Emerging role of pharmacists in managing patients with chronic obstructive pulmonary disease

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Chronic obstructive pulmonary disease (COPD) affects approximately 16 million adults in the United States.[1] Additionally, 12 million adults may have undiagnosed COPD[2] and potentially avail themselves of primary healthcare services for associated symptoms. COPD negatively impacts patient-related quality of life (QoL) and exerts substantial burden; the economic impact in low- and middle-class economies is expected to reach $2.2 trillion by 2030.[3] In the United States, the direct medical costs attributable to COPD were projected to increase from $32 billion in 2010 to $49 billion by 2020.[4] COPD-related hospitalizations contribute largely to healthcare costs, accounting for nearly 50% of the direct costs.[5] Managing patients with COPD encompasses many aspects, and ensuring that patients adhere to their treatment plan and adopt lifestyle changes remains challenging.[6] The role of pharmacists in direct patient care is evolving, with their importance highlighted in healthcare systems[7] and multidisciplinary patient care teams.[8]

Role of hospital and community pharmacists in management of COPD. Model COPD management includes early diagnosis, personalized pharmacotherapy selection, and ongoing patient education to optimize inhaler use and adherence.[9,10] Pharmacists play an important role in managing drug therapy and are integral members of healthcare professional (HCP) teams.[6,8] Studies have explored the impact of pharmacist-led interventions to improve outcomes in patients with COPD (Table 1).[11-16] Furthermore, integrating performance metrics such as care quality, financial impact, and patient satisfaction into the methodology is advised for assessing the impact of pharmacist interventions on patient care.[17]

The COPD National Action Plan emphasizes the importance of early detection and diagnosis of COPD and of developing effective strategies for preventing disease onset and progression.[18] Spirometry is an important diagnostic tool in COPD[19] and, when performed by pharmacists, can facilitate accurate diagnosis, patient monitoring, and optimum medication selection.[20] In a retrospective study of physician-referred patients (n = 150), spirometry testing conducted by community pharmacists (CPs) identified respiratory disease abnormalities and led to drug regimen optimization.[12] Collaboration between pharmacists and physicians offers a feasible approach for performing spirometry and can help avoid scheduling spirometry testing to be performed in distant medical facilities.[20] Additionally, pharmacists could enroll in office spirometry certification programs to enable them to perform spirometry accurately.[21] Pharmacists can improve patient convenience, enable timely diagnosis of COPD by screening at-risk individuals,[8] optimize drug therapy selection and educational initiatives, and maintain long-term therapy management.

Polypharmacy and adverse drug events. Polypharmacy is common among patients with COPD, with up to 50% of all hospitalized older patients and about 14% of those with COPD receiving 5 or more medications.[22] Additionally, hospitalization for an acute exacerbation of COPD (AECOPD) is associated with greater disease severity and an increased risk of adverse drug events (ADEs).[23] ADEs and suboptimal adherence due to polypharmacy are modifiable barriers that significantly contribute to morbidity.[24] Pharmacists play a significant role in preventing ADEs by critically analyzing the medication list and discontinuing (or recommending discontinuation of) medications that do not provide effective disease control or whose use results in ADEs.[25]

Medication reconciliation. The Joint Commission accredits and certifies US healthcare organizations and programs as a condition of licensure for the receipt of reimbursement by Medicaid and Medicare.[26] This group publishes standards, including National Patient Safety Goals (NPSGs), to address issues that may adversely affect patient outcomes. One NPSG is to resolve medication discrepancies between newly and previously prescribed therapies. Patient outcomes are improved when coordinated efforts are employed to ensure medication lists are accurately communicated when patients transition from a hospital

Table 1. Impact of Pharmacist-Led Interventions on COPD and Other Patient Outcomes

Study (Year Published) and Objective	Sample Size	Impact of Pharmacist Intervention	Assessment
Gillespie et al[11] (2009) Objective: To investigate the effectiveness of interventions performed by ward-based pharmacists in care of older patients (>80 years of age)	*n* = 400	16% reduction in hospital visits; 47% reduction in ED visits; 80% reduction in drug-related readmissions	Logistic regression analysis for binary responses received from the intervention and control groups
Armero et al[14] (2015) Objective: To assess the efficacy of a smoking cessation campaign at a pharmaceutical care center	*n* = 25	Pharmacist-led smoking cessation program resulted in 43.5% of patients achieving total smoking cessation	NR
Hohl et al[13] (2017) Objective: To assess the effect of early in-hospital pharmacist-led medication review on health outcomes of high-risk patients	*n* = 10,807	Reduction in median number of hospital days; 8% reduction in median length of hospital stay (11% reduction in patients >80 years of age)	Median and inverse propensity score–weighted logistic regression modeling
Smith et al[16] (2017) Objective: To study the impact of a pharmacist-provided clinical COPD bundle on the management of COPD in a hospital-based ambulatory care clinic	*n* = 138	Pharmacist-driven COPD bundle improved outpatient management in patients with COPD ($P < 0.0001$); phone call consults at 90 days reduced ($P = 0.04$)	Student's *t* test or Mann-Whitney *U* test and logistic regression analysis
Nguyen et al[15] (2018) Objective: To evaluate the impact of pharmacist-led training on the improvement of inhaler technique for patients with COPD	*n* = 211	Inhaler techniques significantly improved after pharmacist-led training ($P < 0.05$); average training time reduced from 6 min to 3 min	One-way analysis of variance, with post hoc test and paired-samples *t* test, and McNemar's test

