

COPD case-finding and management in community pharmacy: informing pharmacists to improve patient care

by

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ABSTRACT

Pharmacists could have an important role to play in reducing the increasing societal burden of Chronic Obstructive Pulmonary Disease through the professional services they provide. The overall objective of this thesis is to contribute to a multi-phased research aimed at developing an intervention to enhance the role of pharmacists in COPD diagnosis and management.

In the first study of this thesis, we conducted a scoping review that provided an overview of case-finding approaches by healthcare professionals, examined the yield of these approaches and identified characteristics of studies with the highest yields of new cases. We identified twenty approaches to COPD case-finding. The yield of these approaches range from 2.3% to 33.5%. In the approach that gave the highest yield, case-finding was done through spirometry with bronchodilation. We also identified characteristics of studies with the highest yields as the following: provider education/training, patient education, active screening of symptomatic/ at-risk patients, multi-step approaches to screening, provider engagement, diagnostic criteria by guidelines, and engagement of other healthcare practitioners. Based on this review, recommendations have also been made to inform case-finding strategies in pharmacy practice. The second study was a qualitative research aimed at understanding the experiences of patients with COPD of pharmacists' provided care. Patients with COPD find value in their pharmacists' accessibility, knowledge, effective communication, ability to support patients' disease management by addressing their unique needs. Factors that hinder the patient-pharmacist relationship include perception of pharmacists being too busy and having a poor awareness of the range of services their pharmacists could provide.

Our findings provide important knowledge to inform the development of a community pharmacist initiated case-finding intervention.

PREFACE

This thesis is an original work by Omowumi Ololade Idowu. The qualitative study, which is part of this thesis, received research ethics approval from the University of Alberta Research Ethics Board, with the project name “Experiences of COPD patients with pharmacists’ provided care”, No. Pro00090868, August 15th, 2019.

DEDICATION

To God, who has been there from the beginning.

To my awesome husband, *Olabode*, and my amazing sons, *Irebambo* and *Iteolu*. Thank you for your prayers, love and care. Thank you for all you do and all you are to me. I am blessed to have three of you in my life.

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CHAPTER 1

INTRODUCTION

1.1 Background

Chronic Obstructive Pulmonary Disease (COPD), a preventable and treatable disease continues to be a global leading cause of mortality and morbidity. COPD is caused by significant exposure to obnoxious gases/particles and is mainly characterized by incessant obstruction of airflow in the lungs, and respiratory symptoms (dyspnea, cough and/or sputum production). The risk factors for COPD include air pollution, occupational exposure, genetic abnormalities, accelerated ageing, abnormal lung development and tobacco smoking (which accounts for 85% of cases). Older terms like emphysema and chronic bronchitis are now included within COPD diagnosis.¹

COPD is currently the third leading cause of death globally, and there are projections of a rise in disease burden in the years ahead. In 2015, over three million of global deaths was attributed to COPD, an 11.6% increase compared with 1990.² Increased projections are closely linked to increased exposure to risk factors, in addition to an ageing population.³⁻⁵ With a global prevalence estimated to be at about 11.7%, COPD currently affects about 2.6 million (17%) Canadians aged 35 to 79 years.^{6,7} In Alberta, it is estimated that 3.04% of the population across all ages live with COPD.⁸ While younger people may be diagnosed with COPD, COPD is more prevalent in middle aged and older adults.

Though the prevalence is already high, COPD management is still plagued by underdiagnosis and late diagnosis leading to identification of patients late in the disease stage when patients have lost about 50% of their lung capacity.^{9,10} Late diagnosis may be due to but not limited to unawareness of symptoms (most common of which are dyspnea, cough and/or

sputum production), inactive lifestyles and failure to appreciate the extent of lung function decline by patients.¹¹ With the attendant complications associated with advanced disease stages (when the disease is usually diagnosed) and the presence of comorbidities such as cardiovascular diseases, anxiety, depression, and osteoporosis comes an increased economic and clinical burden.¹² This economic and clinical burden is evident in direct costs of healthcare expenses that include costs due to hospitalizations and emergency department (ED) visits, indirect costs of absenteeism or work loss, and the obvious impact on the quality of life of patients and their families. In Canada, where the highest hospital admissions rate is attributed to COPD among the other chronic diseases, the costs of COPD-related hospitalizations was cautiously estimated at about \$1.5 billion a year.¹³ In 2014, Alberta spent \$254 million on COPD care services with over half (59%) spent on hospital and ED visits.^{11,14}

According to the WHO, the goals of effective COPD management have six components. The components include the prevention of disease progression, relief of symptoms, improving exercise tolerance, health status improvement, prevention and treatment of complications, prevention and treatment of exacerbations and reduction of mortality.¹⁵ However, current gaps in care show a low level of COPD awareness, its symptoms and association with smoking by patients, late disease detection/diagnosis, limited contact time between healthcare providers and patients due to resource pressure, low guideline-concordant management of patients by healthcare providers, poor medication adherence and inhaler technique use.^{1,16-18} Globally, under diagnosis and late diagnosis are estimated to be about 45% to 85%.^{11,19} These two issues lead to COPD diagnosis at advanced disease stages where the rate of exacerbation, attendant complications and hospitalization is high.²⁰

Without proper diagnosis, patients cannot also be effectively managed. To address the gap in prompt diagnosis, case-finding services may be useful. This is supported by the Global Initiative for Chronic Lung Disease (GOLD) guidelines stating that the identification of patients at risk of COPD based on their symptoms improves the chances of early disease detection and treatment.^{1,21} Unlike screening which commonly applies to disease testing in general population, case-finding is targeted at identifying the condition of interest in individuals who are symptomatic and/or have risk factors after which further assessment is initiated to confirm the presence of the disease.²² In COPD, while there is a wide range of instruments that can be used for case-finding, spirometry is required to clinically confirm diagnosis.¹

To ensure the success of chronic disease management, it is essential that all stakeholders (patients and their families, healthcare providers, decision makers) do their part to achieve the desired outcome of *'improving patient quality of life measured in clinical outcomes, self-reported health status or functional status, etc., to delay and reduce comorbidity and (acute) complications.'*²³ Of the various healthcare providers involved in COPD case-finding and management, our research is targeted at pharmacists, especially those that practice in the community setting.

Community pharmacists are an essential part of primary health care. Over the years, their scope of practice has evolved from the traditional roles of dispensing to more patient-centered care. They are also most often the first point of contact in the healthcare system due to their accessibility. Based on their accessibility, educational experience, training and scope of practice, pharmacists are uniquely situated to close some of the identified gaps in COPD care. For patients presenting with respiratory symptoms or seeking treatment for those symptoms, pharmacists can intervene through screening of patients, carry out tests if adequately trained, advise patients on

lifestyle changes like smoking cessation, and refer patients to their physician for further assessment.

Pharmacists, either working alone or collaboratively, have been instrumental in identifying new patients with COPD. Trained pharmacists have been able to successfully identify previously undiagnosed patients, prompting referral to other healthcare providers for confirmatory diagnosis, initiation of treatment or preventive services like smoking cessation programs or pulmonary rehabilitation.²⁴⁻²⁷

COPD case-finding services, targeted at identifying patients at risk of COPD based on the presence of symptoms and/or risk factors, have recently been implemented in a wide range of healthcare settings and reported by various studies. In these studies, primary health care providers, such as nurses and pharmacists, were effective in identifying patients at risk, with the percentage of participants eventually diagnosed with COPD ranging from 10% to 20%.²⁴⁻²⁸ Approaches in identifying patients at risk varied from micro spirometry, to spirometry and questionnaires. Some of these studies also highlight the importance of collaboration among healthcare practitioners in the identification, diagnosis and management of this disease due to the different components of managing a chronic irreversible disease such as COPD.^{24,26} Pharmacist-led interventions have been shown to improve medication adherence, inhalation technique, health related quality of life, and reduce ED visits and hospital admissions of COPD patients.^{29,30} Against this background, our study aims to answer some critical questions to advance the case-finding and management of COPD by pharmacists, potentially reducing the attendant burden.

1.2 Objectives

The long-term goal of our research is to inform the development of an intervention aimed at informing COPD case-finding by community pharmacists. To achieve this goal, we conducted two projects: a scoping review identifying and mapping existing literature on COPD case-finding and a qualitative study exploring the perceptions and experiences of patients living with COPD of pharmacists' provided care in COPD diagnosis and management.

The first phase was a scoping review that examined the literature on case-finding approaches by healthcare professionals, the yield of these case-finding approaches and characteristics of studies with the highest yields. We also identified collaborative practices among healthcare providers (HCPs) in COPD case-finding and identified delivery methods of preventive services (e.g., smoking cessation, vaccination programmes) to patients at risk. A scoping review was done due to the heterogeneity of studies in our area of interest.³¹

In the second project, we explored the experiences of adults living with COPD of their pharmacists' provided care through semi-structured interviews. Through these projects, we identified some of the critical components of case-finding that can inform pharmacists in identifying patients at risk for COPD. The scoping review provides an overview of possible strategies through which pharmacists can detect more undiagnosed patients early enough in the disease spectrum, while the exploration of patients' experiences has helped us understand what is important and valuable for patients with COPD in pharmacy care.

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CHAPTER 2

CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) CASE-FINDING SERVICES BY HEALTHCARE PRACTITIONERS: A SCOPING REVIEW

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ABSTRACT

Purpose: Early detection is one of the strategies to address the increasing human and economic costs of Chronic Obstructive Pulmonary Disease (COPD). We aimed to inform pharmacists' case-finding strategies by providing an overview of case-finding approaches by healthcare professionals, examine the yield of these case-finding approaches, and identify characteristics of studies with the highest yields.

Methods: We undertook a scoping review based on the Joanna Briggs Institute and the PRISMA Extension for Scoping Reviews (PRISMA ScR) guidelines. A systematic literature search was completed in consultation with a librarian using the databases Embase, Medline, Cumulative Index to Nursing and Allied Health Literature (CINAHL) and Web of Science from database inception to January 2019. Two reviewers independently conducted screening of titles and abstracts and a full text review of potential studies. Reviewed articles were organized under the following themes: population characteristics, inclusion and exclusion criteria, setting, case-finding strategies and yield, healthcare practitioners involved, study recruitment strategies used, interprofessional collaboration, and the provision of preventive services.

Results: After the screening process, 132 studies were eligible to be included in the study. We identified 20 case-finding approaches with average yields of new COPD cases ranging from 2.3% to 33.5%. The approach with the highest yield (33.5%) involved the use of bronchodilator spirometry. In 14 of these approaches, the process was initiated with the use of questionnaires. In the majority of the studies, case-finding was targeted at high risk and/or symptomatic patients. Some of the characteristics of the 33 studies with the highest case-finding yields include the following: provider education/training, patient education, active screening, multi-step approaches

to case-finding, provider engagement, diagnostic criteria by guidelines and lastly, engagement of other healthcare practitioners.

Conclusion: We identified twenty approaches to COPD case-finding. In the approach with the highest yield, case-finding was done through spirometry with bronchodilation. Based on this review, we have also highlighted considerations which may inform COPD case-finding in pharmacy practice.

Keywords: COPD; case-finding; scoping review

2.1 Background

With a global prevalence estimated at 11.7% in 2015, Chronic Obstructive Pulmonary Disease (COPD) is a leading cause of morbidity and mortality in adults.¹ It is currently the fourth leading cause of death, with projections to be the third by the year 2030 due to risk factors such as gender, socio-economic and related factors, an ageing population, and an increasing exposure to infections, outdoor/indoor air pollutants, and tobacco smoke.²⁻⁵ The burden on the system is further compounded by underdiagnosis and late diagnosis of new patients.⁶ Global underdiagnosis of COPD, estimated to be at about 45% to 85%, leads to disease detection at advanced stages when the rates of exacerbation, attendant complications, and hospitalization rates are high.^{7,8} Late disease detection, which can be addressed by earlier diagnosis, poses an enormous burden on the health system, the patients and their caregivers.. Evidence-based case-finding strategies are a promising way to address this need as the identification of patients at risk improves the chances of early disease detection and treatment.^{9,10} Unlike screening which commonly applies to disease testing in general population, case-finding is targeted at identifying cases among individuals who are symptomatic and/or have risk factors for the disease after which further assessment is initiated to confirm the presence of the disease.¹¹

In line with the need for more timely diagnosis and efficient care, COPD case-finding services have been implemented in a wide range of healthcare settings. Healthcare professionals (HCPs), such as nurses and pharmacists, have successfully identified patients at risk using case-finding approaches.¹²⁻¹⁵ In these studies, the number of new COPD cases ranged from 10% to 20% of the study population, which was either general practice outpatients or community pharmacy patients. Various approaches used in identifying potential COPD patients include

questionnaires, microspirometry and spirometry, separately or in combination. Questionnaires are instruments used to measure disease impact and enable HCPs effectively evaluate patients' health status, thus informing disease management.¹⁶ Microspirometry, which is done with portable and inexpensive devices, measures an individual's forced expiratory volume in 1 and 6 seconds, FEV1/FEV6 whereas spirometry measures the forced expiratory volume in 1 second and the forced vital capacity, FEV1/FVC. Spirometry procedures require more skill, time and are more expensive. They are however required to confirm diagnosis, with the post-bronchodilation FEV1/FVC < 70% indicative of irreversible airflow limitation.⁸ Many studies highlighted the importance of collaboration among HCPs in the identification and diagnosis of COPD.^{15,17}

A 2015 systematic review aimed at identifying and comparing the effectiveness of COPD case-finding approaches suggested that there were no clear optimal approaches for COPD case-finding, based on available evidence.¹⁷ In this study, the literature search was done in the year 2013. Furthermore, there was a restriction to the primary care setting and to pre-specified case-finding approaches such as questionnaires, clinical examination, handheld flow meters, peak flow meters, decision aids/risk prediction models and chest radiography, either alone or in combination. This may have led to the exclusion of articles with other approaches. In our study, there are no pre-set approaches of interest as we aim to identify all that have been published in literature. Additional research completed since 2013 necessitates an updated evidence synthesis on optimal COPD case-finding strategies.

Pharmacists are uniquely placed to implement COPD case-finding services due to their accessibility to the general public, educational background and skills, and the evolution of their roles in direct patient care. This scoping review examines the literature on COPD case-finding approaches used across diverse settings and their yield of new cases. We will also detail a

summary of interprofessional collaborative practices that support case-finding services, as well as delivery of preventive services (e.g., smoking cessation, vaccination programmes). Smoking cessation is the most effective treatment in altering the progression of COPD and vaccination reduces the susceptibility of COPD patients to recurrent respiratory infections.^{18,19} Due to the paucity of literature that specifically present pharmacists provided case-finding services, we broadened the criteria to target best practices among HCPs overall.

