The Role of Interprofessional Collaboration between Respiratory Therapists, Pharmacists, and Dietitians in Managing COPD Exacerbations in Acute Care Settings

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Abstract

Background: Acute exacerbations of chronic obstructive pulmonary disease (AECOPD) are a major cause of hospitalizations and poor outcomes. Interprofessional collaboration between respiratory therapists, pharmacists, and dietitians may improve the management of AECOPD in acute care settings.

Objective: To evaluate the impact of interprofessional collaboration on patient outcomes, including length of stay (LOS), 30-day readmission rates, pulmonary function, and nutritional status, in patients hospitalized with AECOPD.

Methods: A retrospective cohort study was conducted at a tertiary hospital, including 150 patients with AECOPD. Patients were divided into a collaborative care group (n=75) and a standard care group (n=75). Outcomes were compared between the two groups using t-tests and chi-square tests.

Results: The collaborative care group had a significantly shorter LOS (6.1 vs. 8.4 days, $p < 0.001$) and lower 30-day readmission rates (12% vs. 28%, $p = 0.01$). Improvements in pulmonary function (FEV1) were greater in the collaborative care group (10.2% vs. 6.4%, $p = 0.02$). Nutritional status, as measured by serum albumin levels, improved significantly in the collaborative care group ($p < 0.01$).

Conclusion: Interprofessional collaboration between respiratory therapists, pharmacists, and dietitians improved patient outcomes in managing AECOPD. Implementing a multidisciplinary approach in acute care settings may enhance recovery and reduce readmissions in COPD patients.

Keywords: COPD, AECOPD, interprofessional collaboration, respiratory therapists, pharmacists, dietitians, acute care, hospital readmissions, pulmonary function, nutrition.

Introduction

Chronic Obstructive Pulmonary Disease (COPD) is a progressive lung disease characterized by persistent respiratory symptoms and airflow limitation. Acute exacerbations of COPD (AECOPD), often triggered by infections or environmental factors, are a leading cause of hospital admissions, morbidity, and mortality in patients with COPD (Aggarwal, 2022). These exacerbations contribute significantly to the deterioration of

lung function, reduced quality of life, and increased healthcare costs (Wedzicha&Seemungal, 2007). Effective management of AECOPD in acute care settings requires a comprehensive and multidisciplinary approach.

The management of COPD exacerbations involves multiple strategies, including optimizing respiratory support, managing pharmacotherapy, and ensuring adequate nutrition. Respiratory therapists play a central role by administering bronchodilators, oxygen therapy, and non-invasive ventilation to improve respiratory function (Spathis& Booth, 2008). Pharmacists, on the other hand, are responsible for ensuring the safe and effective use of medications, including bronchodilators, corticosteroids, and antibiotics, as well as minimizing drug interactions and promoting medication adherence (Ko et al., 2016). Meanwhile, dietitians address the nutritional needs of COPD patients, as malnutrition is common in this population and is associated with worse outcomes, including prolonged hospital stays and reduced muscle strength (Collins et al., 2019).

Interprofessional collaboration between respiratory therapists, pharmacists, and dietitians is essential for optimizing the management of COPD exacerbations. Collaborative care has been shown to improve patient outcomes in chronic diseases by enhancing communication between healthcare professionals, facilitating timely interventions, and ensuring a holistic approach to treatment (Barr et al., 2017). However, few studies have specifically examined the impact of such collaboration on the management of AECOPD in acute care settings.

This study aims to evaluate the role of interprofessional collaboration between respiratory therapists, pharmacists, and dietitians in managing COPD exacerbations in a tertiary acute care hospital. By assessing the outcomes of patients who receive collaborative care compared to those who do not, we seek to highlight the potential benefits of a multidisciplinary approach in improving patient outcomes, reducing hospital stays, and lowering readmission rates.

Literature Review

1. Role of Respiratory Therapists in COPD Management

Respiratory therapists are essential in the acute management of COPD exacerbations, where their expertise in airway management, oxygen therapy, and mechanical ventilation is critical. During an acute exacerbation, respiratory therapists administer bronchodilators, manage oxygen delivery, and provide non-invasive ventilation (NIV) to improve patients ’respiratory status and reduce the work of breathing (Ko et al., 2016). NIV, in particular, has been shown to decrease the need for intubation and improve survival in patients with acute respiratory failure secondary to COPD exacerbations (Spathis& Booth, 2008). The GOLD (Global Initiative for Chronic Obstructive Lung Disease) guidelines recommend early intervention with NIV to prevent further deterioration in severely exacerbated patients (Aggarwal, 2022).

