COPD Management in Primary Care: An Observational, Community Pharmacy–Based Study

Els Mehuys, Koen Boussery, Els Adriaens, Luc Van Bortel, Leen De Bolle, Inge Van Tongelen, Jean-Paul Remon, and Guy Brusselle

BACKGROUND: Chronic obstructive pulmonary disease (COPD) is a prevalent disease that is frequently treated in primary care. However, data regarding the primary care management of COPD are scarce. Such observational data are necessary to detect problem areas and to develop targeted interventions for improvement of COPD management.

OBJECTIVE: To provide a detailed description of (1) drug therapy, (2) drug adherence, (3) inhalation technique, and (4) health status of patients with COPD recruited via community pharmacies.

METHODS: A cross-sectional, observational study was conducted in 93 pharmacies in Belgium. Participants (N = 555) completed a questionnaire collecting information on personal characteristics, smoking history, influenza vaccination, COPD medication, and adverse effects. Adherence to COPD maintenance medication was analyzed 1 year retrospectively through prescription refill rates. Inhalation technique was scored using a checklist. Health status was evaluated with the St. George's Respiratory Questionnaire, the Clinical COPD Questionnaire, and the Modified Medical Research Council dyspnea scale.

RESULTS: The mean age of the patients was 68.6 years; 73.7% were men and 37.2% were current smokers. The influenza vaccination status was significantly lower in patients aged less than 65 years (65.7%) than in patients aged 65 years or more (86.2%) ($p < 0.001$). Fixed combinations of inhaled corticosteroids and long-acting β_2-agonists were the most frequently used COPD medications (75.4%). About 48% of patients were underadherent (<80% adherence), 47% were adherent (80–120% adherence) and 5% were overadherent (>120% adherence). Predictors for underadherence were age and number of drugs. Twenty-one percent of patients made major inhalation technique errors with rescue medication; these were all errors in handling pressurized metered-dose inhalers (pMDIs).

CONCLUSIONS: This observational study on COPD management in primary care highlights 4 main aspects that could be improved: (1) drug adherence, (2) inhalation technique with pMDIs, (3) influenza vaccination in COPD patients younger than 65 years, and (4) smoking cessation.

KEY WORDS: COPD, disease management, pharmacotherapy, primary care.

Ann Pharmacother 2010;44:257-66.

Published Online, 26 Jan 2010, *theannals.com*, DOI 10.1345/aph.1M481

Chronic obstructive pulmonary disease (COPD) is a major health problem worldwide, as it is an important cause of morbidity, mortality, and health care costs. It is the fourth leading cause of death in the world, and further increases in prevalence and mortality can be expected.[1]

In spite of the development of a set of practice guidelines by the Global Initiative for Chronic Obstructive Lung Disease (GOLD), the management of COPD remains suboptimal.[1,2] Several reports have shown that implementation of these guidelines is still poor, which may have an adverse effect on patient outcomes and health care costs.[2-7] In an attempt to improve the quality of COPD management, the current GOLD guidelines urge for a better translation of guideline recommendations into practice, particularly in primary care.[1]

Multidisciplinary cooperation between health care workers involved in COPD management could be a strategy to accomplish better care for COPD patients. There is increasing evidence that multidisciplinary COPD programs, embedded in primary care, have a positive impact on health outcomes.[8-11] However, community pharmacist interventions to improve the pharmacotherapeutic management of

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COPD have not yet been explored. Indeed, pharmacotherapy is an important aspect of COPD management. Moreover, effective pharmacologic treatment not only involves prescription of recommended medicines by the physician, but also implies correct use of the prescribed medication by the patient (ie, good drug adherence and correct inhalation technique). Community pharmacists are well placed to improve the latter aspect, as they are highly accessible members of the primary health care team, see patients frequently (eg, on prescription refill), and have expertise on patient education. Recently, we have demonstrated that a pharmacist intervention focused on appropriate use of asthma medication by enhancing inhalation technique and medication adherence significantly improved asthma control in adults with asthma that was not well controlled.[12]

Before effective pharmacist-involved programs can be designed, thorough observational data on the current status of drug therapy are needed. To date, observational studies on treatment of COPD in primary care are scarce. A few reports assessed the knowledge and application of guidelines through questionnaires among physicians.[4-6] A Canadian research paper compared physicians' self-reported data on overall COPD management with the Canadian Thoracic Society recommendations.[3] Another study, conducted in Spain, investigated the use and interpretation of spirometry in general practice and identified the treatment schedules administered.[7]

The present study focused on the pharmacologic treatment of COPD patients in primary care. The objective was to provide a detailed description of (1) drug therapy, (2) drug adherence, (3) inhalation technique, and (4) health status of COPD patients recruited through community pharmacies. Such observational data would help us to detect problem areas and allow us to develop targeted pharmacist interventions for the improvement of COPD management in primary care.

Methods

STUDY DESIGN

This cross-sectional, observational study was performed in 93 randomly selected pharmacies, located in diverse areas of Flanders (the Dutch-speaking northern part of Belgium), between January and May 2008. The participating pharmacies were training sites for students of Ghent University. The study was approved by the Ethics Committee of the Ghent University Hospital, and all patients gave written informed consent. The general practitioner (GP) of each participant was informed about the study by letter.