Abbreviations: COPD, chronic obstructive pulmonary disease; ED, emergency department; NR, not reported.

to the home setting.[26] As recognized by the US Department of Health and Human Services, medication reconciliation can reduce medication errors and support safe use. Pharmacists make interprofessional efforts to establish and maintain an effective medication reconciliation process in hospitals and across health systems.[27] In a randomized trial involving hospitalized patients discharged from a general medicine service, pharmacist-performed medication review identified unexplained discrepancies between discharge medication lists and postdischarge regimens.[28] Involvement of pharmacists is key in preventing ADEs and developing a patient-centered approach to enhance management.[29] Their role may encompass discontinuing unnecessary medicines, switching to less expensive or more effective medications, or altering the drug administration route.[30] The inclusion of a pharmacist in the discharge medication reconciliation process effectively reduces medication discrepancies, which may decrease hospital readmission rates.[31]

Counseling for smoking cessation. To achieve the desired clinical outcomes, steps for medication reconciliation should be complemented with active programs that involve patient counseling during hospital discharge.[32]

Approximately 50% of smokers develop COPD during their lifetime,[33] and adjuvant approaches, such as smoking cessation programs, are required to maximize the effectiveness of pharmacological treatment.[19] The COPD National Action Plan suggests that smoking cessation and pulmonary rehabilitation are essential evidence-based interventions to manage patients with COPD. Smoking cessation has a major influence on the disease course,[8,19] and effective counseling may be delivered by a trained professional in a variety of settings. Several US states have passed legislation allowing CPs to provide smoking cessation counseling and issue Food and Drug Administration (FDA)–approved tobacco cessation drug therapy.[34] Smoking cessation rates in patients who receive counseling by a pharmacist are similar to those in patients receiving counseling from other HCPs.[35] Even brief pharmacist-led counseling sessions are associated with long periods of continuous abstinence.[36]

Treatment adherence and correct inhaler use. The Global Initiative for Chronic Obstructive Lung Disease (GOLD) strategy document highlights the importance of regularly checking treatment adherence and assessing inhaler technique. The prevalence of correct inhaler use remains unacceptably low and did not improve in the 40 years from 1975 to 2014.[37] Only an average of 40% to 60% of patients with COPD adhere to treatment, and more than 50% of patients use inhalers incorrectly.[38] Poor inhaler technique substantially reduces effective delivery of an adequate dose to the lungs[39] and is associated with poor disease outcomes and increased cost (Table 2).[40]

Table 2. Critical Errors in Inhalation Device Technique

Inhaler Type	Critical Errors[37,54]
pMDI[a]	Neglect of full expiration before inhalation, coordination, speed of inspiration, postinhalation breath-hold
DPI	Incorrect preparation, neglect of full expiration before inhalation, inadequate duration of breath-hold, orientation of device during preparation and inhalation, moisture
SMI	Preparation and priming with first use, speed of inspiration, postinhalation breath-hold

Abbreviations: DPI, dry powder inhaler; pMDI, pressurized metered dose inhaler; SMI, soft mist inhaler.
[a]Use of holding chamber or spacer with pMDI could reduce inspiratory effort, improve drug deposition in lungs, and simplify coordination between actuation and inhalation.[55]

When selecting an inhaler device, involving patients in the decision-making process and considering their preferences, needs, abilities, and adherence can improve adherence and outcomes.[41-43] Pharmacist-led interventions significantly improve inhaler technique in patients with COPD and supplement physician-based education.[15,44] In a large single-intervention study of patients with a diagnosis of asthma or COPD (n = 757), inhalation technique was assessed by a CP at baseline and after 4 to 6 weeks of intervention using a 21-item checklist. Pharmacist-led training reduced the number of patients making 1 or more errors while performing inhalation technique from 597 patients (78.9%) to 214 (28.3%).[44]

Peak inspiratory flow (PIF) is indicative of the flow rate required for effective lung deposition of inhaled medication and is an important patient-related factor to guide inhaler device selection. Some patients, particularly older patients with COPD, have low PIF and may be unable to effectively use their dry powder inhalers (DPIs).[45] DPIs are breath-actuated and rely on patient's inspiratory effort to overcome airflow resistance for drug-carrier deaggregation and lung deposition.[46] The In-Check DIAL (Haag-Streit Diagnostics, Bern, Switzerland), a device used for assessing a patient's inspiratory effort by simulating the internal resistance of commonly prescribed inhaler devices, may be useful in guiding inhaler selection. This assessment allows the clinician to determine a patient's ability to generate sufficient inspiratory flow rate to optimize drug delivery to the lung.[47] Suboptimal PIF is associated with exacerbations and hospital readmissions.[48] Routine assessment of PIF could optimize inhaler selection and consequently improve clinical outcomes[49]; this is a role that can be fulfilled by pharmacists. Pharmacists' knowledge of inhaler technique can be instrumental in optimizing inhaler competency and medication adherence, thorough patient education, demonstration of inhaler use, and follow-up.[8]

