests to analyze the frequency of exacerbations and hospitalizations between the groups.
- Multivariate regression analysis to identify potential predictors of improved adherence and symptom control, adjusting for confounding factors such as age, asthma severity, and comorbidities.

Ethical Considerations

The study was approved by the ethics committee. All patients provided written informed consent before participating in the study. Patients were informed of their right to withdraw from the study at any time without affecting their ongoing medical care. Confidentiality was maintained by de-identifying patient data and storing it securely.

Limitations

This study was limited by its sample size and single-center design, which may limit the generalizability of the findings to other settings. Additionally, the self-reported nature of medication adherence data may introduce bias. Future studies with larger sample sizes and longer follow-up periods are recommended to further validate the findings.

Findings

1. Demographic Characteristics

A total of 100 patients were included in the study, with 50 in the intervention group (pharmacist and respiratory therapist collaboration) and 50 in the control group (standard care). The mean age of patients was 45.6 years (SD = 11.8), with no significant differences between the two groups in terms of age, gender, or asthma severity.

Table 1: Demographic and Baseline Characteristics of Study Population

Characteristic	Total (n = 100)	Intervention (n = 50)	Control (n = 50)	p-value
Mean Age (years)	45.6 ±11.8	45.9 ±11.7	45.3 ±12.0	0.764
Male (%)	54%	52%	56%	0.721
Asthma Duration (years)	10.8 ±4.2	10.9 ±4.1	10.7 ±4.3	0.831
Baseline ACT Score	15.2 ±3.4	15.3 ±3.3	15.1 ±3.5	0.910

2. Primary Outcome: Medication Adherence

Patients in the intervention group showed significant improvement in medication adherence compared to the control group. At the 6-month follow-up, the mean Morisky Medication Adherence Scale (MMAS-8) score in the intervention group increased from 5.8 (SD = 1.2) to 7.2 (SD = 0.9) ($p < 0.001$), indicating better adherence. In contrast, the control group showed only a modest improvement, from 5.7 (SD = 1.3) to 6.1 (SD = 1.1) ($p = 0.081$).

Table 2: Comparison of Medication Adherence (MMAS-8 Scores)

Group	Baseline MMAS-8 Score	6-Month MMAS-8 Score	p-value (within-group)	p-value (between-groups

				at 6 months)
Intervention	5.8 ±1.2	7.2 ±0.9	< 0.001	< 0.001
Control	5.7 ±1.3	6.1 ±1.1	0.081	

3. Secondary Outcome: Asthma Control

Asthma control, measured by the Asthma Control Test (ACT), improved significantly in the intervention group. The mean ACT score in the intervention group increased from 15.3 (SD = 3.3) at baseline to 20.1 (SD = 2.6) at 6 months (p < 0.001), indicating better symptom control. In contrast, the control group showed only a slight increase in ACT score from 15.1 (SD = 3.5) to 16.2 (SD = 3.1) (p = 0.093).

Table 3: Comparison of Asthma Control (ACT Scores)

Group	Baseline ACT Score	6-Month ACT Score	p-value (within-group)	p-value (between-groups at 6 months)
Intervention	15.3 ±3.3	20.1 ±2.6	< 0.001	< 0.001
Control	15.1 ±3.5	16.2 ±3.1	0.093	

4. InhalerTechnique

Inhaler technique improved significantly in the intervention group after receiving education and hands-on training from respiratory therapists. The percentage of patients using their inhalers correctly increased from 45% at baseline to 85% at 6 months (p < 0.001). In contrast, the control group showed a smaller improvement, from 47% to 58% (p = 0.041).

Table 4: Inhaler Technique Improvement (Percentage of Patients Using Inhalers Correctly)

Group	Baseline Correct Technique (%)	6-Month Correct Technique (%)	p-value (within-group)	p-value (between-groups at 6 months)
Intervention	45%	85%	< 0.001	< 0.001
Control	47%	58%	0.041	

5. Lung Function

Lung function, as measured by spirometry (FEV1), improved more in the intervention group compared to the control group. The mean FEV1 in the intervention group increased from 70.4% predicted at baseline to 78.1% predicted at 6 months (p = 0.001). The control group showed no significant change, with FEV1 improving from 69.8% predicted to 71.3% predicted (p = 0.158).

Table 5: Lung Function Improvement (FEV1 % Predicted)

Group	Baseline FEV1 (% predicted)	6-Month FEV1 (% predicted)	p-value (within-group)	p-value (between-groups at 6 months)
Intervention	70.4% ±9.8	78.1% ±8.2	0.001	0.004
Control	69.8% ±9.7	71.3% ±10.1	0.158	

6. Exacerbations and Hospitalizations

Patients in the intervention group experienced fewer asthma exacerbations and hospitalizations compared to the control group. During the 6-month follow-up, 10% of patients in the intervention group reported at least one asthma-related hospitalization, compared to 24% in the control group (p = 0.039).

Table 6: Exacerbations and Hospitalizations

Group	Exacerbations (%)	Hospitalizations (%)	p-value (hospitalizations)
Intervention	18%	10%	0.039
Control	30%	24%	

Summary of Findings

The results of this study demonstrate that the collaboration between pharmacists and respiratory therapists significantly improved medication adherence, asthma control, inhaler technique, and lung function in asthma patients. Patients in the intervention group showed greater improvements in adherence (p < 0.001), ACT scores (p < 0.001), and inhaler technique (p < 0.001) compared to the control group. Additionally, lung function improved more in the intervention group (p = 0.004), and fewer hospitalizations were reported (p = 0.039). These findings suggest that a collaborative approach between pharmacists and respiratory therapists is effective in improving outcomes for asthma patients.