PATIENTS

Patients with stable COPD (defined as "no prescription for systemic corticosteroids") who were able to come to the pharmacy themselves were recruited in the participating pharmacies. In similarity with previous studies on drug use in respiratory conditions, COPD patients were identified by means of their medication (R03, Anatomical Therapeutic Chemical classification).[12,13] In consecutive order, patients visiting the pharmacy were invited to participate in the study when fulfilling the following inclusion criteria: aged 50 years or older, a smoking history of at least 10 pack-years, daily use of COPD medication, a regular visitor to the pharmacy, and giving written informed consent. Patients with asthma, as well as analphabetic patients were excluded. Each pharmacy was allowed to include a maximum of 10 patients.

DATA COLLECTION

Assessment of Drug Therapy, Adherence, and Inhalation Technique

At inclusion, the study subjects completed a written questionnaire providing demographic information, age at diagnosis of COPD, smoking history, influenza vaccination status during the 2007–2008 season, type of COPD management supervision (GP only, pneumologist only, or both GP and pneumologist), type of COPD medication and prescribed dosing frequency, and occurrence of adverse events of the COPD medication.

Adherence to COPD controller medication during the 12 months before inclusion in the study was assessed using a validated measure (ie, prescription refill rates).[14] The number of units of controller medication dispensed to each patient during the past 12 months was available through computerized pharmacy records. The daily dose prescribed was asked of the patient (via a self-administered questionnaire, see above) and checked with the prescription record. From these data, adherence to COPD controller medication was calculated and expressed as adherence rate (%). For patients taking more than one COPD controller drug, mean adherence was calculated by summing percent adherence for all COPD controller drugs and dividing by the number of COPD controller drugs. In this study, we considered less than 80% adherence as underadherent, 80–120% adherence as adherent, and greater than 120% adherence as overadherent. These a priori selected cut-off values have also been used by other investigators.[15,16]

At inclusion, the inhalation technique of COPD controller medication and rescue medication was scored using a checklist (1 checklist per device type; see Appendix I). For each correct step, 1 point was assigned and the sum score of the inhalation technique was displayed as percentage correct steps. Patients committing major errors in inhalation technique (for pressurized metered-dose inhalers [pMDIs]: fail to remove cap and/or fail to shake pMDI; for breath-actuated MDIs: fail to remove cap and/or fail to push up lever; for dry powder inhalers [DPI]: fail to load device and/or fail to inhale forcefully and deeply through device) were assigned a sum score of zero.

Assessment of Health Status, Dyspnea and Comorbidities

The health status of the patients was assessed using the St. George's Respiratory Questionnaire (SGRQ)[17] and the Clinical COPD Questionnaire (CCQ).[18] The SGRQ is a validated questionnaire designed to measure health impairment in patients with asthma or COPD. The responses to its 50 items are weighted and summed into a total score and 3 subscores (symptoms, activities, and impacts), expressed as a percentage, with 0% being the best possible score and 100% the worst. The CCQ is a validated health status questionnaire for patients with COPD. The questionnaire consists of 10 items, divided into 3 domains: symptoms, functional state, and mental state. The total CCQ score and the score on each of the 3 domains, varies between 0 (very good health status) to 6 (extremely poor health status).

The level of dyspnea was determined using the Modified Medical Research Council (MMRC) dyspnea scale.[19] The MMRC is a short questionnaire that allows assigning a numeric value to a patient's exercise capacity. It comprises 5 statements that describe almost the entire range of respiratory disability from none (score 0) to almost complete incapacity (score 4). At inclusion, each study patient also performed 3 peak expiratory flow (PEF) measurements with a Mini-Wright Standard Peak Flow Meter (Clement Clarke, Harlow, UK). PEF data are presented as the best of these 3 measurements and are expressed as the percentage of maximum predicted value based on the patient's sex, age, and height.[20] Spirometry was not performed because the Ethics Committee objected to spirometric measurements in the community pharmacy setting.

COPD affects not only the lungs, but is also characterized by extrathoracic manifestations and systemic inflammation.[1] Therefore, self-reported comorbidities of COPD were assessed by asking for 12 medical conditions: "Are you currently taking medication for …..?" (3 answer possibilities: "yes," "no," "don't know"). The medical conditions were simplified to language that could be understood without any medical background. We compared the prevalence of 7 of the 12 investigated comorbidities (hypertension, diabetes, osteoporosis, depression, cataract, glaucoma, and stroke) with an age- and sex-matched general population (data from the Belgian Health Interview Survey 2004).[21] No such comparison could be made for the other 5 comorbidities, since they are not included in the Belgian Health Interview Survey.

STATISTICAL ANALYSIS

For univariate comparisons of defined subgroups of individuals, we used Pearson's χ^2 test for categoric variables and an independent *t*-test for continuous variables (significance level: $p < 0.05$). These univariate analyses were performed using SPSS software (version 16.0).