Patients with chronic pulmonary diseases and high out-of-pocket inhaler costs are at an increased risk for cost-related nonadherence,[50] suggesting that affordability is an issue. Pharmacists can reduce patients' out-of-pocket costs by recommending combination products instead of multiple devices, connecting patients to an assistance program, and switching products to a more cost-effective alternative, if available.[8]

Nonadherence to COPD treatment is associated with poor clinical and economic outcomes, resulting in loss of productivity, decreased QoL, and increased hospitalizations and mortality.[51] In a systematic review evaluating the clinical and economic impact of nonadherence in COPD, patients who were more adherent to their medications had fewer work-related absences and lower costs associated with lost productivity.[51] An analysis of a large US-based administrative claims database showed that a 5% increase in adherence resulted in a 2.5% reduction in hospital visits and a 1.8% reduction in emergency department (ED) visits. Other multicomponent strategies for improving inhaler technique and adherence include brief counseling sessions, inhaler use review, a collaborative self-management approach, and enhancing disease and treatment awareness, along with the inclusion of psychological therapies.[52,53] Pharmacists can promote adherence to a prescribed regimen by educating patients on the disease, reducing counterproductive beliefs, and motivating treatment adherence, thereby improving prescription refill records.[24]

Discharge and follow-up. Recognizing factors that can predict readmissions is important to identify patients who need postdischarge support. These factors include advanced age, low PIF, disease severity, need for ventilatory support, and comorbidities, such as depression and anxiety.[19,48,56] In addition to patient education, medication optimization, inhaler technique review, comorbidity assessment, rehabilitation, and motivational health coaching can effectively reduce hospital readmissions and improve QoL.[57]

Influenza[58] and pneumococcal vaccinations[59] decrease the incidence of lower respiratory tract diseases, such as COPD. Pharmacists play an active role in improving vaccination rates by identifying predisposing factors[60] and by educating patients about the importance of influenza and pneumonia prevention.[60,61]

Pharmacist involvement, as opposed to encounters involving physicians alone, was shown to reduce overall readmission rates and improve drug therapy monitoring and accuracy of medication histories in patients transitioning between acute and outpatient care providers during hospital discharge.[62] The COPD Foundation provides a toolkit summarizing key resources to reduce preventable hospital readmissions, which may be useful for pharmacists.[63]

CPs are accessible to patients for medication therapy management during transitions of care, and their postdischarge involvement is associated

with a reduction in hospital readmissions.[64,65] In a randomized trial involving 178 patients discharged from a general medicine service, patients receiving pharmacist intervention had a lower rate of preventable ADEs, leading to a significantly decreased rate of medication-related ED visits or hospital readmissions (1%) relative to the rate with usual care (8%).[28]

Medication reconciliation and patient education provided by pharmacists can help nursing staff focus on other responsibilities. Hospitals are advised to implement comprehensive pharmacist-driven transitions of care programs including patient education, outpatient QoL assessment, and appropriate COPD maintenance therapy. Use of chronic-care models helps reduce hospitalization rates, length of stay, and the number of ED and/or unscheduled visits.[66]

The COPD National Action Plan encourages the use of a written patient-centric management tool developed with appropriate cultural and health literacy considerations. The written plan should include education on the medication regimen (eg, schedules and dosages of drugs prescribed, information on use of oxygen therapy, and importance of medication adherence), comorbidity management, ways to recognize and manage declining symptoms, and evidence-based resources or visual aids to explain COPD symptoms and associated risks. Personalizing treatment for patients with COPD using a written plan can be useful in preventing ED visits and hospitalizations for severe AECOPD, particularly for those with a history of acute exacerbations.[19,67]

Collaboration to optimize care. Several barriers prevent the implementation of community pharmacy in transitions of care.[68,69] Notably, interventions by unit-based clinical pharmacists in an institutional setting may potentially lead to improved outcomes,[70] with patients participating in physician-pharmacist collaborative practices demonstrated to have improved disease control.[71] However, pharmacists may not always be based in a hospital unit and may therefore find it challenging to increase awareness of newly implemented services. The nature and extent of physician-pharmacist collaboration can vary, being both episodic and informal rather than part of a care continuum. Educating physicians on the benefits of collaborating with pharmacists could increase the rate of acceptance of pharmacist interventions[70] and pose an excellent opportunity for pharmacists to develop their role at a time when the delivery of healthcare is rapidly evolving.[72]

Pharmacists are uniquely positioned to provide evidence-based pharmacotherapeutic recommendations (eFigure 1). Involvement of pharmacists in patient care during admission and discharge reduces medication errors, improves treatment adherence, and decreases rates of ADEs and hospital readmissions. Fostering a collaborative relationship between HCPs, patients with COPD, and pharmacists is required to positively impact outcomes.

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