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the Translator

Canadian Pharmacy ➤ Research ➤ Health Policy ➤ Practice ➤ Better Health

Application of pharmacists' expanded knowledge in respiratory illnesses.

Pharmacists play an important role in improving the overall health of patients experiencing respiratory illnesses. As of 2013, asthma and chronic obstructive pulmonary disease (COPD) are the two most prevalent examples of respiratory diseases affecting over 2.35 million and 3.85 million Canadians, respectively.[1,2] Since this topic was first addressed in the Winter 2008 edition of The Translator,[3] the pharmacist's role in medication management has advanced due to the expanded scope of practice. Pharmacists now have the opportunity to advance the care offered to patients experiencing respiratory illnesses through services such as spirometry testing and monitoring for inhaler adherence.

This issue of *the Translator* highlights four different methods used to optimize the diagnosis and management of respiratory illnesses:

- Community pharmacist provides effective treatment for asthma and COPD patients
- Pharmacist adopting a spirometry clinic in a primary care physician's office
- Implementing programs for asthma and COPD patients in community pharmacies
- A cost-effective intervention to improve inhaler adherence in COPD patients

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2. Statistics Canada. Canadian Health Measures Survey: Household and physical measures data, 2012 to 2013. Available at: www.statcan.gc.ca/daily-quotidien/141029/dq141029c-eng.htm (accessed March 11, 2015).
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Community pharmacist provides effective treatment for asthma and COPD patients

Ottenbros S, Teichert M, de Groot R, et al. Pharmacist-led intervention study to improve drug therapy in asthma and COPD patients. *Int J Clin Pharm*. 2014;36:336-44. doi:10.1007/s11096-013-9887-4. (Ottenbros A 2014). Corresponding author: CAPT Paul Weidle, pweidle@cdc.govCorresponding author: Stefan Ottenbros, s.ottenbros@pharmbition.nl

Issue: Asthma and chronic obstructive pulmonary disease (COPD) are two common respiratory diseases that have become more prominent worldwide, thereby causing a burden on health care systems.[1-4] Many patients find it challenging to properly adhere to their inhaler medications. The proper administration of these medications is essential to ensure complete delivery of the drug to the lungs to yield a positive clinical response.[5-8] Thus far, no large-scale and precise assessments have been done in community pharmacies that study the effect of pharmacist-led interventions on the treatment of patients with asthma or COPD. Moreover, there is conflicting data from previous studies regarding pharmacist-led interventions on improvements of the drug therapy. Even though some current studies

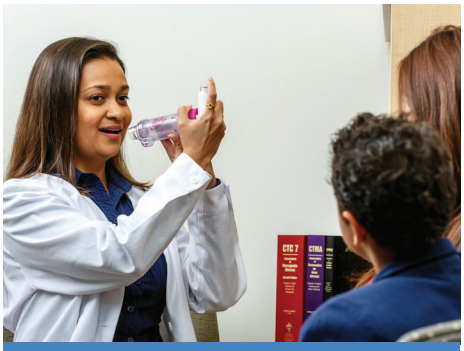
The Translator is an initiative by the Canadian Pharmacists Association to support the knowledge translation between pharmacy practice research and health policy. Each issue selects a number of pharmacy practice research articles, briefly summarizes them and discusses the health care policy implications. These articles are submitted by researchers who have a strong desire to support evidence-based health care policy and best practices.

Canadian Pharmacists Association / Association des Pharmaciens du Canada

show that pharmacy-based services improve medication adherence in patients with respiratory diseases, additional studies are required to evaluate the effect of such services on certain aspects in asthma and COPD treatment for larger patient samples.

A solution: Pharmacists have therapeutic knowledge about respiratory diseases and play a vital role in identifying and counselling patients on how to properly use inhalers. As the medication is being dispensed in the pharmacy, the pharmacist can provide tailored advice by using patient-centred care.[6,8-11] Dispensing data obtained from the pharmacy, which represents the patient's complete medication history, can help classify improper drug use for patients with asthma and COPD. The Foundation for Pharmaceutical Statistics (SFK) gathered this data every month during this study to observe potential signs of improper medication adherence and to report them to the physician.