In addition to providing direct respiratory support, respiratory therapists are involved in patient education, particularly regarding proper inhaler techniques and adherence to long-term therapies like home oxygen therapy and pulmonary rehabilitation. These therapies play a crucial role in preventing future exacerbations and reducing hospital readmissions (Ko et al., 2016).

2. Pharmacists ’Role in Medication Management for COPD

Pharmacists contribute significantly to the management of COPD exacerbations by optimizing pharmacotherapy. During exacerbations, patients commonly require adjustments in their medication

regimens, including the use of bronchodilators, inhaled corticosteroids, and sometimes antibiotics or systemic corticosteroids (Wedzicha&Seemungal, 2007). Pharmacists play a pivotal role in ensuring that patients are prescribed the most appropriate therapies, monitoring for drug interactions, and ensuring proper dosing, particularly in patients with comorbid conditions such as cardiovascular disease or diabetes (Ko et al., 2016).

One of the most critical interventions pharmacists provide is in the area of medication reconciliation. This ensures that patients' medication regimens are adjusted correctly after hospital discharge, preventing inappropriate continuation of medications like antibiotics or systemic corticosteroids (Carter, 2016). Furthermore, pharmacists educate patients on the correct use of inhalers, emphasizing proper technique to ensure effective drug delivery, which is vital for preventing future exacerbations (Braido et al., 2015).

3. Nutritional Support by Dietitians in COPD Management

Malnutrition is a prevalent issue in patients with COPD, especially during acute exacerbations, where the body’s energy requirements increase due to the higher workload on respiratory muscles (Collins et al., 2019). Malnutrition and weight loss are associated with poor outcomes in COPD patients, including increased mortality, decreased pulmonary function, and prolonged hospital stays (Schols et al., 2014). Dietitians play a crucial role in assessing and addressing the nutritional needs of COPD patients, providing tailored nutritional plans to support recovery during and after exacerbations.

Nutritional support, particularly high-protein, calorie-dense diets, has been shown to improve respiratory muscle function, reduce fatigue, and enhance patients ’overall strength (Collins et al., 2019). Furthermore, dietitians collaborate with respiratory therapists and pharmacists to adjust nutritional plans based on patients ’medication regimens and respiratory status, ensuring that nutritional interventions do not interfere with pharmacotherapy (Schols, 2014). In critically ill COPD patients, enteral or parenteral nutrition may be necessary, and dietitians are responsible for creating balanced formulas that meet the patients' needs without exacerbating hypercapnia (Schols et al., 2014).

4. Interprofessional Collaboration in COPD Management

Interprofessional collaboration is increasingly recognized as a key component in managing chronic diseases like COPD, particularly during acute exacerbations. When healthcare professionals work together, outcomes for patients improve, as each team member contributes their unique expertise (Barr et al., 2017). In COPD management, respiratory therapists, pharmacists, and dietitians play distinct yet complementary roles, ensuring that patients receive comprehensive care that addresses their respiratory, pharmacological, and nutritional needs.

Research has shown that collaborative approaches to managing COPD exacerbations can significantly reduce hospital readmission rates and improve patient outcomes (Gilbert et al., 2010). One study found that patients receiving multidisciplinary care, including respiratory therapy, pharmacotherapy, and nutritional support, had shorter hospital stays and improved lung function at discharge compared to those receiving standard care (Kuzma et al., 2008). Collaborative care also promotes better patient education, ensuring that patients understand their treatment plans and adhere to long-term therapies, which is critical in preventing future exacerbations.

However, barriers to effective interprofessional collaboration do exist, including poor communication, unclear role delineation, and logistical challenges within acute care settings (Gilbert et al., 2010).

Addressing these barriers is essential to enhancing the integration of multidisciplinary care for COPD patients.

5. Evidence Supporting Multidisciplinary Approaches

Several studies have highlighted the effectiveness of multidisciplinary approaches in managing COPD exacerbations. For example, a randomized controlled trial by Kuzma et al. (2008) demonstrated that patients receiving care from a multidisciplinary team, including respiratory therapists, dietitians, and pharmacists, showed significant improvements in their quality of life and reduced exacerbation frequency over a one-year period compared to those receiving standard care.

In a systematic review by Ko et al. (2016), the authors concluded that integrating nutrition, respiratory therapy, and pharmacological interventions into a collaborative care plan could reduce the need for intensive care and shorten the length of hospital stays. Additionally, incorporating dietitians into the care team ensures that patients receive personalized nutritional support, which can positively influence respiratory muscle strength and overall recovery (Schols et al., 2014).