Backward logistic regression was performed to investigate the association of adherence with demographic, health-related, and medication-related variables. We started from a model with main effects only. From this model, nonsignificant factors ($p > 0.05$) were consecutively removed. Finally, relevant 2-way interactions of this reduced model were examined. The regression analysis was performed using R software (version 2.8.0).

ORGANIZATION OF THE BELGIAN HEALTH CARE SYSTEM

Belgium has a system of compulsory health insurance, covering the entire population and with a very broad benefits package. Health insurance is organized through private, nonprofit sickness funds. Membership in a sickness fund is mandatory; however, the choice of sickness fund is free. Payment is mainly fee-for-service and patients have a large degree of freedom in their choice of provider. In the case of ambulatory care, patients usually pay the complete fee to the providers and are reimbursed partially by their sickness fund on submission of the bill. In the case of hospital care and pharmaceuticals, financing is mainly through third-payer arrangements, whereby the sickness funds pay the providers and the patients are responsible only for the copayment.[22] Belgium has a very dense network of community pharmacies, which have a monopoly on dispensing medicines. Only physicians and (to the extent that their profession requires) dentists can prescribe drugs. There is a limitative list of medicines that are partly or fully reimbursable. The percentage of the cost that is reimbursable varies depending on the therapeutic importance of the medicine. For COPD medications, the copayment is 15–25% of the medicine cost. Regarding influenza vaccines for COPD patients, the copayment is 60% of the medicine cost.

Results

In the 93 participating community pharmacies, 1150 potentially eligible patients were screened for participation. Four-hundred two (35.1%) of them did not meet the inclusion criteria: 158 had a smoking history of less than 10 pack-years, 123 had asthma, 64 were younger than 50 years, 36 were not regular visitors of the pharmacy, 14 did not take daily COPD medication, and 7 were analphabetic. Of the 748 COPD patients meeting the inclusion criteria of the study, 193 (25.8%) refused to participate. Reasons for refusal were: no interest (93/193; 48.2%), no time (57/193; 29.5%), poor health status (19/193; 9.8%), and other reasons (24/193; 12.4%). The mean number of included patients per pharmacy was 6.

PATIENTS' CHARACTERISTICS

The main characteristics of the 555 participants are displayed in Table 1.[23] Patients were predominantly male, had a mean age of 68.6 years, and had a mean history of COPD of 11.2 years. The study population included 37.2% current smokers. The mean smoking history of the ex-smokers and current smokers was 46.4 and 35.3 pack-years, respectively.

Influenza vaccination status was significantly lower in patients aged less than 65 years (65.7%) than in patients aged 65 years or older (86.2%) ($p < 0.001$). COPD management was supervised by only the GP in 39.3% of the patients, by both GP and pneumologist in 53.9% of the patients, and by only the pneumologist in 6.8% of the patients. There were significantly fewer current smokers in the group in which a pneumologist was involved in COPD management (ie, the both GP and pneumologist group + the pneumologist-only group, further called the pneumologist-involved group) (29.3%), compared with the GP-only group (49.3%) ($p < 0.001$).

DRUG THERAPY, ADHERENCE, AND INHALATION TECHNIQUE

The median number of COPD medications per patient was 2 (range 1–6) (Table 2). The most frequently used COPD medications were fixed combinations of an inhaled corticosteroid and a long-acting β_2-agonist in a single inhaler (ICS-LABA combinations, ie, Symbicort or Seretide) (75.4%), long-acting anticholinergics (tiotropium) (58.5%), and short-acting anticholinergics with or without short-acting β_2-agonists (SAAC ± SABA) (41.0%). Patients of the pneumologist-involved group were dispensed significantly more ICS-LABA combinations, compared with the GP-only group (79.0% vs 69.9%) ($p = 0.015$). Similarly, the pneumologist-involved group also received more long-acting anticholinergics (tiotropium) (70.4% vs

Table 1. Patient Characteristics[a]

Parameter	N = 555
Male sex	409 (73.7)
Age, y	68.6 ± 9.6
50–60	117 (21.1)
61–70	189 (34.1)
71–80	185 (33.3)
≥80	64 (11.5)
BMI, kg/m^2	26.0 ± 4.8
<21[b]	77 (13.9)
≥21	478 (86.1)
Education	
no high school degree	361 (65.0)
high school degree	119 (21.4)
academic degree	75 (13.5)
Smoking status	
current smoker	207 (37.3)
ex-smoker	336 (60.5)
never smoked[c]	12 (2.2)
passive smoker	82 (14.8)[d]
Pack-years of current smokers	35.3 ± 20.7
Pack-years of ex-smokers	46.4 ± 30.6
COPD duration, y	11 ± 14.2
Influenza vaccination	436 (78.6)
COPD management supervised by	
GP only	218 (39.3)
pneumologist only	38 (6.8)
both GP and pneumologist	299 (53.9)

BMI = body mass index; COPD = chronic obstructive lung disease.
[a]Data are presented as mean ± SD or n (%).
[b]BMI values lower than 21 are associated with an increased risk of death.[23]
[c]The treating physician was contacted to confirm the diagnosis of COPD.
[d]Percentage calculated on the total study population (ie, 82/555).