2.1.1 Objectives

The aim of the study was to describe case-finding approaches and identify key takeaway messages to inform development of evidence-based case-finding methods for community pharmacists. For this aim, the primary objectives of this review were to: 1) provide an overview of case-finding approaches by healthcare professionals; 2) examine the yield of these case-finding approaches; and 3) identify characteristics of studies with the highest yields. The secondary objectives were to: 1) identify collaborative practices among HCPs in COPD case-finding and 2) identify delivery methods of preventive services to patients at risk.

2.2 Methods

A scoping review was conducted based on guidelines from the Joanna Briggs Institute and the PRISMA Extension for Scoping Reviews (PRISMA ScR).^{20,21} The study protocol was registered with the Open Science Framework (OSF) on 30th January, 2019. The yield of new COPD cases were obtained directly from the studies. Due to the variations in the case-finding approaches/process and the criteria for new cases by the studies, our scoping review adopted each study's definition of new cases. For reporting purpose, whether or not the case-finding process involved confirmatory diagnosis, the new cases reported by the studies was captured as

‘yield’. To identify studies with the highest yields, studies were grouped into quartiles. To do this, the study yields were sorted from the smallest to the largest value and the quartiles were calculated using Microsoft Excel™. Quartile 1 (Q1) ranged from 0 to 6.9; Q2, 7 to 13.6; Q3, 13.7 to 21; and Q4, 21.7 to 52.1. Thus, 75% of the studies had yields below 21%, and the other 25% between 21.7% and 52.1% which was the highest yield. Furthermore, the case-finding approaches were classified based on the different steps involved in the process, with most of the variations dependent on if testing was done with a bronchodilator or not, or if individuals that initially underwent testing without bronchodilation had to meet pre-set criteria before undergoing testing with bronchodilation or otherwise. Finally, the yield of each approach was calculated as a percentage of the total number of the new cases in the total number of patients tested using an approach (weighted average). Weighted average was used to avoid an overestimation of yields with using the normal average.

2.2.1 Search strategy

A search strategy was developed with the assistance of an information specialist (JK) and peer reviewed by a second librarian. The following electronic databases were searched on January 8, 2019: Embase via Ovid (1974 to 2019), Medline via Ovid (1946 to 2019), Cumulative Index to Nursing and Allied Health Literature (CINAHL) via Ebscohost (1937 to 2019) and Web of Science via all databases (1864 to 2019). The search strategy which was developed from the primary objectives, is attached as Appendix 2.1. Publications had to be in English language, with no limit on the publishing date. Results were exported into Microsoft Excel for screening. In addition to searching subscription-based databases, the research team

expanded the search to grey literature and reviewed conference abstracts and relevant association websites. Hand searching of bibliographies from included studies was also done.

2.2.2 Selection criteria

All study designs were included with the exception of review articles, letters, editorials and commentaries. To be included, studies had to address COPD case-finding strategies for previously undiagnosed patients. We excluded studies addressing screening of diseases other than COPD, co-morbidity studies that did not report COPD results separately, studies aimed at validating screening tools/methods without reporting newly identified cases of COPD, studies screening for lung cancer with Computed Tomography scanning, studies aimed at reviewing equipment or describing screening approaches without measuring results, studies aimed at screening for alpha-1-antitrypsin deficiency and studies that included diagnosed and undiagnosed patients with no sub-group analysis available for new cases. Conference abstracts and articles with no evidence of case-finding strategies were excluded. Studies that were not available in full text were also excluded.

2.2.3 Study selection

Two team members (OI and SG) independently reviewed the studies identified in the search against the inclusion criteria. First, title and abstract, and secondly, full text, if the articles passed the first screening stage were reviewed. After a reconciliation of the decisions, differences were discussed or escalated to a third reviewer, TM as needed. The process of study selection is reported using a PRISMA diagram in Figure 1.

2.2.4 Data extraction

Data charting was an iterative process, undertaken by OI in Microsoft Excel (2013 version) with ongoing input from team members. One team member (MS) provided feedback on appropriate data domains necessary to meet our study objectives while another team member (TM) reviewed a selection of the extracted data for accuracy. Differences were discussed and resolved. Data extracted included population characteristics, inclusion and exclusion criteria, study characteristics, case-finding strategies, reported yield of new cases, healthcare practitioners involved, provision of preventive services, collaborative practices among the HCPs, feedback from study participants and study recruitment strategies used.

2.2.5 Data analysis

Case-finding approaches were identified based on findings from the reviewed studies with categorizations based on the steps involved in the case-finding services. The charted data were analysed using descriptive statistics. In calculating the yield of each approach, we used the weighted means to avoid an overestimation of yield using the normal average. Thus, the weighted average captured the percentage of the total new cases in the total number of participants in each approach. Quartiles were not predetermined. They were obtained from the collation of yields of all the reviewed studies, to give a better representation of the yields. The first quartile, Q1 representing the lowest yield, capturing yields ranging from 0% to 6.9% while quartile 4 (Q4) captures the highest yields ranging from 21.7% to 52.1%.

2.3 Results

2.3.1 Literature search

The search identified 6032 potentially suitable articles after the exclusion of duplicates. After screening of titles and abstracts, 431 full text articles were reviewed from which 199 were further excluded. Post screening, 132 articles were included in the scoping review (Figure 2.1).

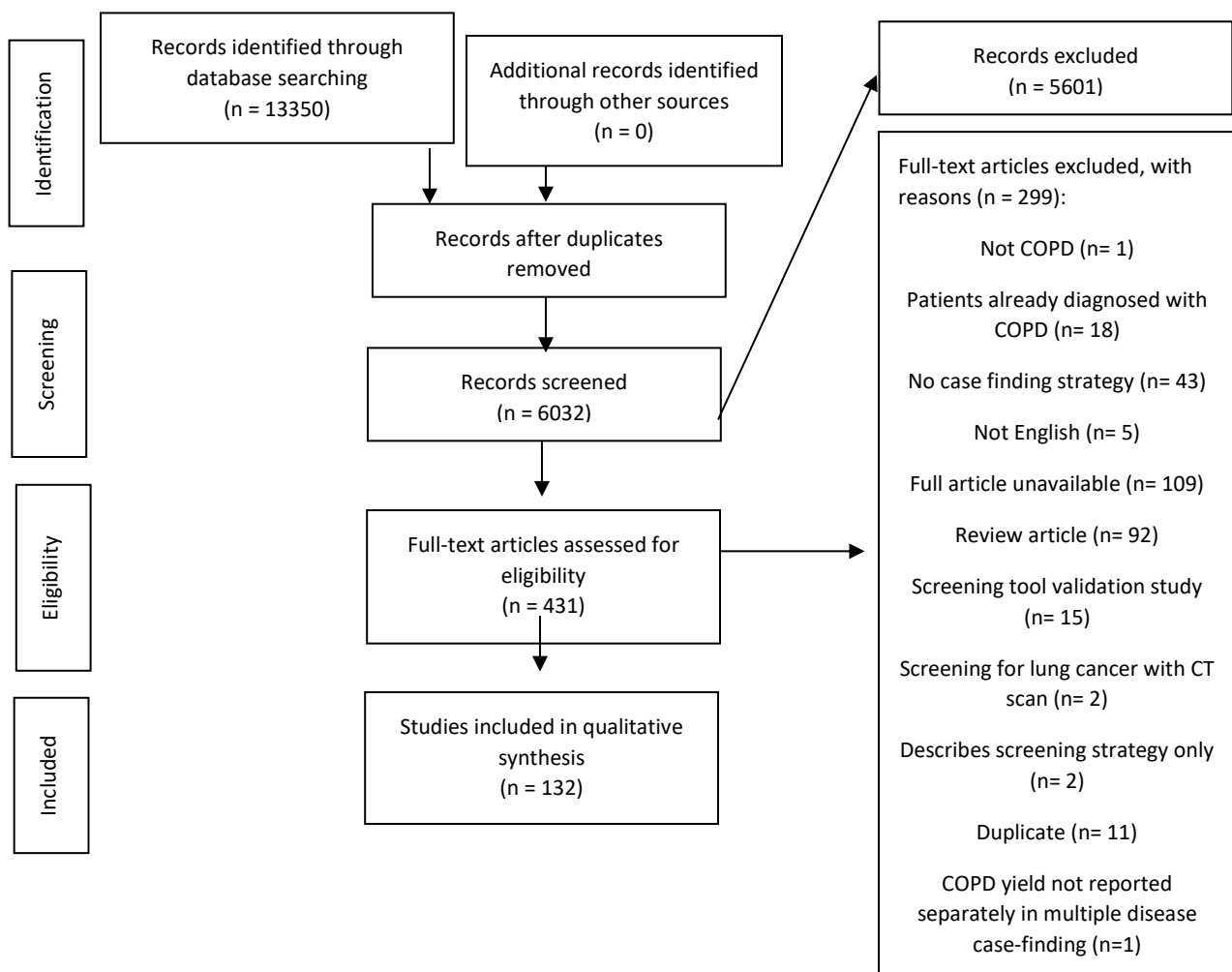


Figure 2.1. Adapted PRISMA Flow Diagram for the scoping review describing the study selection process

2.3.2 Study characteristics

Table 2.1 summarizes the characteristics of the included studies. About 77% (n=102) of the studies were published between 2010 and 2018 which reflects growing research into COPD case-finding services. The majority of the studies (80%, n=105) used a cross-sectional design with general practice/primary care clinic (51%, n= 67) being the more common research setting.

Table 2.1. Characteristics of studies included for review (n=132)

Characteristic	Description	Number of studies, (%)
Year of publication	2010-2018	102 (77%)
	Before 2010	30 (23%)
Study design	Cross-sectional	105 (80%)
	Longitudinal	19 (14%)
	Randomised Controlled Trial	7 (5%)
	Case control	1 (1%)
Geographical region	Europe	70(53%)
	Asia	30(22%)
	North America	18(13%)
	Oceania	6(5%)
	South America	4(3%)
	Multi-region	2(2%)
	Africa	1(1%)
	Not Reported	1(1%)
Setting	General Practice/Primary care clinic	67 (51%)
	Outpatient clinic (Hospital setting)	23(17%)
	Community Pharmacy	5 (4%)
	Inpatient section (Hospital setting)	3(2%)
	Smoking cessation centre	2 (2%)
	Pulmonary outpatient clinic	1(1%)
	Multi settings (Pharmacy + Emergency services+ primary care)	1(1%)
	Others (Farm, Port, Community centre, Outdoors, Field, Military training institution, Home)	15 (11%)
	Not reported	15 (11%)
Health care professionals initiating case-finding	Physician	37 (28%)
	Nurse	17 (13%)
	Combination of two providers (Nurse, Pharmacist, Physician)	5 (4%)
	Pharmacist	5(4%)
	Respiratory therapist	1(1%)
	Physiologist	1(1%)

	Not reported	66 (50%)
Number of centres	Multi-centre	57 (43%)
	Single centre	37 (28%)
	Not reported	38 (29%)
Questionnaires used for case-finding	Standardized Questionnaire	64 (48%)
	Unspecified Questionnaire	44 (33%)
	Not reported	24 (18%)
Guideline for Spirometry procedure	American Thoracic Society/European Respiratory Society	32 (24%)
	American Thoracic Society	28 (21%)
	European Respiratory Society	10 (8%)
	Danish Respiratory Society	3 (2%)
	Dutch College of General Practitioners	2(2%)
	Japanese Respiratory Society Guidelines	2(2%)
	British Thoracic Society	1(1%)
	Brazilian Thoracic Association	1 (1%)
	Gold Guidelines	1(1%)
	Spanish Guideline for COPD (GesEPOC)	1(1%)
	Spanish Society of Pulmonology and Thoracic Surgery (SEPAR).	1 (1%)
	Not reported	50(37%)
	Inclusion criteria for case-finding	Age ≥ 35 years
Smoking history		78 (59%)
Presence of respiratory symptoms		27 (20%)
Presence of comorbidities (e.g HIV, cardiovascular diseases)		11(8%)
Occupational exposure		10 (7%)
Regular purchase of cough medicines/smoking cessation products		2(2%)
History of antibiotic use for respiratory infection at least twice in the preceding 12 months.		1(1%)
Poorly controlled asthma		1(1%)

2.3.3 Target groups for case-finding

Majority of the reviewed studies targeted individuals at high risk of having COPD. As seen in Table 2.1, in 77% (n=101) of the studies, the age criteria for study inclusion was ≥ 35 years. In 59% (n=78) of the studies, a history of smoking was a criterion for participants' inclusion. Other criteria were the presence of respiratory symptoms (coughing, dyspnea, and sputum production) in 20% (n=27) of the studies, presence of co-morbidities by 8% (n=11) studies, occupational exposure as a risk factor by 7% (n=10) studies, and the presence of other

comorbidities like cardiovascular diseases or HIV infection. For pharmacist specific studies, other inclusion criteria were: poorly controlled asthma, regular purchase of cough medicines/smoking cessation products and a history of antibiotic use for respiratory infection at least twice in the preceding 12 months.^{13,22} It is worthy to note that these criteria were not mutually exclusive, thus in majority of the studies, more than one criterion for inclusion was used.