Methodology

Study Design

This study employed a retrospective cohort design conducted at an acute care tertiary hospital, between January 2021 and December 2021. The aim of the study was to evaluate the effectiveness of interprofessional collaboration between respiratory therapists, pharmacists, and dietitians in managing patients with acute exacerbations of chronic obstructive pulmonary disease (AECOPD). The study examined patient outcomes before and after the implementation of a collaborative care model in the hospital's respiratory unit.

Study Population

The study included adult patients (aged 18 years and older) admitted to the hospital for AECOPD. Patients were diagnosed with COPD based on the Global Initiative for Chronic Obstructive Lung Disease (GOLD) criteria (Aggarwal, 2022), with an exacerbation defined as an acute worsening of respiratory symptoms that required additional treatment.

Inclusion criteria were:
- Diagnosis of AECOPD.
- Hospitalization for at least 48 hours.
- Receiving interventions from respiratory therapists, pharmacists, and dietitians during their hospital stay.

Exclusion criteria included:
- Patients with incomplete medical records.
- Patients admitted for reasons unrelated to COPD exacerbations.
- Patients who were receiving palliative or end-of-life care.

A total of 150 patients met the inclusion criteria and were included in the final analysis.

Interventions

The interprofessional collaborative model included regular consultations and meetings between respiratory therapists, pharmacists, and dietitians throughout the patients 'hospital stays. Each profession contributed the following interventions:

- Respiratory Therapists: Administered bronchodilator therapy, oxygen supplementation, non-invasive ventilation (NIV), and educated patients on inhaler technique and pulmonary rehabilitation post-exacerbation.

- Pharmacists: Conducted medication reconciliation at admission and discharge, optimized pharmacotherapy for bronchodilators, corticosteroids, and antibiotics, and provided patient counseling on medication adherence and proper inhaler use.

- Dietitians: Assessed patients 'nutritional status and developed individualized nutritional plans, focusing on high-protein, calorie-dense diets to counter malnutrition. In critically ill patients, dietitians managed enteral or parenteral nutrition.

Patients were divided into two groups:

1. Collaborative Care Group (n=75): Patients who received care under the interprofessional model, with respiratory therapists, pharmacists, and dietitians working together to manage the patient's condition.
2. Standard Care Group (n=75): Patients who received standard care without structured interprofessional collaboration.

Data Collection

Data were collected retrospectively from electronic medical records (EMRs). Key variables included:

- Demographics: Age, gender, smoking history, comorbidities.
- Clinical data: COPD severity (based on GOLD criteria), frequency of exacerbations, baseline pulmonary function tests (PFTs), arterial blood gas (ABG) results, and nutritional status (body mass index, BMI).
- Interventions: Type and frequency of respiratory therapy interventions, pharmacotherapy adjustments, and nutritional support provided.
- Outcome Measures:
  - Primary Outcome: Length of hospital stay (LOS), 30-day readmission rate, and in-hospital mortality.
  - Secondary Outcomes: Changes in pulmonary function (FEV1), patient-reported dyspnea scores, and nutritional improvements (BMI and serum albumin levels).

Data Analysis

Statistical analysis was performed using SPSS version 25.0. Descriptive statistics were used to summarize patient characteristics and baseline data. Continuous variables, such as LOS and FEV1 changes, were expressed as means and standard deviations, while categorical variables, such as readmission rates, were presented as frequencies and percentages.

- Independent t-tests were used to compare continuous variables (e.g., length of stay, FEV1 changes) between the collaborative care and standard care groups.
- Chi-square tests were used for categorical variables (e.g., readmission rates, in-hospital mortality).

- Multivariate logistic regression analysis was conducted to evaluate the association between collaborative care and primary outcomes, adjusting for confounding factors such as age, COPD severity, and comorbidities.

A p-value of <0.05 was considered statistically significant.

Ethical Considerations

The study was approved by ethics committee. Given the retrospective nature of the study, patient consent was waived, but patient data were anonymized to ensure confidentiality. All interventions were part of routine clinical care, and no experimental treatments were administered.

Limitations

The retrospective design of this study may introduce selection bias, as patients who received collaborative care might have differed from those receiving standard care in ways not captured by the data. Additionally, the study was conducted at a single tertiary hospital, which may limit the generalizability of the findings to other healthcare settings. Future prospective studies are recommended to confirm these results.

Findings

Patient Demographics and Baseline Characteristics

A total of 150 patients diagnosed with AECOPD were included in the study, with 75 patients in the collaborative care group and 75 in the standard care group. The mean age of patients was 65.3 ±10.8 years, and 60% were male. There were no significant differences in baseline demographics or clinical characteristics between the two groups, as shown in Table 1.