Table 2. Drug Therapy[a]

COPD medication	
SABA	13.1
LABA	11.7
short-acting anticholinergics ± SABA	41.0
long-acting anticholinergics	58.9
ICS	14.5
ICS + LABA combination	75.4
theophylline	15.4
leukotriene modifiers	4.1
oral corticosteroids	6.1
Number of COPD medications, median (range)	2 (1–6)
≥1 adverse event of COPD medication	25.3
Inhalation technique controller medication	
% of correct steps, median	85.7
pts. scoring 100%	31.9
pts. scoring 0%	3.5
Inhalation technique rescue medication	
% of correct steps, median	85.7
pts. scoring 100%	27.3
pts. scoring 0%	21.0
Adherence to controller medication[b]	
adherence rate, median[c]	81.1
pts. with adherence rate <80%	48.2
pts. with adherence rate 80–120%	46.8
pts. with adherence rate >120%	4.9

COPD = chronic obstructive pulmonary disease; ICS = inhaled corticosteroids; LABA = long-acting β-agonists; SABA = short-acting β-agonists.
[a]Data are presented as %, unless otherwise stated.
[b]Calculated for 491 patients (64 patients had incomplete pharmacy records).
[c]Expressed as %, which is the ratio of dispensed medication to prescribed medication.

41.1%; $p < 0.001$) and more SAAC ± SABA combinations (47.6% vs 27.9%; $p < 0.001$).

About 25% of the study population reported at least 1 adverse event due to the COPD medication: most frequently reported were voice hoarseness (45.4%), irritated throat (41.8%), palpitations (23.4%), excitation (19.9%), and fatigue (15.6%).

Regarding inhalation technique, the median percentage of handling steps performed correctly was about 85% for both controller and rescue medication (Table 2). Of interest, 21% were assigned a sum score of zero (indicating major inhalation technique errors) for rescue medication, while this was only 3.5% for controller medication. Remarkably, all major errors with rescue medication were failures in shaking pMDI devices before use. The DPI was the most frequently used device for controller medication (90.0%), next to pMDI (14.4%), pMDI+spacer (3.0%), and breath-actuated MDI (Autohaler) (0.7%). (Total percentage exceeds 100% because some patients use more than 1 inhaler device type: 6.5% used both DPI and pMDI, 1.3% used both DPI and pMDI+spacer, and 0.3% used both DPI and Autohaler.) For rescue medication, patients mostly used a pMDI (77.6%), whereas DPI (17.1%) and pMDI+spacer (5.2%) were used less frequently. Only a minority of the pMDI users used a large volume spacer (controller medication: 17.2%; rescue medication: 6.3%).

Our study population had a median adherence rate to controller treatment of 81%, meaning that half of the population had an adherence rate of less than 81% and half of the population had an adherence rate of greater than 81% (Table 2). This corresponds with the categorized results of adherence: 48.2% of patients were underadherent (ie, <80% adherence), 46.8% of patients were adherent (ie, 80–120% adherence), and 4.9% were overadherent (ie, <120% adherence). Overadherence (n = 24; 4.9%) occurred with formoterol/budesonide combination therapy (n = 12), inhaled corticosteroids (n = 5), long-acting β-agonists (n = 4), and long-acting anticholinergics (n = 3). According to the regression model, adherence to maintenance treatment was significantly associated with age: the higher the age, the more likely to be adherent ($p < 0.001$). However, this positive association was observed only for patients with medium-to-high values of SGRQ; for lower SGRQ values (ie, <40), the association between age and adherence diminished. The model also revealed that patients taking a greater number of COPD medications were more likely to be adherent ($p < 0.001$). For example, the odds ratio for being adherent was 1.77 times higher (95% CI 1.02 to 3.12) in patients taking 2 COPD medicines than in patients taking only 1 COPD medicine, and it was 3.61 times higher (95% CI 1.97 to 6.76) in patients taking 3 COPD medications compared with those taking only 1 COPD medicine (Figure 1).

HEALTH STATUS, DYSPNEA, AND COMORBIDITIES

Mean total and domain scores of SGRQ and CCQ are presented in Table 3. Frequency histograms and quartiles of total SGRQ and CCQ scores are shown in Figure 2. Patients with a pneumologist involved in their COPD management had significantly higher SGRQ and CCQ total scores than patients treated in primary care only (SGRQ: 42.6 vs 35.2, $p < 0.001$; CCQ: 2.0 vs 1.6, $p < 0.001$).

According to the MMRC, most of the COPD patients in this study experienced no or limited respiratory disability (Table 3). Patients of the pneumologist-involved group were more likely to have higher MMRC scores (ie, more respiratory disability) than were patients of the GP-only group ($p = 0.001$).

Our study population had a mean PEF of 60% of the predicted value (Table 3).

Hypertension (45.6%) and gastroesophageal reflux disease (28.1%) were the most frequently reported comorbidities. Furthermore, a substantial portion of COPD patients (17%) reported taking medication for depression (Table 4). The COPD patients in this study had a significantly higher prevalence of hypertension (45.6% vs 29.0%), diabetes (12.3% vs 5.7%), osteoporosis (13.6% vs 6.7%), depression (17.3% vs 1.7%), cataract (16.5% vs 6.7%), and stroke (3.4% vs 0.0%), compared with an age- and sex-matched general population. No increased prevalence was observed for glaucoma (7.0% vs 6.8%) (Table 4).