Table 2.2 Overview of case-finding approaches and their distribution by yield of new cases (n=132)

		Step 1	Step 2	Step 3	Step 4	No of studies, (%)	Q1 (0-6.9)	Q2 (7-13.6)	Q3 (13.7-21)	Q4 (21.7-52.1)	Weighted Average yield (%)**
Approach *	Reference (n)										
1	Seamark, et al ²³ (1)	Questionnaire				1 (1%)	0	1	0	0	8.7
2	Fathima, et al ¹⁴ , Halpin, et al ²⁴ , Ming, et al ²⁵ , Richard, et al ²⁶ , Wright, et al ¹³ , Yawn, et al ²⁷ (6)	Questionnaire	Microspirometry without bronchodilation			6 (4.5%)	1	2	1	2	6.3
3	Estes, et al ²⁸ (1)	Questionnaire	Pre-post microspirometry			1 (1%)	0	1	0	0	10
4	Allan, et al ²² , Crooks, et al ²⁹ , Chean, et al ³⁰ , Wada, et al ³¹ , Nelson, et al ³¹ (5)	Questionnaire	Microspirometry without bronchodilation	Spirometry without bronchodilation		5 (4%)	1	3	1	0	17.4
5	Ching, et al ³² , Kobayashi, et al ³³ (2)	Questionnaire	Microspirometry without bronchodilation	Spirometry with bronchodilation		2 (1.5%)	2	0	0	0	4.7
6	Campo, et al ³⁴ (1)	Questionnaire	Peak flow meter	Pre-post spirometry		1 (1%)	0	0	0	1	29
7	Jouneau, et al ³⁶ (1)	Questionnaire	Microspirometry without bronchodilation	Spirometry without bronchodilation	Spirometry with bronchodilation	1 (1%)	1	0	0	0	6.8
8	Kaufmann, et al ³⁶ , Kim, et al ³⁷ , Liang, et al ³⁸ , Thorn, J. et al ³⁹ (4)	Questionnaire	Microspirometry without bronchodilation	Pre-post spirometry		4 (3%)	1	0	1	2	15.6
9	Baker, et al ⁴⁰ , Buffels, et al ⁴¹ , Castillo, et al ¹⁵ , DeJong and Veltman, ⁴² , Dirven, et al ⁴³ , Fuller, et al ⁴⁴ ,	Questionnaire	Spirometry without bronchodilation			29 (21%)	9	4	7	9	13.4

	Gorecka, et al ⁴⁵ , Haroon, et al ¹² Hemmingsen, et al ⁴⁶ , Hepper, et al ⁴⁷ , Jordan, et al ⁶ , Korczynski, et al ⁴⁸ , Lambert, et al ⁴⁹ , Lyngsø, et al ⁵⁰ , Maio, S. et al ⁵¹ , Manzar, et al ⁵² , Oike, et al ⁵³ , Qazi, et al ⁵⁴ , Poulsen, et al ⁵⁵ , Robitaille, et al ⁵⁶ , Sekine, et al ⁵⁷ , Sekine, et al ⁵⁸ , Tabori, et al ⁵⁹ , Ulrik, et al ⁶⁰ , Vandevoorde, et al ⁶¹ , Van Schayck, et al ⁶² , Wang, et al ⁶³ Wisnivesky, et al ⁶⁴ , Zielinski and Bednarek ⁶⁵ (29)										
10	Shirley, et al ⁶⁶ , Soriano, et al ⁶⁷ (2)	Questionnaire	Peak flow meter	Spirometry without bronchodilati on	Spirometry with bronchodila tion	2 (1.5%)	2	0	0	0	2.3
11	Mahboub, et al ⁶⁸ (1)	Questionnaire	Peak flow meter	Spirometry without bronchodilati on		1 (1%)	0	1	0	0	12.9
12	Al Ghobain, et al ⁶⁹ , Andreeva, et al ⁷⁰ , Bahtouee, et al ⁷¹ , Bertens, et al ⁷² , Bui, et al ⁷³ , Bunker, et al ¹⁰ Dirven, et al ⁷⁴ , Grzetic-Romcevic and Devcic, et al ⁷⁵ , Hvidsten, et al ⁷⁶ , Jithoo, et al ⁷⁷ , Johnson, et al ⁷⁸ , Jordan, et al ⁷⁹ , KalagoudaMahishale, et al ⁸⁰ , Kart, et al ⁸¹ ,	Questionnaire	Pre-post spirometry			29 (21%)	6	7	11	5	6.6

	Ulrik, et al ⁸² , Kogler, et al ⁸³ , Laniado-Laborin, et al ⁸⁴ , Lewis-Burke, et al ⁸⁶ , Lopez, et al ⁸⁶ , Mahishale, et al ⁸⁷ , Nascimento, et al ⁸⁸ , Sansores, et al ⁸⁹ , Schirmhofer, et al ⁹⁰ , Sinha, et al ⁹¹ , Skucha, et al ⁹² , Stav and Raz ⁹³ , van Mourik, et al ⁹⁴ , Zachariades, et al ⁹⁵ , Zubair, et al ⁹⁶ (29)										
13	Alam, et al ⁹⁷ , Bednarek, et al ⁵ , Burhan, et al ⁹⁸ , Demirci, et al ⁹⁹ , Dickinson, et al ¹⁰⁰ , Geijer, et al ¹⁰¹ , Hagstad, et al ¹⁰² , Hill, et al ¹⁰³ , Khassawneh, et al ¹⁰⁴ , Konstantikaki, et al ¹⁰⁵ , Kotaki, et al ¹⁰⁶ , Laraqui, et al ¹⁰⁷ , Llordes, et al ¹⁰⁸ , Løkke, et al ¹⁰⁹ , Lu, et al ¹¹⁰ , Quiros-Roldan, et al ¹¹¹ , Spyrtos, et al ¹¹² , Stafyla, et al ¹¹³ , Stanley, et al ¹¹⁴ , Stratelis, G. et al ¹¹⁵ (20)	Questionnaire	Spirometry without bronchodilation	Spirometry with bronchodilation		20 (15%)	5	6	5	4	11.3
14	Dirven, et al ¹¹⁶ , Lee, et al ¹¹⁷ , Tsukuya, et al ¹¹⁸ , Capozzolo, et al ¹¹⁹ , Toljamo, et al ¹²⁰ (5)	Questionnaire	Spirometry with bronchodilation			5 (4%)	3	2	0	0	7.9
15	Represas-Represas, et al ¹²¹ (1)	No bronchodilation	Spirometry without bronchodilation	Spirometry with bronchodilation		1 (1%)	0	0	0	1	31.5

		microspirometry									
16	Labor, et al ¹²² (1)	Microspirometry without bronchodilation	Spirometry with bronchodilation			1 (1%)	0	0	1	0	18.9
17	Alchakaki, et al ¹²³ , Catlett and Kidera ¹²⁴ , Cristescu, et al ¹²⁵ , Fidalgo-Garrido, et al ¹²⁶ , Jose, et al ¹²⁷ , Markun, et al ¹²⁸ , Mets, et al ¹²⁹ , Takahashi, et al ¹³⁰ (8)	Spirometry without bronchodilation				8 (6%)	2	0	1	5	26.9
18	Brenner, et al ¹³¹ , Boschetto, et al ¹³² , Hamers, R. et al ¹³³ , Mosharraf-Hossain, et al ¹³⁴ , Queiroz, et al ¹³⁵ , Steinacher, et al ¹³⁶ (6)	Pre-post spirometry				6 (4.5%)	0	3	2	1	13.5
19	Freeman, et al ¹³⁷ , Moore, et al ¹³⁸ , Nathell, et al ¹³⁹ , °Ronaldson, et al ¹⁴⁰ , Sandelowsky, et al ¹⁴¹ , Vrijhoef, et al ¹⁴² (6)	Spirometry without bronchodilation	Spirometry with bronchodilation			6 (4.5%)	0	2	2	2	20.2
20	Singh, et al ¹⁴³ , Marcos, et al ¹⁴⁴ , Tinkelman, et al ¹⁴⁵ (3)	Spirometry with bronchodilation				3 (2%)	0	1	1	1	33.5

*Highlighted are approaches with Q4 yield

**Weighted average yield calculated as a % of the (division of the total number of the new cases in each approach / total number of patients screened using the same approach).

°Involved 18 different case-finding scenarios. However, approach 19 was common to all

2.3.4 Participant recruitment method

In over half of the reviewed studies, participants were recruited during routine care visits to their health providers. Other strategies through which participants were recruited include random sampling of the target population, large public events, conferences and congresses, patients on hospital admission, and lastly, identification of patients through clinical/health databases or computerised medical records by using pre-specified criteria. To raise the awareness on some of these case-finding services, advertisements were done through social media, mass media, billboards and recruitment posters.

2.3.5 Healthcare providers and setting

The HCPs initiating the case-finding services were most commonly physicians (general or specialists (28%, n=37 studies)^{25,33,34,36-38,40,41,43,45,50,58,60-62,65,69,72,79,82,83,84,94,96,103,105,109,112,113,117,119,122,127,128,133,136,137}, followed by nurses (12.9%, n=17 studies)^{5,10,11,21,32,39,42,74,99,116,100-102,114,115,140,142}, pharmacists (4%, n=5 studies)^{13,14,22,15,45} respiratory therapist (1%, n=1 study)³¹, and lastly, physiologist (1%, n=1 study)⁹⁸. Five studies (4%) used a multidisciplinary team with any nurse, pharmacist or physician initiating the process.^{24,51,92,121,144} In 50%, n=66 studies, the health care professional initiating the case-finding process was either not reported or was unclear. With respect to study setting, the most common was the general practice/primary care clinic (51%, n=67),^{5,10,11,21-23,25,26,29,32,33,36-39,41-43,46,49,50,55,60-62,66-70,72,74,79,82-84,86,94,98-100,101,103,105,106,108,109,112-117,122,124,126,128,130,133,135,137,140-142,144,145,147} followed by hospital (20%, n=26),^{30,34,40,45,52-54,56,58,75,80,81,87,92,96,104,111,118,123,129,131,132,134,136,138,139} others (farm, port, outdoors, military training institution, home) (11%, n=15),^{6,28,35,47,48,51,57,77,88,91,95,97,107,119,143} community pharmacies (4%, n=5),^{13,14,22,15,45} smoking cessation centre (2%, n=2),^{24,89} pulmonary outpatient clinic (1%, n=1),⁶⁵ multi settings (Pharmacy + Emergency services+ primary care) (1%, n=1).¹²¹

In 10% (n=14) of the studies, the setting was either not clear or not reported.^{12,31,59,63,64,71,73,76,78,90,93,102,110,120}

2.3.6 Case-finding approaches and their distribution by yield

Classification of approaches was done based on the different scenarios that were observed in the reviewed studies. Though the main screening tools for COPD are the questionnaire, peak flow meter, microspirometry or spirometry, these tools were used in a variety of contexts. Thus it is necessary to separate them for clarity. We arrived at 20 approaches (Table 2.2) to capture the peculiarities of each scenario with most of the variation coming from: 1) If testing was done with a bronchodilator or not and 2) If individuals that initially underwent testing without bronchodilation had to meet pre-set criteria before undergoing testing with bronchodilation or not. In pre-post microspirometry /pre-post spirometry, individuals underwent the tests first without bronchodilation, and then after the administration of a bronchodilator as a single procedure. There were no set criteria for progressing to testing with bronchodilation (as with approach 3, 6, 8, 12, and 18). In other scenarios, individuals had to undergo an initial test without bronchodilator (microspirometry or spirometry without bronchodilator) and then proceeded to testing with bronchodilation (bronchodilator microspirometry or bronchodilator spirometry), after they had met set criteria e.g. $FEV1/FVC < 0.7$ or $FEV1/FEV6 < 0.7$ (as with approach 7, 10, 13, 15, and 19).

A total of 20 different case-finding approaches were identified (Table 2.2). The most common approach was spirometry without bronchodilation after screening with a questionnaire (approach 9), followed by pre-post spirometry after initial screening with a questionnaire (approach 12), and then bronchodilator spirometry when participants fulfilled set criteria after questionnaire screening and pre-bronchodilator spirometry (approach 13). The least common

approaches were the use of questionnaires only (approach 1), microspirometry testing with and without bronchodilation after initial screening with questionnaire (approach 3), and bronchodilator spirometry testing after screening with microspirometry (approach 16).

Focusing on the yield of new cases by the approaches, as seen in Table 2.2, the weighted average yields ranged from 2.3% to 33.5%. Quartiles were used to give a better representation of the yields. The first quartile, Q1 representing the where the 25% of the yields range from 0% to 6.9% while quartile 4 (Q4) captures the highest yields ranging from 21.7% to 52.1%. Each of the quartiles, Q1, Q2, Q3, and Q4 had 33 studies.

The approach with the highest yield (highlighted in the Table 2.2) was approach 20, which involved the use of bronchodilator spirometry only in case-finding (33.5%).¹⁴³⁻¹⁴⁵ Initial screening with microspirometry, followed by spirometry with and without bronchodilation after set criteria were met had the second highest yield (approach 15, 31.5%).¹²¹ The approach with the third highest yield was pre-post spirometry testing after screening with a questionnaire and a peak flow meter (approach 6, 29%).³⁴ Approach 10 had the lowest yield and involved an initial screening with questionnaire and then peak flow meter, after which spirometry was done without and with bronchodilation (2.3%).^{66,146}

Of the 64 standardized questionnaires, the most commonly used were the COPD Population Screener (COPD-PS) (17.2%, n=11), COPD Assessment Test (CAT) questionnaire (12.5%, n=8), Respiratory Health Screening Questionnaire (RHSQ) (7.8%, n= 5) and the Medical Research Council Questionnaire (MRC) (18.8%, n=12).

2.3.7 Studies with the highest yields

In order to better describe the studies with the highest yields, Q4, we identified a number of characteristics (Table 2.3). In the 33 studies, the following were observed: the screening was

targeted at high risk groups 97% (n=32 studies), criteria for diagnosis were according to clinical guidelines 52% (n= 17 studies), various HCPs worked together in different capacities to identify new patients 61% (n=20 studies), patients/study participants were educated on the disease and the importance of early identification 94% (n=31 studies), the case-finding processes were HCPs led 97% (n=32 studies), the case-finding approaches used had multi-steps 100% (n=33), and lastly HCPs underwent trainings/educational activities to improve their skills especially in conducting lung function tests 36% (n=12 studies).

Table 2.3 Characteristics of studies with the highest yields (Q4)

Author	Approach	Provider training/ education	Patient education	Active screening	Multi-step approach	Provider engagement	Diagnostic criteria by guidelines	Engagement of other healthcare professionals
Burhan et al. (2018) ⁹⁸	13	•	•	•	•	•	•	•
Johnson et al. (2018) ⁷⁸	12		•	•	•	•	•	
Hemmingsen et al. (2017) ⁴⁶	9	•	•	•	•	•		
Zubair et al. (2017) ⁹⁶	12	•	•		•	•	•	•
Alchakaki et al. (2016) ¹²³	17		•	•	•	•		•
Campo et al. (2016) ³⁴	6		•	•	•	•	•	•
Halpin et al. (2016) ²²	2	•	•	•	•	•		
Kim et al. (2016) ³⁷	8		•	•	•	•	•	•
Marcos et al. (2016) ¹⁴⁴	20		•	•	•	•	•	•
Markun et al. (2016) ¹²⁸	17	•	•	•	•	•		•
Represas-Represas et al. (2016) ¹²¹	15	•	•	•	•	•	•	•
Mahishale et al. (2015) ⁸⁵	12		•	•	•	•	•	•
Robitaille et al. (2015) ⁵⁶	9			•	•			•
Wright et al. (2015) ¹³	2		•	•	•	•		•
Bertens et al. (2014) ⁷²	12		•	•	•	•	•	•
Lambert et al. (2014) ⁴⁹	9	•	•	•	•	•		•
Sekine et al. (2014) ⁵⁸	9		•	•	•	•		•
Lokke et al. (2012) ¹⁰⁹	13		•	•	•	•	•	
Poulsen et al. (2012) ⁵⁵	9	•	•	•	•	•		•

Steinacher et al. (2012) ¹³⁶	18		•	•	•	•	•	
Cristescu et al. (2011) ¹²⁵	17		•	•	•	•		
Mets et al. (2011) ¹²⁹	17		•	•	•	•		
Ulrik et al. (2011) ⁶⁰	9		•	•	•	•		
Sandelowsky et al. (2011) ¹⁴¹	19		•	•	•	•	•	
Kogler et al. (2010) ⁸¹	12		•	•	•	•	•	•
Thorn et al. (2010) ³⁹	8		•	•	•	•	•	
Nathell et al. (2007) ¹³⁹	19	•	•	•	•	•	•	
Vandevoorde et al. (2007) ⁶¹	9	•	•	•	•	•		
Geijer et al. (2005) ¹⁰¹	13	•	•	•	•	•	•	•
Stratelis et al. (2004) ¹¹⁵	13	•	•	•	•	•	•	•
Gorecka et al. (2003) ⁴⁵	9		•	•	•	•		•
Zielinski et al. (2001) ⁶⁵	9		•	•	•	•		•
Fidalgo-Garrido et al. (1991) ¹²⁶	17		•	•	•	•		

2.3.8 Collaborative practices among healthcare professionals

Half (51.5%, n= 68) of the reviewed studies reported the engagement of other HCPs at different stages of the case-finding process. The weighted average yield of these studies was 12.4%. However, in 48.5% (n=64) of the articles, there was no evidence of other HCPs engagement in the case-finding process. Here, the weighted average yield was 9.2%. In five studies, case-finding was carried out by a multi-disciplinary team while in others there was evidence of engagement of other HCPs through referral of patients to another HCP for spirometry, for smoking cessation programs, for initiation of treatment or pulmonary rehabilitation. In other cases, patients were referred to HCPs who could interpret or validate diagnostic results.