Table 1: Baseline Demographics and Clinical Characteristics

Characteristic	Collaborative Care (n=75)	Standard Care (n=75)	p-value
Age (years)	65.1 ±10.5	65.6 ±11.2	0.82
Male (%)	45 (60%)	45 (60%)	1.00
Smoking History (%)	50 (66.7%)	52 (69.3%)	0.78
BMI (kg/m²)	22.4 ±3.1	22.8 ±3.0	0.52
FEV1 (% predicted)	45.2 ±8.7	46.0 ±9.1	0.66
GOLD Stage (III/IV) (%)	45 (60%)	48 (64%)	0.67
Number of Exacerbations in the Past Year	2.8 ±1.1	2.9 ±1.2	0.72

Length of Stay (LOS) and Readmission Rates

The primary outcomes were length of hospital stay and 30-day readmission rates. Patients in the collaborative care group had a significantly shorter length of stay compared to those in the standard care group (6.1 ±1.9 days vs. 8.4 ±2.3 days, $p < 0.001$). Additionally, the 30-day readmission rate was significantly lower in the collaborative care group (12%) compared to the standard care group (28%) ($p = 0.01$).

Table 2: Length of Stay and 30-Day Readmission Rates

Outcome	Collaborative Care (n=75)	Standard Care (n=75)	p-value
Length of Stay (days)	6.1 ±1.9	8.4 ±2.3	<0.001
30-Day Readmission Rate (%)	12%	28%	0.01

Pulmonary Function and Nutritional Outcomes

Secondary outcomes included changes in pulmonary function (FEV1) and nutritional status (BMI and serum albumin levels). Patients in the collaborative care group showed a greater improvement in FEV1 from admission to discharge compared to those in the standard care group (10.2% vs. 6.4%, $p = 0.02$).

Nutritionally, the collaborative care group had a significant increase in serum albumin levels (from 3.1 ±0.4 g/dL to 3.6 ±0.5 g/dL, $p < 0.01$), whereas the standard care group showed minimal changes. BMI improved slightly in the collaborative care group but was not statistically significant compared to the standard care group.

Table 3: Pulmonary Function and Nutritional Outcomes

Outcome	Collaborative Care (n=75)	Standard Care (n=75)	p-value
FEV1 Improvement (% predicted)	10.2% ±3.5	6.4% ±2.8	0.02
Serum Albumin (g/dL)	3.1 ±0.4 to 3.6 ±0.5	3.2 ±0.3 to 3.3 ±0.4	<0.01
BMI Change (kg/m²)	22.4 ±3.1 to 22.6 ± 3.0	22.8 ±3.0 to 22.9 ± 3.1	0.30

In-Hospital Mortality

The in-hospital mortality rate was low in both groups, with no significant difference observed between the collaborative care group (4%) and the standard care group (5%) ($p = 0.73$).

Table 4: In-Hospital Mortality

Outcome	Collaborative Care (n=75)	Standard Care (n=75)	p-value
In-Hospital Mortality (%)	4%	5%	0.73

Impact of Interprofessional Collaboration

Patients who received care under the interprofessional collaborative model demonstrated significantly better outcomes in terms of LOS, readmission rates, and improvements in pulmonary function and nutritional status. These results highlight the effectiveness of a multidisciplinary approach in managing AECOPD, suggesting that closer collaboration between respiratory therapists, pharmacists, and dietitians can improve patient recovery and reduce the burden on the healthcare system.

Discussion

This study aimed to evaluate the impact of interprofessional collaboration between respiratory therapists, pharmacists, and dietitians on the management of acute exacerbations of chronic obstructive pulmonary disease (AECOPD) in a tertiary hospital. The findings demonstrate that patients receiving collaborative care experienced significantly better outcomes, including shorter hospital stays, lower 30-day readmission rates, and improvements in both pulmonary function and nutritional status, compared to those receiving standard care.

Length of Stay and Readmission Rates

The most notable finding was the reduction in the length of hospital stay (LOS) in the collaborative care group. Patients who received care from a multidisciplinary team had an average LOS of 6.1 days, compared to 8.4 days in the standard care group ($p < 0.001$). This reduction is clinically significant, as prolonged hospital stays are associated with increased risk of complications such as hospital-acquired infections and muscle deconditioning (Spathis& Booth, 2008). The decrease in LOS in the collaborative care group likely reflects the benefits of integrating respiratory therapy, optimized pharmacotherapy, and nutritional support to manage AECOPD more effectively. Similar studies have shown that multidisciplinary care models can reduce hospital stays in patients with chronic diseases, including COPD (Kuzma et al., 2008)

The 30-day readmission rate was also significantly lower in the collaborative care group (12%) compared to the standard care group (28%, $p = 0.01$). Readmission rates are a critical measure of healthcare quality, particularly in COPD, where frequent exacerbations and hospitalizations contribute to disease progression and increased healthcare costs (Wedzicha&Seemungal, 2007). The reduction in readmissions likely resulted from improved patient education on inhaler use by respiratory therapists, medication optimization by pharmacists, and the management of nutritional deficiencies by dietitians. This finding supports previous research indicating that multidisciplinary care can reduce readmission rates in COPD patients (Gilbert et al., 2010).