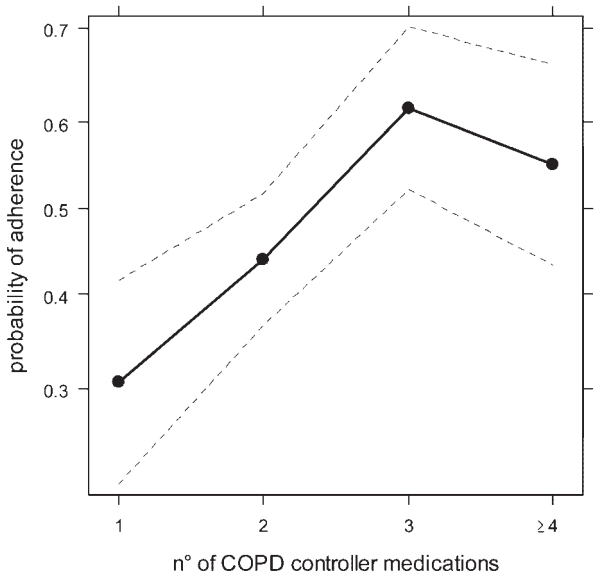

Figure 1. Probability of adherence in function of the number of chronic obstructive pulmonary disease (COPD) controller medications. Dotted lines indicate 95% confidence interval.

Discussion

This article reports on one of the few observational studies on treatment of COPD in primary care, and it is the first one conducted in the community pharmacy setting. The overall results of this study show that the primary care management of patients with COPD is not optimal. Several opportunities for improvement were revealed: (1) smoking cessation, (2) influenza vaccination in COPD patients aged less than 65 years, (3) inhalation technique with pMDIs, and (4) medication adherence.

First, almost 40% of the patients were current smokers. This high percentage is in agreement with other studies.[3,24] Nevertheless, smoking cessation is the only intervention that has been shown to reduce symptoms and to slow progression of COPD, and that can have a substantial impact on subsequent mortality.[25-27] It has been demonstrated that counseling delivered by physicians and/or other health care professionals increases quit rates over self-initiated strategies.[27] Even a short (3-min) period of counseling to encourage smokers to quit results in smoking cessation rates of 5–10%.[28] Remarkably, in this study, there were significantly fewer current smokers in the group of patients who had a pneumologist involved in their COPD management than in the group that was treated by a GP only (29% vs 49% current smokers). This lower number of current smokers in the pneumologist group might result from the poorer health status of this group of patients (ie, the worse scores for SGRQ, CCQ, and MMRC), making smoking cessation a greater necessity from the patient's view, as well as from the physician's view. Our data suggest that all health care workers should pay more attention to smoking cessation messages and interventions for patients with COPD, especially given its major effect on disease progression. Community pharmacists are well placed to play a more active role in this matter, since they are one of the most highly accessible members of the primary health care team, have regular contact with their (chronic) patients, and also often have a relationship of trust and confidence with them.

Table 3. Health Status[a]

St. George's Respiratory Questionnaire[b]	
symptoms	46.8 ± 21.8
activity	53.1 ± 23.4
impacts	29.9 ± 19.2
total score	39.7 ± 18.6
Clinical COPD Questionnaire[c]	
symptoms	2.3 ± 1.2
functional state	1.8 ± 1.3
mental state	0.9 ± 1.3
total score	1.8 ± 1.1
MMRC dyspnea scale, %[d]	
score 0	21.8
score 1	33.9
score 2	19.6
score 3	15.2
score 4	9.4
Peak expiratory flow, % of predicted	60.0 ± 22.2

COPD = chronic obstructive pulmonary disease; MMRC = modified Medical Research Council.
[a]Data are presented as mean ± SD or %.
[b]Scores on the St. George's Respiratory Questionnaire are based on a scale from 0 to 100, with lower scores indicating better health status.
[c]Scores on the Clinical COPD Questionnaire are based on a scale from 0 to 6, with lower scores indicating better functioning.
[d]Scores on the modified Medical Research Council dyspnea scale can range from 0 to 4, with a score of 4 indicating that the patient is too breathless to leave the house or becomes breathless when (un)dressing.

Second, the GOLD guidelines recommend annual influenza vaccination to reduce exacerbations and probable death in COPD patients.[1] The influenza vaccination level in our patients aged 65 years or older was high (86%), but it was significantly lower in the younger group (66%). Influenza vaccination campaigns specifically targeted at this patient group and conducted simultaneously in general practice and community pharmacy can be a strategy to improve influenza vaccination rates in COPD patients aged less than 65 years.