2.3.9 Provision of preventive services

With respect to preventive services, 20.5%, (n= 27) of the studies reported provision of smoking cessation programs in addition to the case-finding approaches they used in identifying

new patients. Thus, after being diagnosed with COPD through any of the case-finding approach or identified as high-risk, there was either a recommendation, deployment of smoking cessation programs or referral of such individuals to another healthcare practitioner for smoking cessation programs. However, 79.5% (n=105) of the articles did not report the initiation of, or referral of participants for smoking cessation programs. Vaccination was not reported by any of the articles.

2.3.10 Studies conducted in the community pharmacy setting

Five studies were conducted in the community pharmacy setting.^{13,14,22,15,45} Their yields were 1.9%, 3.2%, 9, 9.6% and 52.1%. Two of these studies fall in Q1, another 2 in Q2 and the last study was in the 4th quartile, Q4. In 2 of the studies, case-finding was initiated with a questionnaire after which the study participants underwent microspirometry without bronchodilation (Approach 2).^{13,14} In another study, case-finding was also initiated with the use of a questionnaire after which microspirometry was done without bronchodilation and finally, spirometry without bronchodilation (Approach 4).²² In the last two studies, where approach 9 was used in case-finding, spirometry without bronchodilation was done after the initial step of using a questionnaire.^{15,45} The most commonly engaged HCP were physicians, to whom patients were referred for validation of the potential cases identified by the pharmacists' or for commencement of treatment.

To effectively identify new cases, pharmacists underwent training programs on conducting screening and identifying patients at risk of COPD, conducting spirometry tests, analyzing and interpreting spirometry results and providing ongoing support to diagnosed patients.

2.4 Discussion

The evidence for this review was obtained from 132 primary studies, with the majority published between 2010 and 2018. The most common setting in these studies was general practice/primary care, and initiation of case-finding by physicians was found to be more common than by other HCPs. From these studies, we identified 20 COPD case-finding approaches deployed by HCPs, either alone or by engaging other professionals. Of these 20 approaches, only one involved a single step while the others involved multiple steps including a questionnaire or any combination of a screening questionnaire; hand held spirometry devices; peak flow meters; or conventional spirometry, with or without bronchodilation. The yield of new cases by these approaches ranged from 2.3% to 33.5% of the study population. The most commonly used approaches were those where participants underwent pre-post spirometry after an initial screening with a questionnaire and where study participants underwent spirometry without bronchodilation after an initial screening with a questionnaire. The approaches with the highest yields all involved the use of bronchodilator spirometry either alone or with other screening tests to identify new cases.^{34,121,143–145} In the majority of the studies, case-finding was targeted at high risk and/or symptomatic patients; however, a few studies targeted apparently healthy individuals. Twenty seven studies (20%) reported referrals for smoking cessation programmes, while none reported on vaccinations. HCPs also engaged other practitioners either as part of a multidisciplinary team involved in the case-finding or to refer study participants for confirmation of diagnosis, initiation of treatment, or commencement of smoking cessation programs, among other needs. For the 33 studies where the highest yields (Q4) were reported, the following characteristics were observed: provider education/training, patient education, active screening, multi-step approaches to case-finding, which included spirometry (as opposed to the use of

questionnaires alone), provider engagement, diagnostic criteria by guidelines, and engagement of other healthcare practitioners.

The majority of our reviewed studies being published between 2010 and 2018 is in line with more recent evidence that the most rapid decline in lung function occurs at early disease stages,^{148,149} contrary to the prior notion that the rate of lung function decline was directly proportional to the time progression of COPD.¹⁵⁰ Furthermore, due to the evolution of HCP roles over the years, we also see more involvement of other HCPs apart from physicians (pharmacists inclusive) in identifying individuals who may be at risk of COPD based on the presence of symptoms and/or risk factors.

Interestingly, the more commonly deployed case-finding approaches were not those with the highest yield; in fact, only three studies reported using the approach with the highest yield. It is however important to note that in those studies, the GOLD recommended criteria for diagnosis (which is post-bronchodilator spirometry FEV₁/FVC) was used in the identification of new patients. In the reviewed studies where the diagnostic criteria (post-bronchodilator spirometry value of FEV₁/FVC < 70%) was not used to identify new cases, there was a higher yield of new cases (13.4%) compared to others, where COPD was confirmed by bronchodilator spirometry as recommended by the GOLD guidelines (8.2%). A common feature in the high yield case-finding approaches was the use of spirometry with bronchodilator, either alone or in combination with other tests to identify new cases, which aligns with guideline recommendations. Adherence to the COPD diagnostic criteria recommended by the guidelines is essential in reducing misdiagnosis, which may lead to an overestimation of actual cases.

Provider education/training was also observed in some of the studies with the highest yields. Training empowers HCPs to accurately identify new cases.^{39,154} Trainings may also help

to reduce COPD misdiagnosis, which is commonly associated with inadequate skill in general practice. In the studies where providers were educated/ trained, the training programs were mostly targeted at enhancing/ensuring the capability of the providers to conduct the case-finding tests appropriately, specifically the microspirometry and spirometry. In some cases, the providers were also taught how to interpret test results. Among the studies that involved an educational/training component, some were intervention studies while others were not.

In addition to provider-education/training, in the studies with the highest yields, patients were educated or provided with additional information about their symptoms, risk factors, and the disease itself to increase awareness. The absence of this information is a challenge to COPD diagnosis.¹⁵⁵ In COPD case-finding, educating symptomatic individuals or those at risk of COPD may increase their awareness about their health and the disease, thus potentially influencing their willingness to undergo and complete case-finding services. This is consistent with the knowledge that patient education is a critical factor in decision making.¹⁵⁶

When we reviewed the groups of participants recruited in the reviewed studies, case-finding were primarily targeted towards symptomatic (presence of respiratory symptoms) individuals and/or those at high risk of COPD, which is consistent with recommendations by the National Institute for Health and Care Excellence (NICE) guidelines, the GOLD guidelines, and the United States Preventive Services task force that there is no evidence of cost-effectiveness of such an exercise in an asymptomatic population.^{8,157,158} In four of our reviewed studies however, study participants were apparently healthy/asymptomatic patients. While the yields in these studies ranged from 19.6% to 20.3%, no cost effectiveness analysis was done.^{31,51,63,96} In addition to respiratory symptoms and the commonly known risk factors, other target groups may include HIV patients, elderly patients with complaints of dyspnea or exercise intolerance, or

cardiovascular disease patients.^{50,73,80,88,137,158} In the studies with the highest yields, all but one executed case-finding services by actively targeting symptomatic/high-risk groups.

Furthermore, we also observed that the yield of new cases when other HCPs were engaged in the case-finding process, was not markedly higher than if the whole process was executed by one HCP. Engagement of other HCPs affords the benefit of leveraging each other's knowledge, resources, skill, or capability to identify and further assess new COPD cases. However, we are unable address the impact of collaboration on the differences in the observed case-finding yields. In the five studies conducted in the community pharmacy setting, the most commonly engaged HCPs were physicians (general practitioners and pulmonologist) to whom patients were referred for confirmatory diagnosis or for commencement of treatment. Engagement of other HCPs in case-finding was also common to most of the studies with high yields.

Finally, case-finding was commonly practice-managed (provider-led), thereby supporting more patients to complete the case-finding process. This is more effective than patient-managed case-finding scenarios, where patients self-administer the screening questionnaires and reach out to HCPs for next steps, if they are interested.⁴³

2.5 Considerations for pharmacy practice

Based on our review of studies across various healthcare settings, the following may be considered in case-finding planning at the community pharmacy:

1. High risk, symptomatic groups should be targeted for case-finding by pharmacists.

Other criteria, such as regular purchase of respiratory medicines, smoking cessation

- products, or antibiotics for treatment of respiratory infections twice in the preceding year could also be used;
2. Pharmacists should consider their skill, ability to deploy, and the feasibility of use of any of the identified case-finding approaches in the community pharmacy setting;
 3. Pharmacists should avail themselves of learning opportunities via professional development and/or training programmes offered by certified bodies to improve their skills in executing case-finding services;
 4. Patients should be educated on COPD, its associated symptoms, and risk factors to increase awareness;
 5. Case-finding services should be proactively directed by a pharmacist, which may reduce the incidence of patients not completing the whole process;
 6. Pharmacists should collaborate with physicians for further assessment and diagnosis of potential cases identified at the community pharmacy. This is because the skill, time and quality assurance requirements to conduct full spirometry testing may make it not feasible in real life pharmacy practice.

Future studies may examine the interplay of these elements and how they can be optimized for positive impact on case-finding services, especially in the community pharmacy setting. Studies exploring the comparative cost-effectiveness of the various case-finding approaches should also be done.

2.6 Limitations

Our scoping review has some limitations. First, only studies published in English were included, which may have led to the exclusion of relevant studies in other languages. Second, not all of the studies used the clinical guideline recommendations as their diagnostic criteria, which may have led to an inflated yield of new cases. Some of the articles were also unclear or did not

report about the HCPs, the study settings, or the referral processes involved, which led to a high number of unreported/unsure cases in some of our results. In some other studies, participants were lost to follow up, especially in cases where there was a referral for confirmatory diagnosis. In some cases of interprofessional collaboration, there was poor follow up/continuity of care and sharing of information, making it problematic to determine the number of at-risk individuals who were appropriately diagnosed. Furthermore, because no inferential statistical analysis was done, we do not know the significance of the differences in the various yield of new cases in this review. In calculating the weighted average yields for the different approaches, the influence of the number of studies each approach had was also not considered. Furthermore, the yields may have been influenced by other factors, such as study design, recruitment strategy, study setting, healthcare practitioners involved, and are not solely dependent on the case-finding approaches. We also acknowledge that our findings and considerations for pharmacy practice may have been affected by the methodological limitations/risk of bias of the individual studies, which were not analyzed. Lastly, only five of the 132 reviewed studies were conducted at community pharmacies. Thus, we are assuming that the best approaches could be used by pharmacists.

2.7 Conclusion

This review identified twenty case-finding approaches used by different healthcare practitioners, across various practice settings. We were able to characterize approaches with the highest yield of new cases, including involvement of spirometry with bronchodilator. We also identified some considerations which may be useful in the planning case-finding services by pharmacists. Collaborative practices involved case-finding in multidisciplinary teams or referral of patients from one HCP to another during the case-finding process. Of the two preventive services of interest, a few studies reported deployment of/ referral of patients for smoking cessation programs. We assume that with appropriate training, pharmacists may be able to

deploy some of these case-finding approaches in the community setting after which potential cases can be referred for a confirmation of diagnosis. Our findings can inform future research on the optimal strategies in COPD case-finding at the community pharmacy.

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CHAPTER 3

EXPERIENCE OF PATIENTS WITH COPD OF PHARMACISTS' PROVIDED CARE: A QUALITATIVE STUDY

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Abstract

Background: Chronic Obstructive Pulmonary Disease (COPD) is associated with a high global morbidity and mortality. To address this challenge, early diagnosis and optimal disease management are essential. Pharmacists are uniquely positioned to provide services in these areas by identifying and helping patients achieve management goals, and as a result reducing the burden of this disease on the health system, patients and their families. With the limited knowledge on patient experience of pharmacist care, our study aimed to understand the perceptions and experiences of patients living with COPD with pharmacists' provided care in COPD diagnosis and management.

Methods: Participants living with COPD were recruited through the placement of posters in community pharmacies, seniors' centres, a general practice clinic and a pulmonary rehabilitation centre. Twelve patients who could communicate in English participated in semi-structured interviews. Guided by qualitative description methodology, interview data were recorded, transcribed, and analyzed through qualitative content analysis. The study was reported in accordance with the consolidated criteria for reporting qualitative research (COREQ) checklist.

Results: Twelve participants aged 46 to 85 years and living with COPD between 2 to 22 years were interviewed. We identified ways through which care is received, how connections are formed and what can hinder them, response to care, and expectations. The study participants' experience of pharmacy provided care varied based on the depth of patient-pharmacist engagement. Patients who regarded their pharmacists as an essential member of their healthcare team and those who do not have contrasting experiences with education, communication and ability to form connections.

Conclusion: Patients' experiences with pharmacists' provided care varied with the overall perception of pharmacists being positive. For patients with COPD, it is important that the pharmacist is proactive in engaging patients through effective communication, education/provision of relevant information, identification of patient needs and consistent provision of care with empathy. We also identified challenges in COPD care identified by patients, which if addressed, can improve patients' experience of care.

Keywords: COPD; pharmacists; qualitative research; patient experience

3.1 Background

3.1.1 COPD global burden

Chronic obstructive pulmonary disease (COPD) is currently the fourth leading cause of death in Canada, affecting about 4% of the population.¹ COPD, under which older terms like chronic bronchitis and emphysema fall, is characterized by progressive lung function decline. Though currently incurable, COPD is preventable and treatable. COPD is mostly caused by tobacco smoking with characteristic symptoms of dyspnea and cough, with or without sputum production.^{2,3} Despite COPD being a leading cause of global death already, its contribution to global mortality is projected to increase in the years ahead.⁴ The rise in disease burden is expected due to increased exposure to risk factors, an ageing population, and a low awareness of the disease by individuals.^{5,6} In countries where COPD prevalence has been rigorously measured, prevalence rates range from 4 to 10%.⁷ Actual prevalence rates are however thought to be higher because diagnosis mostly occurs at advanced stages when patients are symptomatic.