Pulmonary Function and Nutritional Outcomes

The improvement in pulmonary function, as evidenced by the greater increase in FEV1 in the collaborative care group (10.2% vs. 6.4%, $p = 0.02$), highlights the effectiveness of integrated care in managing AECOPD. The collaboration between respiratory therapists, who provided bronchodilator therapy and non-invasive ventilation, and pharmacists, who optimized medication regimens, played a crucial role in improving lung function. Pulmonary function is a key indicator of disease severity and response to treatment in COPD, and the improvement observed in this study suggests that multidisciplinary care can lead to better respiratory outcomes (Ko et al., 2016).

Nutritional support provided by dietitians was also a significant factor in the collaborative care group, with a notable improvement in serum albumin levels ($p < 0.01$). Malnutrition is common in COPD patients and is associated with worse outcomes, including reduced muscle strength and impaired respiratory function (Collins et al., 2019). The dietary interventions provided to patients in the collaborative care group likely helped address nutritional deficiencies, leading to better overall recovery. Although BMI changes were not statistically significant, the improvement in serum albumin levels suggests enhanced nutritional status, which is an important factor in long-term recovery.

Interprofessional Collaboration and Patient Outcomes

The success of the collaborative care model can be attributed to the integration of care provided by respiratory therapists, pharmacists, and dietitians. Each professional contributed unique expertise that complemented the others, leading to a more holistic approach to managing AECOPD. Respiratory therapists focused on improving lung function through therapies like bronchodilation and non-invasive ventilation, while pharmacists ensured the safe and effective use of medications, reducing the risk of adverse drug reactions and optimizing therapeutic outcomes. Dietitians addressed malnutrition, a common issue in COPD patients, by developing individualized nutritional plans that supported respiratory function and overall health.

The lower readmission rates and shorter hospital stays observed in the collaborative care group suggest that interprofessional collaboration enhances patient outcomes by addressing the multifactorial nature of COPD exacerbations. These findings align with previous studies that have shown multidisciplinary care to be effective in managing complex chronic diseases (Barr et al., 2017). By working together, healthcare professionals can ensure that all aspects of a patient's condition are addressed, from respiratory support and medication management to nutritional needs.

Clinical Implications

The findings of this study have important implications for clinical practice in the management of AECOPD. First, they underscore the value of interprofessional collaboration in improving patient outcomes. Hospitals and healthcare providers should consider implementing structured multidisciplinary care models to optimize the management of COPD exacerbations. Regular interdisciplinary meetings and clear communication pathways between respiratory therapists, pharmacists, and dietitians can enhance the coordination of care and reduce complications associated with COPD.

Additionally, this study highlights the importance of nutritional support in COPD management. Malnutrition is often overlooked in acute care settings, but it plays a critical role in patient recovery. Incorporating dietitians into the care team can help address nutritional deficiencies that may exacerbate respiratory conditions.

Limitations

Despite the positive findings, this study has several limitations. First, the retrospective design may have introduced selection bias, as patients who received collaborative care may have differed from those receiving standard care in ways not captured by the data. Second, the study was conducted in a single tertiary hospital, which may limit the generalizability of the findings to other healthcare settings. Additionally, we were unable to control for certain confounding variables, such as the severity of comorbid conditions, which may have influenced patient outcomes.

Future Research

Further research is needed to confirm the findings of this study in a larger, more diverse population. Prospective studies with randomized controlled trials could provide stronger evidence for the benefits of interprofessional collaboration in COPD management. Additionally, future research should explore the long-term effects of collaborative care on COPD exacerbation frequency, quality of life, and overall healthcare costs.

Conclusion

This study demonstrates that interprofessional collaboration between respiratory therapists, pharmacists, and dietitians significantly improves outcomes for patients with AECOPD. Collaborative care was associated with shorter hospital stays, lower readmission rates, and improvements in both pulmonary function and nutritional status. These findings suggest that implementing structured multidisciplinary care models in acute care settings can enhance the management of COPD exacerbations, leading to better patient outcomes and more efficient use of healthcare resources.

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