Third, regarding inhalation technique, most crucial errors (ie, errors probably leading to no drug deposition in the lungs) occurred with rescue medication. All of these errors were failures in shaking pMDI devices before use. Such mistakes are known to be common.[1] Community pharmacists can play an active role in this area by teaching the patients how to use their inhaler devices properly and by regularly checking the technique during the course of treatment and intervening when necessary (in close consultation with the treating physician). The importance of correct use of inhaler devices is often overlooked, though it is an obvious strategy to maximize therapeutic effects and to minimize adverse effects of inhaled medication. Recently, we demonstrated the efficacy of a simple and pragmatic pharmacist intervention, focused at improving inhalation technique (and adherence to controller treatment), in patients with asthma.[12]

Fourth, effective pharmacologic treatment also depends on the patient's adherence to the prescribed medication. Adherence by patients with COPD is generally poor, with reports citing underuse ("when feeling good") as well as overuse (during periods of respiratory distress).[29] In the present study, almost half of the patients were underadherent. Some simple strategies for improving adherence, which can be easily delivered in primary care, include: actively looking for markers of nonadherence (eg, missed refills, missed appointments), asking about barriers to adherence without being confrontational, emphasizing the value of the medication and the importance of adherence, and

eliciting the patient's feelings about his/her ability to follow the medication regimen.[14]

This study has some limitations. First, our patients may not be fully representative of the overall general population of COPD patients, since they participated voluntarily in the study. Moreover, only regular pharmacy customers were recruited in order to obtain 1 year of retrospective data of dispensed medication in the computerized pharmacy records. This selected patient sample may reflect: (1) a better health status, since participants were still able to come to the pharmacy by themselves (COPD patients whose medication was collected by a representative were not included in the study, for practical reasons), and (2) a higher medication adherence, since we only included regular customers of the pharmacy. These 2 factors possibly generated a positive selection bias, meaning that our data may reflect an underestimation of the problems in real-world COPD management. Second, when evaluating inhalation technique of DPIs, we did not formally measure the inspiratory force of the patient, but made a visual estimate ("patient makes deep and forcible inhalation?"). This may have caused an underestimation of inhalation technique errors

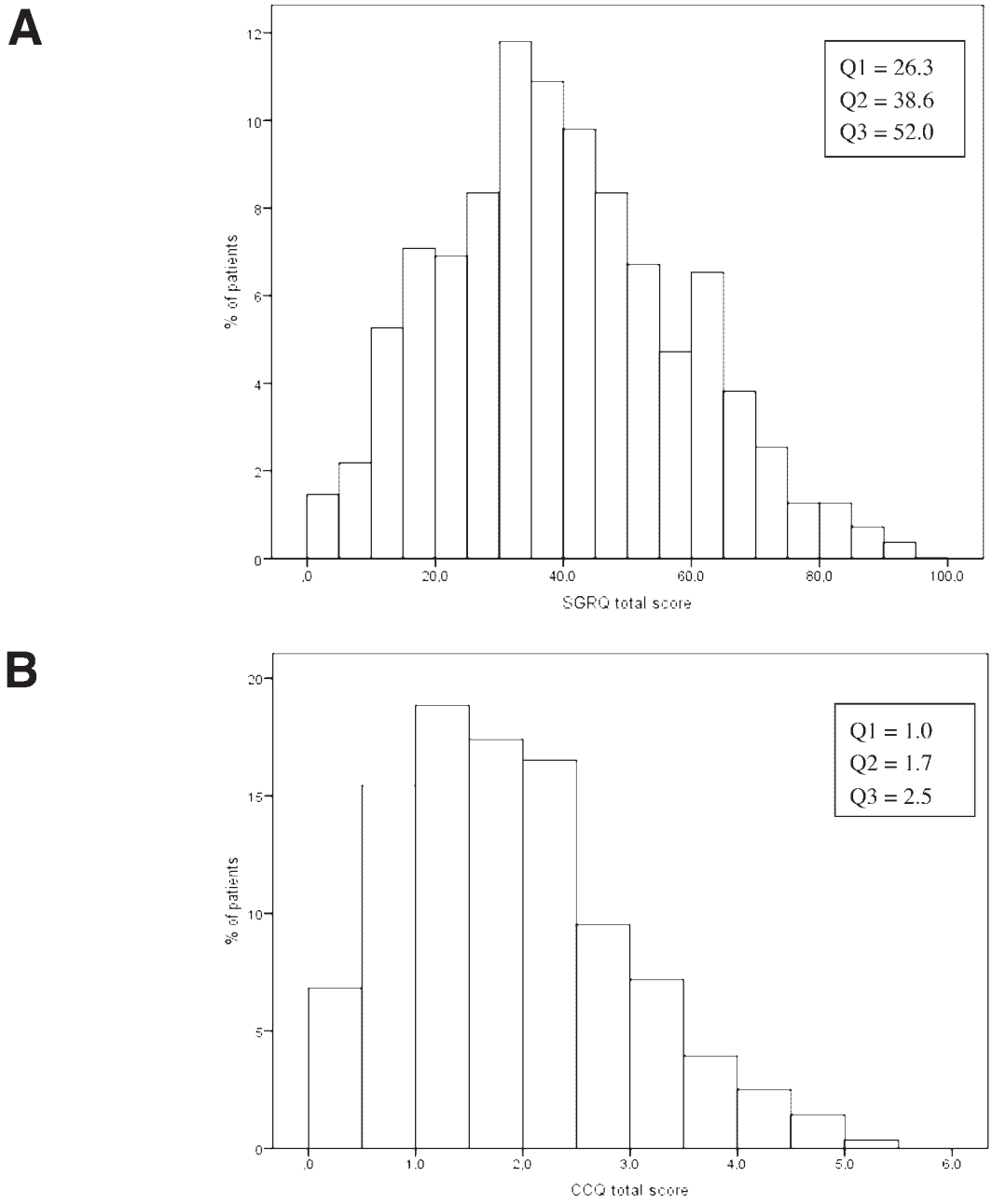

Figure 2. Frequency histogram of total SGRQ scores (A) and total CCQ scores (B).CCQ = Clinical COPD Questionnaire; SGRQ = St. George's Respiratory Questionnaire.