Because COPD is incurable, the goals of management are to determine the severity of the disease, including the severity of airflow limitation, the impact of disease on the patient's health status, and the risk of future events (such as exacerbations, hospital admissions or death), in order to guide therapy.⁸ Early disease diagnosis, administration of preventive services like smoking cessation and vaccination, pharmacotherapy, nutrition, self-management and pulmonary rehabilitation influence the achievement of management goals.⁹ Thus, it is imperative that health care providers work towards achieving these management goals within the ambits of their practice.

3.1.2 Pharmacists and COPD management

Pharmacists can be instrumental in COPD care optimization as their scope of practice has evolved over the years from the traditional dispensing roles to patient-centred care. They are also easily accessible and perceived to be affordable by the public, making them the first point of contact in the healthcare system. In COPD management, some of the patient-centred outcomes include improving health-related quality of life and prevention of exacerbations which are a major cause of morbidity and mortality in patients.¹⁰ To prevent exacerbations, pharmacists can conduct smoking cessation programs, administer vaccines or recommend appropriate therapy to patients alone, or collaboratively with other healthcare providers. Also, in managing exacerbations, rescue packs are essential. Depending on the jurisdiction of practice, some pharmacists may have standing orders for rescue packs for their patients who are prone to exacerbations or refer patients to their general physicians to obtain these rescue packs when needed. Pharmacists also play crucial roles in all the key stages of patients' pathways by providing educational campaigns on disease awareness, risk prevention, targeted disease screening with risk assessment, and by optimizing management and supporting patients with self-care plans, patient and medication monitoring and transition of care.^{11,12} With their education and training, pharmacists offer clinical expertise, unique insights, and beneficial recommendations regarding medication use/monitoring and patient management. Better patient management may in turn result in improved therapeutic, safety, and humanistic outcomes, as well as contribute to more cost-effective health care.¹³ The provision of direct patient care by pharmacists has also been shown to have positive effects across various disease states, health care settings and patient outcomes.¹³⁻¹⁶ All these factors make pharmacists uniquely situated to

contribute to COPD patients' care involving case-finding, clinical assessment, optimal pharmacotherapy, and supporting self-management.

3.1.3 COPD patient experiences, what is known?

To achieve and enhance the quality of patient-centred care, it is important to understand patients' experiences. In a Canadian systematic review published in 2012, themes on experiences from diagnosis to end-of-life of patients living with COPD included unawareness of disease and symptoms, poor information on disease prognosis, difficulty of smoking cessation, and poor confidence in community-based services.¹⁷ Patients have also expressed the need for more information at the time of diagnosis in understandable terms, including the implications of being diagnosed with COPD.^{18,19} Additionally, some patients have a poor understanding on the link between smoking and their disease state, and consequently, may not take smoking cessation advice from their health care providers as seriously as needed.²⁰

COPD patients are documented to have experienced substandard care service delivery characterized by poor accessibility to healthcare services, lack of information and capability to make informed decisions, and poor relationships with healthcare providers.^{18,21} On the relationship with health care providers, patients often judged a successful relationship with their physicians based on the level of empathy and support they got at disease diagnosis and during the management process.¹⁸ Patients' negative perception of their physicians is also contributory to poor adherence to treatment and failure to modify health behaviors. Additionally, poor patient-physician relationships may influence a patients' choice not to seek medical advice when needed, thus negatively impacting on their quality of life and disease-coping mechanisms.¹⁸

Other studies have also shown that patients had a positive perception about pharmacists' provided care in the management of diabetes, cystic fibrosis, and hypertension.²²⁻²⁴ With respect

to COPD however, only the general experiences of patients and interactions with physicians have been explored, leading to a need to explore these patients' experiences of pharmacists' provided care specifically. To the best of our knowledge, there is no study that has explored this phenomenon. As such, it is important to understand the experiences of people who live with COPD and access care from pharmacists based on their unique care needs. Understanding these experiences would enable us to understand what patients value in pharmacy services and to know how pharmacist-provided care in COPD diagnosis and management can be improved from the perspective of patients, who are key stakeholders. Improving COPD care is particularly important as a clear need exists to address the increasing disease burden in the years ahead. As such, the aim of the study was to understand the perceptions and experiences of patients living with COPD of pharmacists' provided care in COPD diagnosis and management.

3.2 Method

3.2.1 Design

We conducted semi-structured one-on-one interviews guided methodologically by qualitative description (QD),²⁵ for patients with COPD to enable us understand their perceptions of pharmacists and experiences of pharmacists' provided care.²⁶ QD methodology is aimed at understanding and describing a phenomenon through the views of people who have experienced such phenomenon in their natural setting. QD is embedded in the naturalistic approach, enabling an understanding of the phenomenon of interest through the meanings participants attach to them. The ontological position in this methodology is relativism, where reality is subjective and varies among individuals. The epistemological assumption is subjectivism, which accepts that

multiple interpretations of reality can co-exist. The goal of this methodology is to describe the phenomenon in a rich and easily understandable manner.²⁷

3.2.2 Participants: Sampling and Recruitment

Adults (aged 18 years and above) with COPD diagnosis, residing in the Edmonton area were invited to join the study through recruitment posters in 11 community pharmacies, two seniors' centres, two pulmonary function laboratories, two hospitals, one general practice clinic, and one pulmonary rehabilitation centre. Two members of the research team, OI and TM also contacted four practicing community pharmacists inviting them to discuss the study with their eligible patients. A short presentation was also done for members of a respiratory club at the pulmonary rehabilitation centre. The presentation done for the members of the respiratory club was to increase the awareness of patients with COPD about the study. The recruitment posters had information on the study eligibility criteria, the expectations from participants, the incentive for participation in the study (\$25 gift card) and the contact details of two members of the research team. Of all these places where our study was advertised, only those from the pulmonary clinic and the community pharmacies contacted the research team. Of the 14 individuals that were recruited, one declined participation while another could not be interviewed due to the global pandemic at the time of the study.

Study participants were recruited through convenience sampling. Criteria for study participation was a diagnosis of COPD and experience with pharmacist provided care, ability to communicate in English and give informed consent. The first six participants were from a pulmonary rehabilitation centre. Three participants were recruited from a community pharmacy where the pharmacist is a certified respiratory educator (CRE) and the three others were from

three pharmacies where the pharmacists are not CREs. Interviews were conducted until data saturation was reached. Data saturation was defined as non-emergence of new data in response to interview questions, or new themes and codes after analysis of all collected data.²⁸ Two members of the research team agreed that data saturation was reached when the data from the last two interviews did not yield any new categories different from the previously analyzed. Though there was a plan to do a final interview to confirm there were no new codes beyond what we had, this did not materialize due to logistic reasons.

3.2.3 Data collection

Data were collected between October 2019 and January 2020 through digital audio recording of the semi-structured interviews. In 7 of the interviews, there were 2 researchers present (OI and TM or MQ). Thereafter, OI conducted the remaining 5 interviews alone. The presence of other researchers at the interviews enhanced the quality of notes taken and data interpretation later on in the process. Moreover, field notes taken during and after the interviews enriched the data analysis.

Interview lengths ranged between 20 and 114 minutes, with the average being 54 minutes. Before the interviews started, we went through the research information with the participants, and gave them a copy of the information sheet for their documentation. We asked participants if they had any questions after which their written consent to participate in the interview was obtained. All participants gave their consent to have the interview audio recorded. Of the 12 interviews, nine were done at the participants' homes, two were done at a meeting room at the University of Alberta and one was done at the participant's pulmonary rehabilitation centre. In one of the interviews, a non-participant (participant's spouse) was present.

The interview guide (Appendix 3.1) was developed based on the phenomenon of interest and drawn from review of studies that had explored the experiences of patients with pharmacists' provided care in other disease areas. The interview questions covered experiences with COPD diagnosis, management, preventive services like smoking cessation and vaccination, participants' perception of their pharmacists care as well as their expectations. Open-ended questions were used to get participants to discuss their experiences. To go into more detail, participants were probed with questions like 'Can you tell me more about that?', 'How did that make you feel?' However, the interview guide was reviewed and updated during the data collection process. To illustrate, the first version of the interview guide started with a question asking participants about their life prior to being diagnosed with COPD, to allow the participants ease into the interview. However, we observed that this question elicited a range of responses that were not crucial to our study objectives. Thus, this question was reviewed and changed to 'Who helps you manage your COPD?' to set a context for the interview. Furthermore, in response to 'Tell me more about your experiences with your pharmacists' provided care', some participants' response was centered on medication dispensing. Thus, in those interviews, we included 'What role did your pharmacist play?' to enable participants reflect on their interactions with the pharmacist and thereby share their experiences. Additionally, a questionnaire was administered to collect demographic data like age, sex, time of diagnosis, presence of co-morbidities, frequency of pharmacy visits and how many times they had exacerbations within the previous 12 months (Appendix 3.2).

3.2.4 Ethical considerations

The study protocol was approved by the University of Alberta research ethics board (Pro00090868). All participants were informed and reminded they could withdraw their consent

to continue with the interview at any time, or not respond to any questions they were not comfortable with. They were also assured of the anonymization of their data.

3.2.5 Data analysis

The collected data were analyzed by qualitative content analysis.^{29,30} Because our aim was to describe the phenomenon of interest, qualitative content analysis was an appropriate approach to data analysis.²⁹ The phases involved in this approach to analysis are data familiarization, generation of initial codes, searching, review and naming of codes and the reporting of the analyzed data.³¹ Immersion in the data enables the inductive development of codes, which allows the code names to flow from the data, as against using pre-conceived nomenclature.²⁹

Interviews were transcribed by a third party while OI did the analysis, with support from MQ. As an initial step, OI and MQ independently analyzed a transcript and discussed consistency of the coding process and the codes. More experienced member of the team (MQ) reviewed some of the transcripts coded by OI to ensure validity of the codes, categories and themes that were created. Themes were discussed and refined to best capture participants' experiences. Data analysis occurred concurrently with data collection. Transcripts were initially read to ensure there were no transcribing errors. Subsequently, they were read through to enable immersion into the data. The transcripts were then read line by line and coded, using phrases that described participants' perceptions and experiences. These codes represented the researcher's impression of the participants' responses. While reflecting on the codes and their meanings, notes were taken to document first impressions. Most of the initial codes came from the transcript text and were used as a guiding scheme for subsequent transcripts. Codes were then

sorted by their similarities into categories from which our themes were induced.²⁹ The data was organized using the NVIVO12 software (QSR International) ®. To provide guidance during the reporting of this study, the consolidated criteria for reporting qualitative research (COREQ) checklist (Appendix 3.3) was used.³² Table 3.1 illustrates the coding process.

Table 3.1 Example of coding and categorizing the theme ‘community of care’

Meaning unit	Condensed Unit	Code	Category	Theme	
It’s really easy, like I go to the pharmacy and so it’s really easy for me to get any of the information I need.	Easy to reach	Ease of reach	Characteristics fostering interactions	Community of care	
...I can’t get an appointment with the doctor until the next week, well then I can go to my pharmacist...	Short wait time				
it’s easier to talk to your pharmacist, because a doctor, you got to wait, and then go in.	Easier access				
She was so proud of him and she would encourage him I’m proud of you	Encouraging	Support	Characteristics hindering interactions		
She’ll phone me and ask how I’m feeling.	Follow up				
Just caring, concerned, very nice lady	Empathy				
Yeah just I would go in and whine and she would tell me what to change or do and how often.	Shoulder to lean on				
There might be other pharmacists that are not quite as busy that would have more time to interact.	Busy to interact	Pharmacists busyness			Characteristics hindering interactions
Do you know, they’re so crazy busy there. How can they – they’re just so busy.	No time				
they don’t have a lot of time to spend with each individual person so ... I don’t know.	No time				
I didn’t even know that pharmacists could give you a prescription without a doctor’s okay.	Don’t know	Patients’ unawareness of pharmacy services		Characteristics hindering interactions	

3.2.6 Trustworthiness and reflexivity

Trustworthiness is an essential component of high quality research. Elements of trustworthiness include credibility, transferability, dependability, confirmability and reflexivity.^{33,34} Credibility was ensured through reflective journaling during the research process,

peer debriefing during data analysis, and the inclusion of field notes in the iterative coding process. To ensure transferability, we described the research context, participants and settings in a rich manner. To ensure dependability, discussions about the data analysis and codes with a researcher experienced in QD methodology/qualitative content analysis were done and appropriate adjustments were made based on the feedback. This is in addition to a detailed reporting of the research process. Confirmability was ensured through a detailed methodological description and reflexivity.

Lamb and Huttlinger defined reflexivity as ‘a self-awareness and an awareness of the relationship between the investigator and the research environment’.³⁵ Our research team consisted of three female researchers, two of whom are non-practicing pharmacists (OI and TM), and the last, (MQ), a qualitative researcher. Both OI, who is a master’s student, and TM (an assistant professor) have interests in improving pharmacy care experience of patients living with COPD. At the time of the interviews, OI had taken a graduate study course on qualitative research methods. MQ has over 11 years of experience as a qualitative researcher. TM has experience in conducting qualitative research and is a member of the Alberta Health Services Respiratory Health Strategic Clinical Network (RSCN). OI conducted the interviews, with support from TM and MQ. Throughout the research process, they all discussed their personal views on patients’ experience of pharmacy care. After every interview, OI and either TM or MQ appraised the interview, the appropriateness of the questions, the interview setting and discussed the level of comfort of participants in answering the interview questions. Reflexivity was also addressed through journaling all through the research process and continuous update of the interview guide. The interview guide was reviewed after each interview to enable the research

team to get as much relevant and specific information in relation to the aim of this study as possible.

3.3 Findings

3.3.1 Demographic and clinical details of the participants

Six men and six women participated in this study. In one of the interviews, a participant's spouse was in attendance. We however did not have her consent to participate in the study in writing, thus, her discussions are excluded from our findings. The participants' age range from 46 to 85 years and had been living with COPD for between 2 to 22 years. Of all the participants, four were on oxygen therapy. The participants recruited through the pulmonary rehabilitation centre were members of the 'Breathe easy' program. All participants accessed care from different pharmacies except for three participants who used the same pharmacy. Table 3.1 gives an overview of the participants' characteristics.