In the intervention group (IG), there were 102,497 patients who received asthma or COPD medications from the 107 pharmacies that participated in this study. At the beginning most of the people in this group (99%) had at least one of the 19 possible medication problems due to improper drug use. A complete analysis was performed on 3757 patients who were selected by pharmacists from the IG pharmacies to enhance medication therapy. In the control group (CG), there were a total of 105,507 patients who also received asthma or COPD medications from the 105 control



Pharmacist-led respiratory intervention improves the therapy regimen in patients with asthma or COPD in community pharmacies.

pharmacies in the SFK database. Since the CG and IG pharmacies had comparable characteristics, the only difference was that IG had a greater number of pharmacists working for every pharmacy. Patient population between the two groups were also similar; however, the selected patients in the IG were older (58 years versus 47 years), observed more issues (6.7 versus 3.5 problems) and received more chronic medications (5.6 versus 3 drugs) compared to the CG patients.

Measuring the primary outcome, the mean number of high dose treatment (HDT) was further reduced by 0.54 (95% CI, 0.21-0.86) HDT treatments in the selected IG patients compared to the CG patients. Ten percent of patients with a lower number of HDT initiated inhaled corticosteroid (ICS) therapy, whereas 10% of patients with a higher number of HDT stopped the administration of ICS therapy. Measuring the secondary outcome, 14 out of the 19 potential problems were decreased in the selected IG patients to a higher degree compared to the CG patients. The statistically significant problem decreases were 61% (95% CI, 38% to 75%) due to using contra-indicated medications, 35% (95% CI, 6% to 54%) for using older medications and 29% (95% CI, 13% to 42%) for using powdered inhalers in the elderly. Generally, the total number of potential medication problems decreased by 25% to 41% in the IG patients.

Implications: Pharmacist-led respiratory intervention improves the therapy regimen in patients with asthma or COPD in community pharmacies. More specifically, pharmacists will be able to identify patients with respiratory diseases who are not diagnosed properly according to the guidelines and could then alter their therapy. Overall, patient adherence to maintenance treatment and the optimal use of inhaler medications were improved due to this intervention. A complete pharmacy care service not only provides a method for effective therapy but it also reduces the number of prescriptions used for asthma or COPD exacerbations. Pharmacoeconomic research should be done in order to quantify the potential savings to the health care system.

Background and research methods: In this population-based, prospective, cohort study done from May 2011 to February 2012, Dutch community pharmacies were divided into two groups: the IG and the CG. In order for pharmacists to be eligible for the IG, they needed to collaborate with physicians, utilize web-based tools and agree to conduct pharmacy care services according to the structured pharmacy care program. The CG was matched to every IG pharmacy by the SFK database based on the number of medications dispensed, the number of pharmacists and the degree of urbanity to eliminate bias. Eligible patients with asthma and COPD were selected for additional pharmaceutical care by IG pharmacies based on structured agreements. For COPD patients, they had to be more than 40 years old and have taken at least two oral medications with HDT of antibiotics or corticosteroids within the past year. Asthma patients had to be between 16 and 40 years old and have used a dose of more than 2 inhalations per day of short-acting betamimetic drugs (SABD), with or without using ICS. Nineteen possible problems with asthma and COPD medications were developed as algorithms to help identify IG patients to pharmacists. Over a 10-month period, changes in these problems were measured in selected and all users of asthma and COPD medication of IG pharmacies and compared to CG pharmacies without the organized program. The primary outcome measured was to reduce the HDT of the antibiotics and corticosteroids, where HDTs represent poor control of respiratory disease. The secondary outcome measured was the difference between treatment problems found in the IG compared to the CG.

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Pharmacist adopting a spirometry clinic in a primary care physician's office

Cawley MJ, Pacitti R, Warning W. Assessment of a pharmacist-driven point-of-care spirometry clinic within a primary care physicians office. *Pharm Pract.* 2011;9(4):221-7. Epub 2011 Dec 12. (Cawley MJ 2011). Corresponding author: Michael J. Cawley, m.cawley@usciences.edu

Issue: Spirometry serves as a diagnostic and screening tool for various respiratory diseases such as asthma and chronic obstructive pulmonary disease (COPD).[1,2] Spirometry testing is primarily performed in specialized pulmonary function laboratories and in physician's offices. Performing this test regularly in asymptomatic patients should be avoided because it may result in unnecessary testing, more costs with resource usage and misguided disease identification.[3] Thus, the clinical practice guidelines of the American College of Physicians (ACP), American College of Chest Physicians (ACCP), American Thoracic Society (ATS) and European Respiratory Society (ERS) currently suggest to use spirometry testing only to diagnose patients who experience respiratory symptoms.