with DPI devices, especially in the elderly population with respiratory obstruction. Third, we used prescription refill rates as a measure for medication adherence. One should be aware that the purchase of medication in the pharmacy does not necessarily correlate with its actual use. However, pharmacy dispensing records already are a more accurate measure of adherence than are prescription data, since the patient already bought the medication (suggesting the intention of actual use).

In conclusion, this cross-sectional observational study on COPD management in a real-world setting highlighted several aspects that could be improved. Community pharmacist interventions are a possible strategy to ameliorate the pharmacologic aspects of COPD treatment. Currently, we are designing a randomized controlled trial to evaluate this hypothesis.

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Table 4. Comorbidity

Comorbidity, %	COPD Pts.	General Population[a]	p Value[b]
Hypertension	45.6	29.0	<0.001
Diabetes	12.3	5.7	<0.001
Osteoporosis	13.6	6.7	<0.001
Depression	17.3	1.7	<0.001
Glaucoma	7.0	6.8	0.8
Cataract	16.5	6.7	<0.001
Stroke	3.4	0.0	<0.001
Angina pectoris	10.1	–[c]	
Chronic heart failure	15.3	–[c]	
Myocardial infarction	5.7	–[c]	
Gastroesophagal reflux disease	28.1	–[c]	
Myopathy	8.4	–[c]	

COPD = chronic obstructive pulmonary disease.
[a]Matched for age and sex.
[b]Based on Pearson's χ^2 test.
[c]Disease not included in the Belgian Health Interview Survey.

Financial disclosure: This work was supported by Ghent University. Dr. Van Bortel has received financial support from or did speaking activities in symposia organized by Servier, Menarini, Merck, Daiichi-Sankyo, and Novartis. Dr. Brusselle has, within the last 5 years, received honoraria for lectures from AstraZeneca, Boehringer-Ingelheim, GlaxoSmithKline, MerckSharp&Dohme, Novartis, Pfizer, and UCB; he is a member of advisory boards for AstraZeneca, GlaxoSmithKline, Novartis, and UCB.

We thank the participating patients and pharmacists and AstraZeneca Belgium for donating the spirometers.

Appendix I. Inhalation Technique Checklists

For each correct step, 1 point was assigned and the sum score of the inhalation technique was displayed as percentage correct steps. Not performing an essential step (indicated with *) correctly was considered as a major inhalation technique error (ie, probably leading to no drug deposition in the lungs) and was assigned a sum score of zero.

A. Pressurized metered dose inhaler
1. Remove cap.*
2. Shake inhaler.*
3. Hold inhaler upright with mouthpiece down.
4. Breathe out.
5. Put mouthpiece between lips and seal lips tightly around it.
6. Take a slow deep breath at the same time as pressing the canister down.
7. Hold breath for 10 sec.
8. If corticosteroids: rinse mouth with water.

B. Pressurized metered dose inhaler + large-volume spacer
1. Remove cap.*
2. Shake inhaler.*
3. Hold inhaler upright with mouthpiece down and place mouthpiece into the spacer.
4. Breathe out.
5. Put spacer between lips and seal lips tightly around it.
6. Press the canister down.
7. Breathe in slowly within 5 sec after pressing down the canister.
8. Hold breath for 10 sec.
9. Breathe 5 times in and out in the spacer.
10. If corticosteroids: rinse mouth with water.

C. Dry powder inhaler
1. Load dry powder inhaler correctly (depending on the type).*
2. Breathe out.
3. Put mouthpiece between lips and seal lips tightly around it.
4. Inhale forcefully and deeply.*
5. Remove dry powder inhaler from the mouth.
6. Hold breath for 10 sec.
7. If corticosteroids: rinse mouth with water.

D. Breath-actuated metered dose inhaler (Autohaler)
1. Remove cap.*
2. Hold inhaler upright with mouthpiece down.
3. Push up top lever.*
4. Breathe out.
5. Put mouthpiece between lips and seal lips tightly around it.
6. Breathe in slowly and deeply, and continue breathing in after hearing a click.
7. Hold breath for 10 sec.
8. If corticosteroids: rinse mouth with water.

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Manejo de EPOC en el Cuidado Primario: Un Estudio de Observación con base en Farmacia de comunidad

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Ann Pharmacother 2010;44:257-66.