Table 3.2. Overview of participant's characteristics

	Gender	Age (years)	Years of living with COPD (years)	Site of recruitment	Smoking status	Frequency of pharmacy visit
1	Female	64	7	PRC	Former Smoker	2 to 4 times per month
2	Male	61	8	PRC	Former Smoker	>5 times per month
3	Female	76	6	PRC	Former Smoker	2 to 4 times per month
4	Male	75	4	PRC	Former Smoker	Less than every 3 months
5	Male	51	2	PRC	Former Smoker	> 1 visit a month

6	Female	85	8	PRC	Former Smoker	Once in three months
7	Male	72	5	CP	Former Smoker	Monthly
8	Male	77	22	CP	Former smoker	Monthly
9	Male	75	12	CP	Former Smoker	Monthly
10	Female	66	6	CP	Current smoker	Monthly
11	Female	46	4	CP	Current smoker	> 1 visit a month
12	Female	67	10	CP	Current smoker	Monthly

PRC: Pulmonary rehabilitation centre, CP: Community Pharmacy

Though six participants were recruited through community pharmacies, for three of them, their pharmacist was a certified respiratory educator (CRE) while for the other three, their pharmacists were not.

3.3.2 Experience of patients with COPD of pharmacy care

The following themes emerged from the data as participants described their experience of pharmacists' provided care: **1) *Meaning of care*, 2) *Community of care*, 3) *Participant's response to the community of care*, 4) *Expectations***. Figure 1 shows the themes, categories, the codes and the relationship between them.

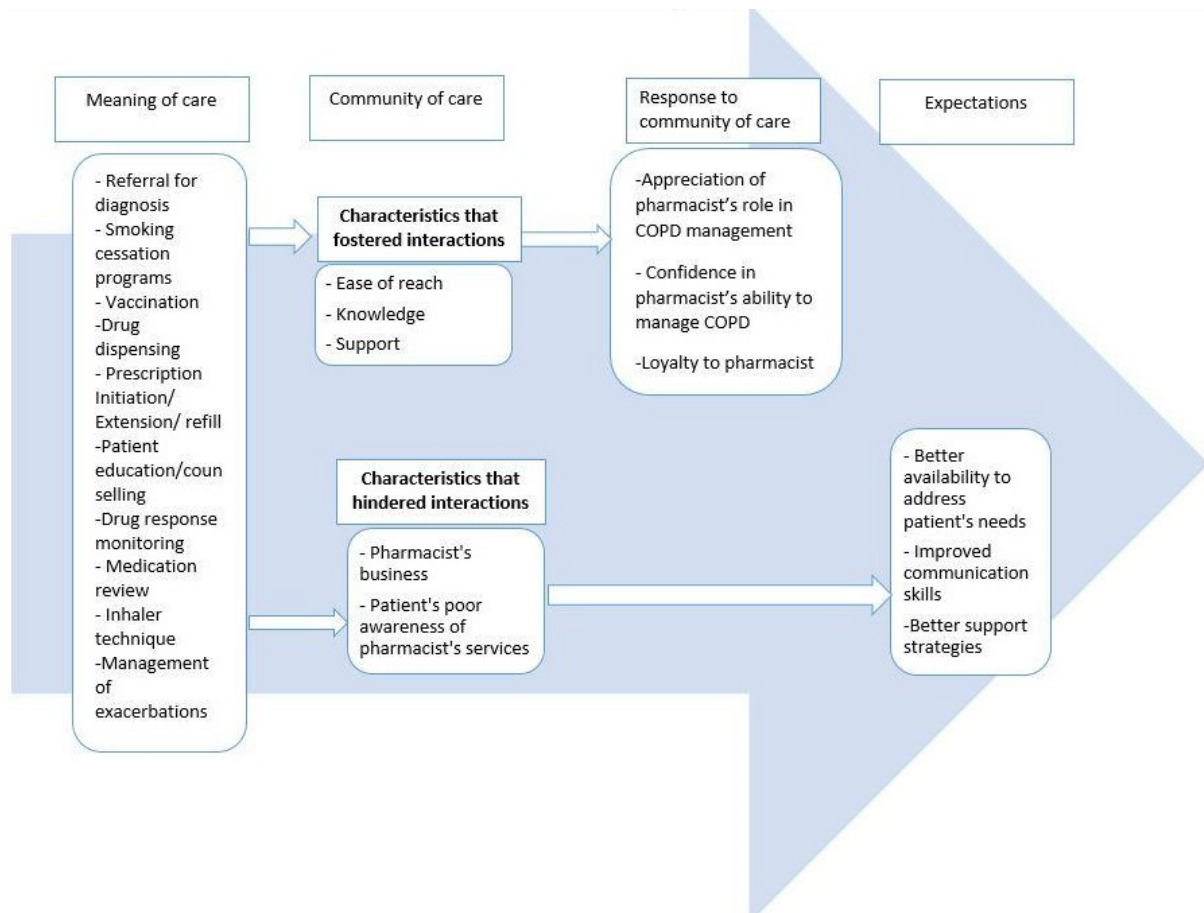


Figure 3.1. Themes, categories, codes and the relationship among them

3.3.2.1 Meaning of care

In many cases, when we asked patients about the healthcare providers that support their disease management, patients did not readily mention their pharmacists until they were probed further and thereafter, they discussed ways through which they were cared for by their pharmacist.

Participants discussed ways through which they received care from their pharmacist, spanning the COPD diagnosis and management spectrum. Majority of the participants had little experience of discussing their symptoms with their pharmacists which was partly due to unawareness of the significance of their symptoms and the position of pharmacists in helping

patients better understand the implications of those symptoms. Thus, they did not perceive their pharmacists as instrumental in their disease diagnosis as their pharmacists were either not aware of their symptoms or their COPD diagnosis was done during hospitalization for other health challenges A participant said:

“I did have symptoms, but I didn’t know that it was COPD. I was always phlegmy, a lot of – wheezing, I guess, when I was laying down or resting ...And tired. No energy... thinking back now, knowing now, there was all the symptoms, because, you don’t really have that intimate one-on-one conversation with your pharmacist about, “Hey, you know what?” So, I didn’t go to my pharmacist and say, “Hey, you know what, I’m wheezing today and having troubles. I bought over the counter cough syrup or halls or something like that, Vicks. I bought a humidifier...a couple of times when I did get Bronchitis, I went and got antibiotics for it. But, nobody put it together that I had COPD,” **Participant 5, Male.**

Another participant said:

“I had been hospitalized for something else and they did a whole bunch of tests and they found that I had COPD. The pharmacist really didn’t play any part in the diagnosis, and then it was sort of confirmed when I was in for my first hip surgery because again I had to go through a bunch of tests and they found that I had COPD.” **Participant 12, Female**

One participant however, reckoned her pharmacist was instrumental in her disease diagnosis as the pharmacist recommended a lung function test based on the patient's respiratory symptoms.

“Based on my symptoms and how much difficulty I would have with my asthma symptoms, and thinking that there was potentially something else going on....she did recommend that I get a lung function test done.”

Participant 11, Female

Other ways patients discussed that they were cared for by their pharmacist were through smoking cessation programs and vaccinations which they perceived to be helpful in their disease management. A participant said:

“So now because a lot of the cessation aids don't help me we discuss a lot of the mental barriers and blocks and stuff like that regarding quitting; and that's really where my struggle. It's not so much the physical addiction but more the mental addiction and the anxiety of 'what am I going to do if I can't smoke'. And so she helps talk me through a lot of that. We've spent a lot of time on that consultation. It hasn't been fully successful yet but we keep working on it.” **Participant 11, Female.**

Patients also experienced support and preventive care through vaccination. The same participant said:

“This year she recommended that I get the two pneumonia vaccinations on top of getting the flu shot...She's very pro-active in terms of prevention

...knowing what it is important for respiratory patients to have. She makes sure that I'm getting all the protection I can." **Participant 11, Female.**

Of all the participants that had quit smoking, none of them perceived this to be due to their pharmacists' intervention as they attributed their successful quitting either to personal motivation or the influence of family members.

"I quit because...I got so sick and then I started to think about my children, I'll never see them grow up. I'll never see them getting married – I just dropped it right then and there. And like, my grandchildren are who made up my mind, I just love them to death, how can I leave them yet?"

Participant 3, Female

Participants also discussed they experienced care by being able to conveniently get their ongoing medications, get their prescriptions renewed or get initiated on new prescriptions for some medication, especially when they could not get in to see their physicians or their physicians were unavailable. They deemed these services important because it improved their health or prevented their disease conditions from worsening.

"So she can prescribe – I just think they prescribe certain medications, that you could continue for say one month, or a few days, or something like that, provided that probably you're already on it, and you're running out, and you can't get to see the doctor, so they'll provide a kind of a stopgap." **Participant 7, Male.**

Furthermore, they discussed that they felt more capable of managing COPD when they received information on their medication, potential side effects, disease condition, and treatment

options or how to properly use their inhalers from the pharmacist. This was expressed by those patients whose pharmacists took their time to provide these education/ counselling services, and asked questions to better understand their patients.

“When I go in to see him and I tell him I need this or that, he’s very interactive and suggests some of – like he’ll look at my other medications and say “You know what, maybe you might not want to take that because if you take it for too long it can affect asthma, so let’s try –” Like I mean he’s always educating me which is important because I didn’t know that and I now I do. So now I have a choice to decide whether or not I change it and, of course, I’m going to change it because the last thing I need is something else to worry about, you know. That to me, that’s important.”

Participant 1, Female

However, in some cases, participants experienced less information sharing from their pharmacists; thus, they did not perceive the pharmacists as a major source of drug information as they got whatever information they needed from the drug inserts. One of those participants however acknowledged it would have been easier for her if her pharmacist spoke to her instead of having to always read the inserts.

“I know all new medications that they prescribe for me, they give me a sheet...They just put a sheet in the bag, you know, they put your meds in the bag, and they put the sheet with it...I mean, probably it’d be easier if she spoke to me instead of me reading the paper” **Participant 6, Female.**

Patients also found discussions with their pharmacists about their drug response and medication review sessions beneficial as this made them more aware. The following quote is an example of a pharmacist who had detailed conversations with the patients and asked questions which were focused on the patient's medication use.

“Well, she's always got lots of questions. Every time I go in to pick up refills she has a lot of questions... they would ask me almost pill by pill, medication by medication how it was working and how much was I taking. They would maybe make suggestions to change the amount I was taking or the time I was taking it or something like that...She lets me know what could go wrong and is it? You know, is that happening to you? No, it isn't. Okay, that's good and then she goes through the benefits and is that happening to you? Yeah. Good. So, you know, she gives you both sides of the medication story.” **Participant 8, Male.**

Lastly, based on previous experiences with flare-ups and the fear of not getting timely care during such exacerbations, some patients requested their physicians provide standing orders for antibiotics at the pharmacy. Patients found this speedy access to treatment helpful in managing their exacerbations and the pharmacist's involvement in this process, was recognized.

“I made my doctor put in a standing antibiotic order at my pharmacy so that the minute I start to feel the infection here, I'd call and they'd send me out antibiotics right away and then that way I got the jump on it before it got a chance to get too bad.” **Participant 1, Female**

Some participants discussed that their pharmacists had to collaborate with their physicians in some instances where there was a need to initiate, change or discontinue a medication. In getting an appropriate therapy, a patient perceived himself as the communication link between the pharmacist and the physician.

“if she thinks something on my prescriptions is wrong she’ll call him and talk to him about that” **Participant 11, Female**

“Yeah, and if you say you’re experiencing this, well then you can go to the doctor and say, well, I’ve talked to the pharmacist, and they’re like, you know, suggesting this. And then they say, what do you think? So – and they say either yay or nay, and if they do say yay, they normally write you a prescription. So – but then again, too, that’s just confirmation that the pharmacist is correct. And so it’s a system – kind of a system with checks and balances, so to speak.” **Participant 7, Male**

3.3.2.2 Community of care

This theme captures participants’ descriptions of how connections with their pharmacists are formed and sustained. Participants’ discussions also entail how such connections may have been hindered.

Characteristics that fostered interactions

We identified the following to foster the interactions between a patient and a pharmacist: *Ease of reach, Knowledge, Support*. Overall, participants felt that their pharmacists were accessible and described them as easier to reach and talk to. They expressed that not having to

wait for days before being able to see their pharmacist was convenient and less difficult, as they could reach their pharmacist, as long as the pharmacy was open, and in some cases, through phone calls. To them, they could get their challenges addressed without much delay.

“...it’s easier to talk to your pharmacist, because a doctor, you got to wait, and then go in. But with a pharmacist, they’ll usually talk to you right away.” **Participant 7, Male**

Beyond the perception of pharmacists’ being easier to reach when they needed care, participants deemed that the pharmacists’ knowledge was also essential in sustaining the sense of community they felt in the relationships with their pharmacists. Participants perceived the pharmacist as knowledgeable when they provided care that addressed the patients’ personal COPD management needs. Participants also expressed they thought their pharmacist was knowledgeable when they communicated relevant and needed information which made them feel understood. Furthermore, participants felt their pharmacist was knowledgeable when they resolved any of their (patient) issues or provided clarity in unclear situations.

“...She knows everything, knows her job inside and out....she pretty much knows the ins and outs, and knows what questions to ask for which patients.” **Participant 7, Male**

Another participant perceived her pharmacist as knowledgeable because she attended training programs, conferences and seminars on respiratory care and was able to share learnings from such programs with her. Access to new information made this patient feel empowered.

“She belongs to some asthma and respiratory groups and boards and committees, and she’s very up-to-date on the new treatments that come

out...she lets me know when she's gone to asthma conferences or respiratory conferences and gained new information or she tells me about a study that she had been reading up on, as well as I think she's – she has specific like qualifications of her respiratory knowledge, the extra courses or programs she's done in regards to respiratory care.” **Participant 11, Female**

Beyond ease of pharmacist reach and their knowledge, participants discussed that the feeling of being supported by the pharmacist was also important. They described support in the pharmacists' consistence in provision of care both in words and actions, which, according to patients, made their disease management more effective and enhanced the achievement of their treatment goals. Participants acknowledged that in some instances, it involved the pharmacist doing additional work to ensure that they (participants) got what they needed whenever they needed it. This made them feel like “*individuals, not just numbers or business clients*”

Participant 8, Male. Patients also felt supported when the pharmacist considered their financial situation while recommending, or before dispensing their prescription medicines. All these made them feel well cared for.

“We went to Grand Prairie and when I got up there I had forgotten one medication and so I just – we were only going to be there for a week so I just did without it for a week. And then when I came back I mentioned it to her. She says why didn't you phone me? I said well, what would happen then? She said I would send you to a pharmacy up there and you could get some refill just like that. Okay. I said what if I go down in the States?”

Same thing, she says I will get you some or somehow I will convey that you need it to a pharmacist down there.” **Participant 8, Male**

Moreover, a participant acknowledged that her pharmacist’s concern and interest in other areas of her life which may impair her COPD management also made her feel supported and cared for by her pharmacist. On this, she said:

“She cares on more than just a professional level.... she’s always asking about how I’m doing not just about my medical issues or things like that. She’s concerned about why the symptoms are the way they are and if some other aspect of my lifestyle or health is impacting it.” **Participant 11**

The ability to communicate with their pharmacists with familiarity and humor, like friends will communicate with one another felt good to participants and they discussed this helped to nurture their relationship with their pharmacist.