Discussion

This study aimed to evaluate the impact of collaboration between pharmacists and respiratory therapists on medication adherence and symptom control in asthma patients. The results demonstrate that a multidisciplinary approach significantly improves medication adherence, asthma control, inhaler technique, and lung function. These findings underscore the value of integrating pharmacists and respiratory therapists into asthma management to enhance patient outcomes and reduce healthcare utilization.

Improvement in Medication Adherence

The most significant finding of this study was the improvement in medication adherence in the intervention group, where patients received personalized counseling and support from pharmacists. The Morisky Medication Adherence Scale (MMAS-8) scores in the intervention group improved significantly from 5.8 at baseline to 7.2 at 6 months, compared to a smaller improvement in the control group (p < 0.001). These findings are consistent with previous studies demonstrating the role of pharmacists in addressing barriers to adherence, such as misunderstandings about medication use, concerns about side effects, and forgetfulness (McQuaid, 2018; Bunting &Cranor, 2006).

The improvement in adherence is likely due to the tailored interventions provided by pharmacists, which included medication reviews, education on the importance of daily inhaled corticosteroids, and strategies to address patient-specific barriers to adherence. This result highlights the need for pharmacist-led interventions in asthma management, as medication non-adherence remains a major obstacle to achieving asthma control and preventing exacerbations.

Improvement in Asthma Control

Patients in the intervention group also showed significant improvements in asthma symptom control, as measured by the Asthma Control Test (ACT). The ACT score increased from 15.3 at baseline to 20.1 at 6

months, indicating better control of asthma symptoms ($p < 0.001$). In contrast, the control group showed only a slight improvement in ACT scores, which was not statistically significant ($p = 0.093$).

These findings align with existing literature on the impact of pharmacist and respiratory therapist collaboration in chronic disease management (Hesso et al., 2016; Mangione-Smith et al., 2015). Respiratory therapists provided ongoing monitoring and assessment of asthma symptoms, while pharmacists focused on medication adherence. This combination likely contributed to better overall asthma control, as patients received comprehensive support in both managing their medications and controlling their symptoms. This interdisciplinary approach can reduce the frequency of asthma exacerbations, improve quality of life, and reduce the burden on healthcare systems by minimizing the need for emergency room visits and hospitalizations.

Inhaler Technique and Lung Function

Another key finding of the study was the significant improvement in inhaler technique in the intervention group. At baseline, only 45% of patients in the intervention group used their inhalers correctly, but after training and education by respiratory therapists, this percentage increased to 85% at the 6-month follow-up ($p < 0.001$). In contrast, the control group showed only a modest improvement in correct inhaler use (47% to 58%, $p = 0.041$). This underscores the importance of respiratory therapists in providing hands-on inhaler technique training and follow-up to ensure that patients are using their devices correctly (Price et al., 2018).

Improvements in inhaler technique were also reflected in lung function outcomes. Patients in the intervention group experienced a significant increase in FEV1 from 70.4% predicted at baseline to 78.1% predicted at 6 months ($p = 0.001$), while the control group showed no significant change. These findings are consistent with previous research suggesting that correct inhaler technique is essential for optimizing the delivery of inhaled medications and improving lung function in asthma patients (Dalcin et al., 2011). By providing both education and ongoing monitoring, respiratory therapists can help ensure that patients derive maximum benefit from their medications.

Reduction in Exacerbations and Hospitalizations

One of the most important clinical outcomes of this study was the reduction in asthma exacerbations and hospitalizations in the intervention group. Only 10% of patients in the intervention group reported at least one asthma-related hospitalization during the study period, compared to 24% in the control group ($p = 0.039$). This finding suggests that the combination of improved medication adherence, better asthma control, and enhanced inhaler technique contributed to fewer severe exacerbations requiring hospitalization.

This reduction in hospitalizations has significant implications for healthcare costs and patient quality of life. Previous studies have shown that asthma exacerbations account for a substantial proportion of asthma-related healthcare costs, and interventions that reduce hospitalizations can lead to significant cost savings (McQuaid, 2018). The collaboration between pharmacists and respiratory therapists appears to be an effective strategy for preventing exacerbations and reducing the overall burden of asthma.

Clinical Implications

The results of this study have important clinical implications for asthma management. First, they highlight the critical role of pharmacists in improving medication adherence and supporting patients in overcoming barriers to adherence. Second, the findings emphasize the value of respiratory therapists in providing

education on inhaler technique and monitoring lung function, both of which are essential for optimizing asthma control.

By integrating these two healthcare professionals into asthma care teams, healthcare systems can provide more comprehensive and effective management for asthma patients. This interdisciplinary approach not only improves clinical outcomes but also reduces healthcare utilization by preventing hospitalizations and exacerbations. Given the positive impact of this collaboration, healthcare providers should consider adopting similar models of care in outpatient settings.

Limitations

While the findings of this study are promising, there are several limitations that should be considered. First, the study was conducted in a single tertiary hospital, which may limit the generalizability of the results to other healthcare settings. Additionally, the study relied on self-reported measures of adherence, which may introduce reporting bias. Future studies with larger sample sizes and a more diverse patient population are needed to confirm the findings and assess the long-term benefits of pharmacist and respiratory therapist collaboration.

Conclusion

In conclusion, this study demonstrates that collaboration between pharmacists and respiratory therapists significantly improves medication adherence, asthma control, inhaler technique, and lung function in asthma patients. The findings suggest that interdisciplinary approaches to asthma management can lead to better clinical outcomes and reduce the need for hospitalizations. Healthcare providers should consider incorporating pharmacists and respiratory therapists into asthma care teams to optimize patient outcomes and reduce the burden of asthma on healthcare systems.

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