EXTRACTO

TRASFONDO: La enfermedad pulmonar obstructiva crónica (EPOC) es una enfermedad prevalente tratada frecuentemente a nivel de la atención médica primaria. Sin embargo, datos con relación al manejo de EPOC en el cuidado primario escasean. Tales datos de observación son necesarios para determinar áreas problemáticas y para desarrollar intervenciones dirigidas a mejorar el manejo de EPOC.

OBJETIVO: Este estudio observacional tuvo como objetivo el proveer una descripción detallada de (1) la farmacoterapia, (2) el cumplimiento del tratamiento con fármacos, (3) la técnica de inhalación y (4) el estado de salud de pacientes con EPOC reclutados a través de farmacias de comunidad.

MÉTODOS: Un estudio de observación, transversal, en 93 farmacias de Bélgica. Los participantes (n = 555) completaron un cuestionario recopilando características personales, historial de fumar, vacunación contra la influenza, medicamentos para EPOC y efectos secundarios. El cumplimiento del tratamiento con medicamentos de mantenimiento para EPOC fue analizado por un año retrospectivamente, a través de la frecuencia de las repeticiones de recetas. La técnica de inhalación fue calificada haciendo uso de una lista de control. El estado de salud fue evaluado usando el Cuestionario Respiratorio de San Jorge, el Cuestionario de EPOC Clínico y la Escala de disnea MRC.

RESULTADOS: La edad media de los pacientes de EPOC fue de 68.6 años, 73.7% eran hombres y 37.2% eran fumadores en la actualidad. El estado de vacunación contra la influenza fue significativamente inferior en pacientes menores de 65 años (65.7%) que en pacientes de 65 años de edad o mayores (86.2%) ($p < 0.001$). Los medicamentos para EPOC usados con más frecuencia (75.4%) fueron combinaciones fijas de corticosteroides y agonistas β_2 de acción prolongada. Alrededor de 48% de los pacientes siguió poco el tratamiento (<80% de adherencia), 47% siguió el tratamiento (80–120% de adherencia) y 5% siguió mucho el tratamiento (>120% de adherencia). Los factores de predicción para un bajo cumplimiento con el tratamiento fueron la edad y el número de fármacos. Veintiún por ciento de los pacientes cometieron errores mayores en la técnica de inhalación con medicamentos de rescate. Todos los errores fueron en el manejo de inhaladores presurizados de dosis medida (pMDI's).

CONCLUSIONES: Este estudio observacional sobre el manejo de EPOC en el cuidado primario pone al relieve cuatro aspectos principales que se pueden mejorar (1) el cumplimiento de la terapia con fármacos, (2) la técnica de inhalación con pMDI's, (3) la vacunación contra la influenza en pacientes con EPOC menores de 65 años y (4) el cese del hábito de fumar.

Traducido por Brenda R Morand

Le Traitement de la MPOC en Première Ligne: étude d'Observation en Pharmacie Communautaire

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Ann Pharmacother 2010;44:257-66.

RÉSUMÉ

MISE EN CONTEXTE: La MPOC (maladie pulmonaire obstructive chronique) est une maladie qui est fréquemment traitée en soins primaires. Cependant, les données portant sur le traitement de cette maladie sont rares. Des données d'observation sont requises afin de pouvoir détecter des sources de problèmes et développer des interventions visant à améliorer la gestion des MPOC.

OBJECTIFS: Cette étude visait à établir une description détaillée (1) thérapie médicamenteuse, (2) observance au traitement, (3) technique d'inhalation, (4) état de santé des patients recrutés dans les pharmacies communautaires.

MÉTHODES: Étude d'observation en plusieurs sections de 93 pharmacies en Belgique. Les participants (n = 555) ont complété un questionnaire démographique comportant des questions sur l'historique de tabac, la vaccination contre la grippe et les médicaments et leurs effets indésirables. L'observance au traitement a été mesurée de façon rétrospective sur une période d'un an à l'aide des renouvellements d'ordonnance. La technique d'inhalation a été évaluée à l'aide d'une liste de critères préétablis. L'état de santé a été évalué à l'aide du questionnaire respiratoire de St-Georges, un questionnaire MPOC clinique et l'échelle de dyspnée MRC.

RÉSULTATS: Les patients étaient âgés en moyenne de 68.6 ans, 73.7% étaient des hommes et 37.2% des fumeurs actifs. La proportion de patients vaccinés était moins élevée dans le groupe de moins de 65 ans (65.7%) que dans celui des 65 ans et plus (86.2%; $p < 0.001$). Les combinaisons fixes de corticostéroïdes et de β_2-agonistes étaient les médicaments les plus utilisés (75.4%). Environ 48% des patients étaient inobservants au traitement (<80%), alors que 47% l'étaient et 5% étaient sur-observants. Les facteurs prédictifs à l'inobservance étaient l'âge et le nombre de médicaments. 21% des patients ont fait des erreurs techniques majeures lors de l'inhalation de médicaments d'urgence administrés avec des inhalateurs pressurisés.

CONCLUSIONS: Cette étude mets en évidence quatre aspects qui pourraient être améliorés (1) observance au traitement, (2) technique d'inhalation, (3) vaccination contre la grippe chez les plus de 65 ans, (4) l'arrêt du tabac.

Traduit par Nicolas Paquette-Lamontagne