“The other day, she was back in the corner, and she had a mortar and pestle, or whatever, and she was mixing something up. And all I said was double, double, toil and trouble. And she says, what, are you calling me a witch? And I said, no, I’m just quoting Shakespeare. So she’s got a sense of humor, I got a sense of humor... So we do have a nice rapport back and forth. So lots of fun. It’s always a joy to go in there.” **Participant 7, Male**

Some participants also felt supported when their pharmacists put additional effort through phone calls and home visits either to follow up on how they patients were doing or to deliver their services, especially when they had reduced mobility (which is common among patients with COPD).

While some participants described what helps in sustaining their relationships with their pharmacists, other participants' experiences had limited interactions and little relationships with their pharmacists.

Characteristics that hindered interactions

The following categories highlighted what hindered rich patient-pharmacist interactions: *pharmacists' busyness* and *patients' poor awareness of pharmacist's services*.

In contrast to a feeling of the pharmacist being more readily accessible and easier to reach, some participants felt that their pharmacists were not always available to address their needs. Thus for them, the pharmacist's presence at the pharmacy did not mean they could easily interact with them to access care. This was attributed to the participants' perception of pharmacists being very busy based on recurrent experiences of being on long queues in and long wait times to be able to pick up their prescriptions. In some of these participants' opinion, the large customer base, and sometimes, the physical set up of the pharmacy was not conducive for extensive interactions. As a result, some participants regarded the internet or drug inserts as their primary sources of drug information. Based on the perception of pharmacists being too busy, participants were usually unwilling to engage with their pharmacists as to avoid spending a longer time at the pharmacy or delaying other people's drop offs and pickups. Participants who had the perception of pharmacists being too busy commonly were those who sought care at larger pharmacies.

"...There's always a line and they're all running around trying to get everything done especially where I go. They don't have a lot of time to spend with each individual person so...if I'm picking them up right away I

have to wait sometimes an hour or more because there's so many people ahead of me; so I think they're very, very busy.” **Participant 12, Female**

Through some participants' discussions, we noted that a poor awareness of pharmacists' services existed, and prevented them from extensively engaging their pharmacist. Patient's unawareness of some duties and capabilities reflected in their expectations of what care they can access from their pharmacist. While some participants were aware about services other than dispensing, e.g., initiation, adapting or extending a prescription, others were not. For example, Participant 6 (Female), was unaware that her pharmacist could prescribe certain medications because *“they do not have my health records.”* The same participant added that she rarely discussed her prescription medicines with her pharmacist, and was unaware that her pharmacist could assess her inhaler technique. For her, the only form of care her pharmacist is associated with is the filling of prescriptions. In this case, interactions with the pharmacist were limited to only picking up of medication which did not allow for better engagement and hindered a stronger patient-pharmacist relationship.

“I didn't even know that pharmacists could give you a prescription without a doctor's okay.... Well, I don't think they can prescribe a prescription for me without a doctor's note, cause they don't know my – they don't have my health records, I don't think. So, how would they know what to prescribe?” **Participant 6, Female**

3.3.2.3 Participants' response to community of care

The response to the value that participants attached to the pharmacists' care is captured by: *Appreciation of pharmacists' role in disease management, Confidence in pharmacist's ability to manage COPD and Loyalty to pharmacist.*

Some participants described their pharmacists as “caring”, “lovable”, “concerned”, “friendly”, and “personable”. These participants were grateful for the care their pharmacist provided for them and how the care was provided which they saw as valuable. Beyond appreciation, participants were also more confident in their pharmacists’ services and ability based on their experiences. With increased confidence in their pharmacist’s practice came trust and a sense of safety that their pharmacist had their best interest in mind.

“They seem to know what they’re talking about because what they say usually works... you have more confidence in somebody that seems to know what they’re doing, especially when it’s the same person that you’ve been seeing for 30 years.” **Participant 12, Female**

“Since I first met her she’s just been great... she’s probably the best in the city, that’s a doctor’s opinion. If she closed her doors, I’d be in dire straits. It sounds odd when you say that about somebody you deal with. But when you find somebody that you deal with whether its medicine or buying clothes or cars and you trust them, you don’t want them to leave. Knowing that I’ve got who I have behind me in my medical situation I feel well protected” **Participant 9, Male**

With trust and sense of safety, came a sense of loyalty of participants to their pharmacists. Loyalty was also due to the value participants perceived they got from their pharmacists and in a lot of cases, the personal and social skills, and the friendly attitude of the pharmacists and other pharmacy staff. Loyalty is also displayed when participants access care from their pharmacy, even when it is not necessarily the closest to them or convenient to do so. It

is also displayed in patients sticking with their pharmacist even with the awareness that they could get their prescriptions from other pharmacies at lower prices. On loyalty, a participant said:

“I’ve been going to her for 25 years. I go out of my way because the hours that the pharmacy is open are limited compared to big commercial companies or, you know, the grocery stores that have the pharmacies in them. Honestly the reason I haven’t left is I like the personal attention that she ... part of it I think is the longevity of the relationship that we’ve had, also she’s very personable and asks questions and it’s not just a service where you go in put your prescriptions in and you get your meds and out the door.” **Participant 11, Female**

3.3.2.4 Expectations

Based on experience of accessing care from their current pharmacies or those they had used at some point or the other, participants had a variety of expectations of pharmacists in general. Participants’ expectations were observed to be linked to experiences of an absence of the ‘characteristics that fostered interactions’. The categories we identified here were *better pharmacist’s availability to address patient’s needs, improved communication skills, and better support strategies*. Participants expressed that the lack of these things had made them change their pharmacies at times during the course of their disease management. For availability, participants expressed a need for pharmacists to be more available, especially to address their needs as chronic disease patients. Improved availability entailed pharmacists being able to engage their patients as needed, despite their busy schedule. A participant described that though her pharmacist was very busy, she still found a way to attend to her patients’ needs at the pharmacy.

Some participants also discussed that respectful and friendly interactions with the pharmacist/pharmacy staff were important, and preferred that in comparison to interactions that were overly formal.

They also discussed support in terms of pharmacists consistently delivering care with high quality. Pharmacists could also be supportive by being flexible in delivery of care like prescription drop off and administration of vaccines, especially for individuals with reduced mobility. A participant who got vaccinated in his home by his current pharmacist said his previous pharmacist would never have done that because in that setting, *“everything was black and white, there were no in-betweens”* Participant 9, Male. Some participants wished that their pharmacists were more helpful in getting them to stop smoking. Support was also seen in the light of earlier initiation of discussions on smoking cessation by the pharmacist, pharmacists being more detailed in their education and counselling services, including demonstration of inhaler technique and also providing information on programs like pulmonary rehabilitation which the patients said could help them better manage their condition.

“This is how you take the medication, this is what you’re supposed to do whether you rinse or gargle or whatever after. And this is how you actually do, like, inhale.” That’s how I would like it. Not just, “Here you go, this can cause this, do you understand? See you later.” I would like it if they went more into show you how to use it, explain more, give you some examples of some side effects. Because if they ask you, “Okay, do you have any side effects?” how do you know? I just might not be feeling well this day or, “Hey, I got a rash,” but I didn’t – it might affiliate with that.”

Participant 5, Male

“And then I tried [name of pharmacy], because they had the low dispensing fee, one of the lowest, and they were horrible. They were just horrible. They didn’t understand what you were saying. They didn’t have your medication ready. You know, there was, like a hassle after hassle.”

Participant 10, Female

In communicating however, a participant said his pharmacist should use simple language to enable him understand medical terms, which he was unfamiliar with.

“I don’t understand all the words that he says. I don’t understand everything. Sometimes, not often, because a lot of times – I think people, and myself included, feel less intelligent if somebody’s talking very big words or whatever, and so you’ll just agree, and even if you don’t understand them, you’ll just agree.” **Participant 5, Male**

3.4 Discussion

This study explored the experiences of patients living with COPD of care provided by pharmacists using qualitative descriptive methodology. Our study participants’ experience of pharmacy care varied based on the depth of patient-pharmacist engagements. For some patients, the pharmacist was proactively and consistently involved in patient care through the provision of medication and non-medication services. In addition to this, the pharmacist proactively collaborated, communicated, educated, engaged, connected with, and supported their patients with empathy. This made those patients value pharmacy care and regard their pharmacist as an essential member of their healthcare team. Other patients however did not perceive their

pharmacists as an essential member of their healthcare team. These patients had limited interactions and engagement with their pharmacist, which may have been linked with the perception of pharmacists as being too busy to interact with them, and a poor awareness of pharmacy services in COPD care. Though the overall experiences of the participants were somewhat positive, the challenges expressed by the participants can serve as a ground to improve care.

Through patients' experience of care in the timely management of exacerbations, medication dispensing by the pharmacist, and optimization of pharmacotherapy, participants perceived their pharmacist as the medication expert and the assurer of appropriate therapy. This aligns with findings from a review by Anderson and colleagues that patients perceive community pharmacists as medication experts.³⁶ Additionally, some patients' experience of non-medication care such as referral for diagnostic tests, health promotion, educational consultations and smoking cessation support improved patients' awareness, and empowered patients to take responsibility for their own health. Active patient education and empowerment promote patients' self-management, which is a crucial component of high quality care, especially in chronic disease management.³⁷ Access to necessary information may have also helped our participants address uncertainties about their disease management or effectiveness of treatment, which are suggested to be anxiety-provoking in chronic disease patients.³⁸

Beyond disease management activities, we were able to understand that the way care is delivered (pharmacist's level of patient centredness) is a major influence on the patient's experience of pharmacy care. Effective communication, provision of care with empathy, collaborative practices with other healthcare providers were elements of patient-centred care that the participants discussed. Through the pharmacists' proactive conversations and communication

(active listening, speaking and asking relevant questions), pharmacists were able to identify and address patients' personal challenges to smoking cessation and COPD management, as well as medical needs such as the need for confirmatory diagnosis based on patients symptoms. This patient-centred communication was crucial to the provision of individualized care to patients. In addition to this form of communication which helped pharmacists identify and proffer solutions to patients unique needs, the experience of being supported and cared for with empathy and the humor/familiarity that characterized patient-pharmacist interactions made patients look forward to their pharmacy visits. This aligns with previously published findings that good communication, empathy and support are elements of successful patient-healthcare provider relationships.^{18,39,40}

Furthermore, from the patients' experiences, we also understand the importance of pharmacist-physician collaboration. Collaboration was illustrated by the physician's standing order for antibiotics at the pharmacy, the pharmacist calling the physician to address patients' prescription issues and importantly, the shared decision making process involving the patient, pharmacist and physician in the initiation of appropriate therapy for the patient. The pharmacists' involvement in choosing an appropriate therapy for the patient is an evolutionary step in changing the narrative of pharmacists' being just medication dispensers, which a number of studies have reported.^{41,42} It is also informative that patients who discussed their pharmacist-physician collaboration and their experience of shared decision making with the pharmacist were those who regarded their pharmacists as an essential member of their healthcare team. This confirms that collaboration and shared decision making are crucial components of patient-centred care.⁴³ Some patients however interpreted this collaborative efforts as a gap in care due to lack of pharmacist autonomy in making some decisions on patients' drug therapy.

The lack of patient-centred care in some participants' experience underscores the need for pharmacists to be deliberate in the consistent delivery of patient-centred care. Though our study did not explore how patients' outcomes were impacted by the level of patient-pharmacist interactions, strong relationships were important to our participants, and they attributed some of their disease management successes to them. With the provision of consistent high-quality care and patient engagement, patients perceived their pharmacists as valuable. In response to this, patients had increased confidence in the pharmacists' practice and expressed a strong sense of loyalty to their pharmacists, based on trust and a sense of safety. These findings are echoed by another study suggesting that positive customer perceptions of the pharmacist significantly influence devotion.⁴⁴

Furthermore, though the overall experiences of our participants were somewhat positive, this study also highlights challenges in pharmacy care of patients with COPD, which if addressed can improve patients' experience of care. Some of the challenges we identified include patients' poor awareness of pharmacists' scope of practice, patients' perception of the pharmacists as being too busy for effective communication and forming connections, inadequate information/education, and inadequate support in COPD care such as disease awareness, COPD prevention and smoking cessation.

Patients' poor awareness of pharmacists' scope of practice reflected in the perception that the pharmacist does not have access to patients' health records and may not have enough information to be able to make some clinical decisions such as medication prescribing. Though pharmacists may lack access to patient records in other jurisdictions, this is not the case in Alberta where this study was done, as Netcare (provincial health electronic records) allows health care professionals (pharmacists included) have access to patients' information. Patients

perceived the pharmacists as being too busy for extensive interactions based on experiences of long queues and long wait times at the pharmacy. Lack of time is a known barrier to the provision of patient-centred care by pharmacists.⁴⁵ To address the limitation of time, expansion of the roles of pharmacy technicians and other pharmacy support workforce have been made to enable pharmacists focus more on intellectual decision making and provision of patient-centred care.^{46,47} Other methods through which lack of time may be addressed include more than one pharmacist working at a time, and if allowed by the law, having a technician checking the prescriptions filled by other technicians, as against the pharmacist.⁴⁸ The poor awareness of pharmacy services and the patients' perception of pharmacists as being too busy may have limited some patients' expectations of the pharmacist, and this aligns with existing evidence.^{41,44,45,49} It is therefore important to put more effort into increasing public's awareness of pharmacy services to improve care and patients experiences of care.^{41,49}

Inadequate information/ education was experienced by participants when the pharmacist provided drug information through drug inserts as against verbal communication. Though it may be more convenient or less time consuming for the pharmacists to direct patients to drug inserts for information, there are some barriers that limit the effectiveness of using drug inserts alone to educate patients about their medication. These include poor health literacy, reading difficulties by the elderly, and the use of technical language in the drug inserts which patients may not understand.⁵⁰ To address the challenge of inadequate information/ education, verbal (in simple and understandable language) and written communication, with the use of visual aids/ demonstrations (where appropriate), should be used concurrently to educate patients on their medication.⁵¹

On inadequate support in COPD awareness and prevention, a majority of the participants' said they were unaware about the association between their symptoms and smoking (a major risk factor) with COPD, which may have contributed to their late disease diagnosis. Poor disease awareness and late diagnosis are documented challenges in COPD management.^{5,6,52,53} It is therefore imperative that pharmacists proactively ask their patients questions on their risk factors and symptoms, listen to these patients, educate them, and answer any questions the patients may have with empathy to improve patients' awareness on COPD, which may lead to earlier disease diagnosis and management. Furthermore, to support patients in quitting smoking, psychological factors such as anxiety and depression should be addressed through behavioural therapy and individual counselling.^{54,55} A participant's submission, which aligns with published evidence, suggests that smoking cessation in patients with COPD may be more challenging due to these mental barriers.⁵⁴

Finally, we have seen that patients' experience of patient-centred care may be linked with their perception of the pharmacist as an essential member of their healthcare team or otherwise. Patients' experience of pharmacy care may be enhanced if the challenges we identified are addressed. With the evolution of pharmacists' roles and the unique needs of patients with COPD, it is essential that pharmacy care is consistently patient-centred.