Traditionally, respiratory therapists are the health care professionals designated to perform these tests in hospital, yet they have a limited scope of practice. Additionally, many nursing or nursing assistant personnel are assigned to perform this testing in physicians' offices and many do not have the full training in spirometry, which might lead to improper diagnosis. Even though pharmacists may provide assistance, only a few studies thus far have been done to illustrate pharmacists' ability to individually conduct spirometry testing.[4-5] Also, pharmacists do not routinely perform spirometry testing because they do not believe it is an aspect of their scope of practice, making it the responsibility of other medical office staff.

> Pharmacists can educate the patients and their caregivers by counselling how to properly administer respiratory medications along with their devices.

A solution: Pharmacists may have an important responsibility in providing spirometry testing. They have extensive therapeutic knowledge about respiratory treatment, ability to screen patients who have the diagnostic symptoms (such as cough and shortness of breath) and/or can monitor changes in patients with asthma and COPD by consulting their physicians. The spirometry clinic was a pilot program to be implemented with other clinical pharmacy services available in the hospital. In this study, the pharmacist had unique qualifications as a registered respiratory therapist (RRT) and certified pulmonary function technologist (CPFT). Implementing a point-of-care spirometry clinic driven by pharmacists enhances the quality of spirometry testing and provides additional value to the service due to the pharmacist's level of expertise. The spirometry clinic was held every month, with the pharmacist scheduling five patients who were referred from the medical clinic or from physicians outside the clinic. Specific instructions were given to patients prior to visiting the clinic to ensure they did not

Pharmacist adopting a spirometry clinic in a primary care physician's office *(cont.)*

administer any respiratory medications during the 24 hours before to obtain accurate baseline results during the test.

Fifty-one of the 65 scheduled patients completed their scheduled spirometry appointment, with 32 patients yielding normal results and 19 patients yielding abnormal results. For the abnormal values, 9 patients had an obstructive defect, 7 patients had a restrictive defect and 3 patients had a combination of both. A higher estimated lung age (78.2 versus 58.1 years) and a higher number of smoking pack years, which is the number of cigarette packs smoked per day over the total years of smoking (32.7 versus 14.4 years), were observed for patients with abnormal tests compared to the normal tests. Moreover, the abnormal spirometry tests increased the mean percent change in FEV1 drastically after receiving the bronchodilator medication to 10.9% compared to the normal forced expiratory volume at one second (FEV1) change of 4.0%.

After the spirometry test results were analyzed, many of the respiratory medications required modification. Fourteen out of the 51 patients stopped their current medications whereas 28 patients needed additional medications to control their respiratory symptoms identified during the test. Beta agonists were the main medication to be stopped for 8 out of 14 drugs because patients were not receiving any therapeutic benefit and/or having a negative response after administering the bronchodilator. However, leukotriene antagonists were the most prescribed medication for 9 out of 28 prescriptions after performing the test.

The pharmacist performed additional interventions for all 51 patients. Thirty-two patients were offered smoking cessation services and 14 were referred to the physician or required additional testing. Particularly, 5 patients required additional pulmonary testing, 5 were referred to the allergist and 4 were referred to the cardiologist. For all the enrolled patients, 77 out of 102 spirometry attempts achieved forced vital capacity (FVC) or FEV1 within 0.2L of the next biggest number according to the ATS guidelines.

Implications: Implementing spirometry testing serves as a value-added pharmacy service to allow pharmacists to expand their knowledge and abilities about respiratory diseases in hospital and outpatient settings. In addition, pharmacists can educate the patients and their caregivers by counselling how to properly administer respiratory medications along with their devices. Even though some studies highlighted the importance of spirometry clinics in pharmacy practice, this study is currently the only spirometry program conducted by pharmacists in the US to improve patient care. Additional studies are required to determine the performance outcomes for the patient and the pharmacist's role in performing spirometry testing.

Background and research methods: In this retrospective cohort study, patients that visited the spirometry clinic during 2008 to 2010 were analyzed. Patients screened with spirometry were identified using their medical information and certain inclusion and exclusion criteria had to be met. The inclusion criteria consisted of patients older than 8 years with current cough and shortness of breath and diagnosed with respiratory disease such as asthma, COPD or other symptoms that require spirometry testing. Some of the exclusion criteria included systolic/diastolic blood pressure greater than 200/110mmHg, chest/abdominal surgery in the previous three weeks, nausea and vomiting or took respiratory medication one hour prior to test. All equipment, the spirometer and flow transducer, had to meet the requirements according to the ATS for syringe volume reproducibility of less than 3% of predicted value. The pharmacist offered complete spirometry clinical services, one of which included pharmacological interventions. The pharmacist in consultation with the prescribing physician recommended to add, stop or change the medication of the current dose or to prescribe new respiratory medications. Every spirometry test was performed at least three times until the FVC or the FEV1 was within 0.2L of the next biggest number, according to the ATS guidelines. Then, the pharmacist, medical physician and medical resident assessed the results to determine the most suitable pharmacotherapy plan for the patient. Any abnormal results were classified as either restrictive and/or obstructive defect.

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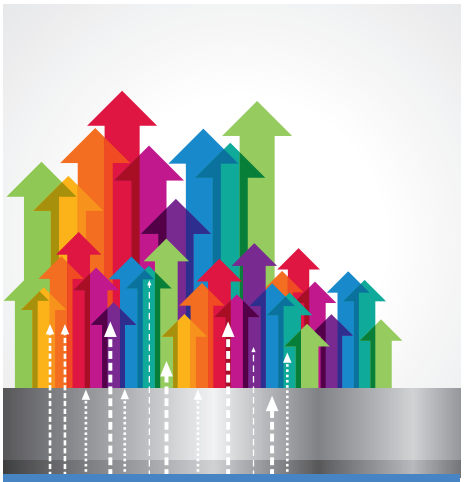
Implementing programs for asthma and COPD patients in community pharmacies

Petkova V, Andreevska K, Gueurguiev, et al. Community pharmacy-based program for patients with asthma and chronic obstructive pulmonary disease. *Biotechnol Biotec* Eq. 2012;26(6):3437-442. doi:10.5504/BBEQ.2012.0099. (Petkova V 2012). Corresponding author: Valentina Petkova, petkovav1972@yahoo.com

Issue: Asthma and chronic obstructive pulmonary disease (COPD) continue to prevail as two of the most common chronic diseases, affecting roughly 2.3 million and 1.5 million Canadians, respectively.[1,2] Although these conditions share similar characteristics, they are in fact very different disease states, namely in terms of the progression and frequency of symptoms and the severity of airway damage over time. Controlling and relieving asthma symptoms centres on the elimination of triggers such as allergens, stress, pollutants and other aggravating factors. Conversely, COPD symptoms cannot be alleviated in the same sense; rather, the goal of treatment focuses on slowing the progression of the disease, primarily through smoking cessation. Both of these diseases represent a serious public health issue on a national and global scale and place significant financial and resource burdens on health care systems. Patient education has already been highlighted by previous studies as the most effective factor in the management of these conditions, but a lot remains to be accomplished to decrease the prevalence of these diseases and improve quality of life.

A solution: Community pharmacists are in a very unique position to help patients in the management of chronic lung diseases such as asthma and COPD. Repeated contacts with patients, expertise in drug therapy and medication management, as well as easy accessibility are a few of the reasons that should promote pharmacists into the role of lung disease educators and pharmacotherapy specialists. Previous reports, such as the European TOM-studies (Therapeutic Outcome Monitoring), have already established the pharmacists' critical role in providing comprehensive care and ensuring the safe and effective use of drugs for asthmatic and COPD patients. This particular European study also affirmed that pharmacists intervention improved a range of health-related factors such as patients' drug knowledge, inhalator skills, compliance to prescriptions, self-management and the quality of drug therapy.[3,4,5,6]



Pharmacist-driven interventions in asthma and COPD care leads to distinct improvements in health.

Stemming off of existing research, which should serve as a foundation to justify the value of pharmacy services and proper patient education, this study aimed to develop and implement an education program for both asthma and COPD patients in community pharmacies. Furthermore, it assessed the influence of this program on patients' quality of life. Patients allocated to the intervention group received extensive education provided by the community pharmacist. The exhaustive list of information topics included: information about their disease, instruction regarding the appropriate use of medications and training on the inhaler technique; adverse drug reactions during treatment; recognition of early signs of exacerbation and information about the identification and control of asthma/COPD attacks; tobaccoism and efficacy of different methods on smoking cessation. In comparison, the control group did not receive any information additional to their routine dispensing services.

Education in itself has always shown to advance an individual's scope of understanding and this report validates, yet again, that pharmacist intervention has a significant influence on patient knowledge and health. Positive changes were observed in all of the studied parameters in the intervention group after four months; however, not all differences were statistically significant (P>0.05), such as the changes in peak expiratory flow (PEF) rate and forced expiratory volume at one second (FEV1). Despite this, there were key differences observed in the frequency of reporting symptoms such as cough, chest tightness and shortness of breath in the two groups. At baseline, over 90% of patients in the intervention and control trials reported the persistence of these symptoms most of the time. After four months of education, 37% of patients in the intervention group reported no more symptoms, compared to only 9% of control patients (P= 0.013). Other statistically significant differences were observed in the number of self-reported hospitalizations and frequency of urgent medical aid (UMA), which were both distinctly lower in the intervention group.

Implications: Pharmacist-driven interventions in asthma and COPD care leads to distinct improvements in health through education, monitoring, reassessing and optimizing drug therapy. Although this study was unable to conclude precise differences in the patient's quality of life over the four-month period, other metrics showed marked improvements within the intervention group, emphasizing the importance of education and of the pharmacist's role in chronic lung disease management. Pharmacists should be provided with the tools necessary to assess and educate asthma and COPD patients at the community pharmacy level. Further studies should be conducted to determine the implications of pharmacy-based spirometry testing and opportunities for pharmacists to prescribe for these conditions.

Background or research methods: This community-based study was designed as a prospective, randomized, controlled trial, carried out in 24 community pharmacies in Sofia and Plovid, Bulgaria. Patients included in the asthma study group were required to be over the age of 14 years with an understanding of both spoken and written Bulgarian. The inclusion criteria outlined for COPD patients required them to be outpatients with a confirmed diagnosis of COPD and over the age of 40 years. The presence of any other notable pulmonary disease (e.g., carcinoma) or a condition that could hamper the questionnaire completion (e.g., poor eye sight) and any mental illnesses rendered the patient as excludable. Sixty asthma patients and 26 COPD patients were equally divided into an intervention group and a control group, reducing to 30 and 13 patients in each respective disease cohort. The control groups

were treated as usual by the pharmacist, while the intervention groups attended educational programming for a period of three months. Various parameters were assessed at baseline and every month, including their PEF rate, FEV1 complications, hospitalizations, as well as subjective opinions on their health. These assessments were performed using repeated-measures analysis of variance (ANOVA), t-tests and the Mann-Whitney U-test as appropriate. Statistically significant values corresponded to a P-value below 0.05.

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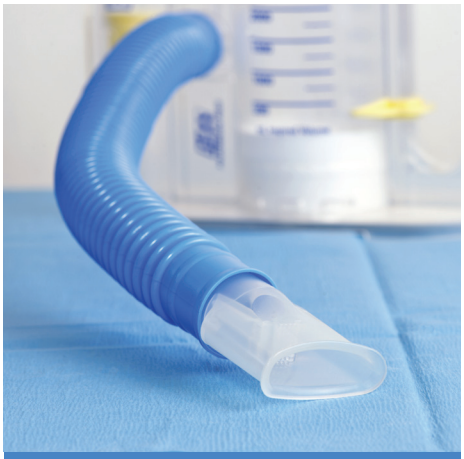
A cost-effective intervention to improve inhaler adherence in COPD patients

van Boven JFM, Tommelein E, Boussery K, et al. Improving inhaler adherence in patients with chronic obstructive pulmonary disease: a cost-effectiveness analysis. *Respir Res.* 2014;15(1):66. doi:10.1186/1465-9921-15-66. (van Boven JFM 2014). Corresponding author: Job F. M. van Boven, j.f.m.van.boven@rug.nl

Issue: Chronic obstructive pulmonary disease (COPD) is a long-term, progressive disease that causes significant damage to the airways, making it difficult to breath. This condition is not fully reversible and worsens over time; however, treating it early can greatly improve symptoms, a process that routinely begins with smoking cessation. In Canada there are more than 1.5 million people who have been diagnosed with COPD. More alarming is the number of Canadians that may have it but remain undiagnosed, which is currently estimated to be around 1.6 million.[1] This disease state has notably contributed to the morbidity and mortality of the population, as well as health care and societal costs. Despite effective medication being available, non-adherence to COPD medication is common, resulting in worsened clinical and economic outcomes.[2] A study, recently conducted in community pharmacies in Belgium, demonstrated that a pharmacist intervention improved both medication adherence and inhalation technique in COPD patients.[3] However, this study, referred to as the PHARMACOP-intervention (PHARMA-ceutical Care for COPD), failed to address the economic feasibility of implementing such a program at community pharmacies.

A solution: This report was designed to assess the cost-effectiveness of the PHARMACOP-intervention. It is the first study ever conducted to estimate the cost-effectiveness of a COPD intervention that focused on improving medication adherence based on a large randomized, controlled trial in community pharmacies. A major strength of this study worth noting is that the medication distribution among the study population was modeled on real-life conditions. Hence, the economic impact of improving medication adherence among the population could be accurately estimated based on these distributions.



Non-adherence to COPD medication is common, resulting in worsened clinical and economic outcomes.

When comparing the study group with the control group, the total costs per patient were €2221 and €2448, respectively. This reveals a total cost saving of €227 (95% CI: €58 to €403) per patient in one year. There was also a considerable decline of 0.07 (95% CI: 0.04-0.10) hospital-treated exacerbations per patients, thereby considerably contributing to overall cost-savings and additional financial benefits to the health care system. Furthermore, long-term projections estimated that if the PHARMACOP-intervention is extended beyond the one-year timeframe (up to 12.5 years), about 1.36 hospital-treated exacerbations per patient would be prevented.

In addition, it is worth noting that the PHARMACOP-intervention group had initially higher costs, stemming from factors such as increased medication adherence and standard intervention costs that did not apply to the usual care group. Despite this, these additional costs were offset by €388 in savings, primarily from a decrease in expenses otherwise needed for the treatment of exacerbations. These robust cost savings reflect the need to establish more medication management services in community pharmacies for COPD patients.

Implications: Community pharmacists are becoming increasingly engaged in the treatment and management of COPD. Due to their routine patient contacts upon filling or administering medications, community pharmacists can strongly influence behaviours such as medication adherence and inhalation techniques in patients with COPD. Effective and cost-effective interventions like PHARMACOP support the idea that treatment regimens should be optimized before new drugs are added. Furthermore, health insurance companies should be motivated to offer means of reimbursement for these types of services.

A cost-effective intervention to improve inhaler adherence in COPD patients *(cont.)*

Background and research methods: The cost-effectiveness analysis used in this study was achieved in accordance with Belgian guidelines for pharmacoeconomic research. A Markov model was designed to capture the long-term costs and effects of the PHARMACOP-intervention. This is the recommended model for health economic evaluations of COPD interventions due to strong external validity and possibility for long-term follow-up.[4,5] The analysis of cost-effectiveness was carried out from the health care payer's perspective and only studied direct health care costs such as primary care, hospital care and medications. Indirect costs such as productivity losses were not included. Timeframe for the base case analysis was one year, after which outcomes were calculated as cost per Quality Adjusted Life Years (QALY) gained and cost per hospital-treated exacerbation avoided. To account for individual variances, all parameters were set to be included within 95% confidence intervals.

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