3.5 Limitations

We recruited study participants using the convenience sampling approach. Thus, the study sample may not fully represent the wide range of COPD patients' experiences. Another limitation is that our study participants were diagnosed in the past, which might affect their experiences with pharmacists as pharmacy care has changed more recently. Additionally,

participants relied on their memory to answer the interview questions. Also, most of them did not have the experience of their pharmacists being involved in their diagnosis, which we were interested in. Furthermore, all participants were recruited from an urban area, leaving out those in rural areas whose experiences may have been different based on previous findings that pharmacy practices may differ between urban and rural communities.⁵⁶ Participants did not also have an opportunity to go through the transcripts to validate what was said during the interviews, neither did they go through the analyzed data to provide their feedback on the appropriateness of the codes in capturing their experiences. Last, time restrictions and the current global pandemic were factors that affected the sample size and collection of data.

3.6 Implications for research and practice

Based on patient experiences, the following aspects of pharmacist provided care should be considered.

1. Patients appreciate and anticipate meaningful interaction with their pharmacists about patients' overall health, the use of medications, managing side effects and assistance with smoking cessation;
2. Patients appreciate pharmacists being involved in prevention and timely management of exacerbations, e.g., standing orders for antibiotics;
3. Patients value pharmacists being an active collaborator with the patient's physician (family or specialist), e.g., in addressing prescription errors and in the initiation of appropriate therapy;
4. Patients value pharmacists connecting patients with resources, e.g., rehab programs;

5. Patients appreciate pharmacists' knowledge of them, i.e., recent hospitalizations, medication use that might signal an underlying condition (COPD) and other challenges (personal or otherwise) which may impair COPD management;
6. Patients identified the need for ongoing care;
7. Patients identified the importance of being aware of COPD, COPD symptoms and risk factors pre-disease diagnosis, and being supported in early disease identification.

Future research should explore the impact of pharmacy care of COPD on patient outcomes. As the experiences of rural patients may differ from those in the urban areas, these patients' experiences may also be explored. To understand current pharmacists' practices with regards to early disease identification, it may be important to conduct interviews for recently diagnosed patients, as their experiences may differ from our study participants who have lived with COPD for seven years on average.

3.7 Conclusion

Pharmacy care is important in successful COPD management. In improving pharmacy care in COPD, the experiences of patients are crucial. For patients with COPD, it is important for the pharmacist to properly educate, communicate and connect with their patients, show empathy and consistently provide support in their disease management such as timely management of exacerbations. Our findings also indicate a need for patients' early awareness on COPD, support in early disease identification and patient-centred care in disease management. Lastly, patient awareness of pharmacy services may influence the utilization of such services, thus affecting their overall experience of care.

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CHAPTER 4

GENERAL DISCUSSION AND CONCLUSION

4.1. General discussion

The timely diagnosis and optimal management of patients are essential in reducing the growing burden of COPD on the healthcare system. Pharmacists are well positioned to contribute to the optimization of COPD care due to their educational background and training, scope of practice, and accessibility to the public. They can identify new COPD cases and also manage, support, and follow up with these patients, particularly in community settings. To inform the development of a community pharmacist initiated case-finding intervention, it was important to, first, identify case-finding approaches and the characteristics of studies with the highest yields and, second, to understand patients' experiences of accessing care from their pharmacists. In this thesis, we used two different methodologies in two projects (a scoping review of the literature and a qualitative study) to achieve our research objective.

4.1.1 Scoping review of COPD case-finding services by healthcare professionals

The first study was a scoping review of the published literature on COPD case-finding aimed at highlighting evidence-based case-finding approaches that can be considered by community pharmacists. Highlighting evidence-based case-finding approaches was done by providing an overview of case-finding approaches by healthcare professionals (HCPs), examining the yield of these case-finding approaches, and identifying characteristics of studies with the highest yields. Other objectives of the review were to identify interprofessional collaborative practices in case-finding and the delivery of preventive services to individuals at risk. We summarized the results of 132 peer-reviewed studies using the Joanna Briggs Institute and PRISMA Extension for Scoping Reviews (PRISMA ScR) guidelines.^{1,2}

We identified 20 COPD case-finding approaches deployed by a HCP alone, or in collaboration with other HCPs. In all but one, the approaches involved multiple steps including a questionnaire or any combination of a screening questionnaire and: handheld spirometry devices; peak flow meters; or conventional spirometry, with or without bronchodilation. The yield of new cases by these approaches ranged from 2.3% to 33.5% of the study population. The approaches with the highest yields all involved the use of bronchodilator spirometry either alone or with other screening tests to identify new cases. The following characteristics were observed in the studies that had the highest yield of new cases: provider education/training, patient education, active case-finding targeted towards high risk and/or symptomatic patients as against the general population, multi-step approaches to case-finding, which included spirometry (as opposed to the use of questionnaires alone), provider engagement, diagnostic criteria by guidelines, and engagement of other healthcare professionals. HCPs also engaged one another either as part of a multidisciplinary team involved in the case-finding or for the referral of study participants for confirmation of diagnosis, initiation of treatment, or commencement of smoking cessation programs, among other needs. A few studies reported referrals for smoking cessation programmes, while none reported on vaccinations.

Some of our observations are consistent with the findings from Haroon and colleagues in a systematic review on effectiveness of COPD case-finding approaches.³ The systematic review suggested that active case-finding of symptomatic patients with or without risk factors produces a higher yield of new cases than inviting the general public, and that provider-led case-finding may lead to higher yields than patient-led case-finding. In addition to the findings similar to both our scoping review and that of Haroon and colleagues, these , we also identified other characteristics of high yielding studies as provider training, patient education, and engagement of

other healthcare professionals. However, our study did not assess the impact of these on the yields. Our study also highlights the different approaches and their variations based on bronchodilation or pre-set criteria between steps involved in each approach.

Other studies have demonstrated the role of pharmacists in the feasibility and effectiveness of COPD case-finding in community pharmacy setting.⁴⁻⁶ Using this background and the evidence of 20 case-finding approaches in our review, pharmacists have the flexibility to choose whichever is most feasible for deployment in their practice settings. However, though the approaches with the highest yields all involved bronchodilator spirometry as the confirmatory test for COPD, this may not be feasible in the community pharmacy setting based on the stipulated quality assurance requirements⁷. Thus, as seen with pharmacy based studies, pharmacists can conduct case-finding with the use of questionnaires and microspirometry tests which are less expensive and require a lesser amount of training and time to effectively deploy.⁸ Finally, the need for confirmatory diagnosis may necessitate the collaboration of pharmacists with physicians for the confirmation of identified cases.

It is important to note some of the limitations in our study that include non-assessment of the methodological quality of the reviewed studies and the influence of other factors that may have affected the yields such as study population and recruitment strategy. In addition, since inferential statistical analyses were not done, the significance of the differences in the yields by quartiles is unknown. Last, the yields may have been influenced by other factors such as study design, recruitment strategy, study setting, and healthcare practitioners involved.

Collectively, observations from our scoping review and other published findings provide evidence on how pharmacists may identify potential COPD patients who may have otherwise

remained undiagnosed. This evidence is relevant as we believe that pharmacists have an important role to play in early COPD identification.

4.1.2 Qualitative study of COPD patients' experience of pharmacists' provided care

This second study was a qualitative study, guided by the qualitative description methodology, with analysis done using qualitative content analysis. The objective of this study was to understand the perception of patients living with COPD of their pharmacists and their experiences of pharmacists' provided care in COPD diagnosis and management. Data was obtained through audio-recorded, semi-structured interviews of 12 consenting patients with COPD.

Patients had a wide range of experiences. The majority of the patients discussed that their pharmacists were not instrumental to their disease diagnosis. However, to various extents, they all had experiences of pharmacy care in COPD management which reflected in the type of relationships they had with the pharmacist. The level of patient-pharmacist interactions was also linked to patients' perception of the pharmacists. Participants who regarded their pharmacists as an essential part of their healthcare team had a spectrum of meaningful care experiences, such as medication dispensing, initiation of prescriptions, assistance with timely management of exacerbations, medication assessment, and medication reviews. The experience of care through medication services made patients perceive their pharmacists as medication experts. Their experiences were also characterized by their pharmacists' good communication, engagement, forming of connections with the patients, support, and the provision of care with empathy. For those whose pharmacists were not perceived as a key member of their healthcare team, patients had experiences of less than ideal/poor education by the pharmacist, ineffective communication by the pharmacists, limited interactions with their pharmacists due to the busy pharmacy

environment and lack of time by the pharmacists, lack of connections with the pharmacist, and inconsistent quality service. Other findings reveal that these patients had limited expectations of their pharmacists, and a poor awareness of pharmacy services.

In comparing our findings with existing literature, our study participants' perception of their pharmacists as medication experts is echoed by a systematic review.⁹ Beyond medication services, our study also highlights the importance of patient education, health promotion and smoking cessation support in patients' overall experience of care. Furthermore, previous research suggests that provision of individualized care with empathy and consistent support strengthens patient-pharmacist relationships, which may affect patient outcomes.¹²⁻¹⁴ Our study participants also identified that care provided with empathy is important, with those who regarded their pharmacist as an essential member of their healthcare team attributing some of their disease management successes to the pharmacists' ability to listen and offer solutions to their challenges with empathy. In accessing care, patients' experience also points to the importance of patient-pharmacist collaboration and patient-pharmacist-physician collaboration in addressing prescription errors or initiating appropriate therapy for the patient. Patient-pharmacist collaboration is a key component of shared decision making, which is crucial to successful patient-centred care.¹³ The limited interactions of some participants, which may be linked with their poor awareness of scope of pharmacists' practice/ pharmacy services such as initiation of prescriptions and access to patients' health records aligns with the findings of a systematic review that poor public awareness of pharmacy services is accompanied with low utilization of such services.¹⁴ Lastly, our participants' experiences highlight some challenges in care such as ineffective communication and lack of connections with the pharmacist, inadequate information/education to empower patients and improve their awareness, and inadequate support

in COPD prevention and smoking cessation. These challenges reflect that pharmacy care of COPD patients is beyond medication dispensing.

Collectively, our findings and others from previously published studies highlight patients' experiences and gaps in care. The contributory factors to positive patient experience should be reinforced while gaps in care should be addressed. It is crucial that these gaps are addressed to enhance the experience of patient-centered care of people living with COPD.

4.2 Implications and future directions

4.2.1 for clinical practice:

Our research work has potential implications for enhancing the role of pharmacists in COPD case-finding and management. Based on risk factors, such as age over 40 years and tobacco smoking, respiratory symptoms like dyspnea, and cough with or without sputum production, pharmacists can identify patients at risk of COPD and screen such patients with instruments like a questionnaire and a microspirometry device. It is however important that cases are confirmed with bronchodilator spirometry which may not be feasible in the community pharmacy setting. Thus, collaboration with other capable professionals may be necessary to ensure suspected cases receive diagnosis. Appropriate measures should also be in place to ensure that patients are not lost to follow up as they move from one healthcare provider to another.

Furthermore, pharmacists should proactively engage their patients by listening and asking relevant questions to identify their needs, such as barriers to smoking cessation and management of exacerbations, and adapt their services to meeting patients' unique needs. In educating patients, pharmacists should communicate verbally, as against the reliance on leaflets and drug inserts. We have also identified a need for the improvement of the public's awareness on the

pharmacy services in COPD care which pharmacists may do through extensive engagements of their patients or deeper interactions during provision of care. As echoed by an earlier study,¹⁶ we suggest that increased awareness will reflect in patients' increased expectations of, and demand for services geared toward supporting their disease management. Though evidence suggests that lack of time is a barrier to patient-pharmacist interactions,¹⁷ pharmacists could find ways to meaningfully engage their patients to maximize consultation times. In some jurisdictions, services such as comprehensive annual care plans (CACP) and standard medication management assessment (SMMA) are some avenues through which pharmacists engage their COPD patients.

4.2.2 for future research:

Through our scoping review, we have identified COPD case-finding approaches, in addition to the characteristics of high yielding studies. Studies conducted in the community pharmacy setting also show that pharmacists can identify potential COPD cases by collaborating with other healthcare professionals to confirm patients' diagnosis. From our qualitative study, we understand it is important that patients are aware about COPD, its associated symptoms and risk factors, even before disease diagnosis. We also understand that pharmacists' ability to communicate well (active listening, asking relevant questions, being empathetic) and effectively educate/inform is important to patients. In addition to these, patients appreciate forming of connections and good relationships with their pharmacists, which arise from extensive patient-pharmacist interactions. Our study findings, which are also backed up by previously published evidence, reinforces our belief that patients overall experience of pharmacy care may be improved if these elements of patient-centred care are incorporated into service delivery by pharmacists. Based on these, we propose a case-finding intervention at the community pharmacy setting.

Study purpose: The purpose of the study is to evaluate the effectiveness of a case-finding intervention in the community pharmacy setting. The study objectives are to: 1) Compare the yield of two case-finding strategies: intervention versus usual care; 2) To assess patients' satisfaction with case-finding intervention and; 3) To assess pharmacists' attitude to and perception of case-finding in routine practice.

Study design and setting: Cluster randomized controlled trial in community pharmacies in Alberta.

Study population: Community pharmacy clients who are ≥ 40 yrs and have a history of smoking, in addition to any of the following: cough with or without sputum production, breathlessness with or without exertion, past history of asthma, severe childhood respiratory disease, and regular purchasers of cough medicines or smoking cessation products. Patients with confirmed COPD diagnosis or those with conditions for which spirometry is contraindicated and non-consenting patients will be excluded. Potential participants may be identified through electronic pharmacy records or during routine pharmacy visits.

Study Procedures:

Intervention Group:

1. Development and delivery of training program for pharmacists on communication skills, provision of patient-centred care, and how to build and sustain an enabling environment for patient-centred care. Findings and quotes from the qualitative study will be incorporated into the training program;

- a) Communication skills training will enhance pharmacists' ability to actively listen and respond to patients with empathy, and ask relevant questions in order to identify and address potential barriers to COPD case-finding;
 - b) Training on patient-centered care will incorporate the reinforcement of evidence-based models supporting community pharmacists to increase engagement with patients, and enriched with the components of care that patients identified as important, such as provision of care with empathy, familiarity between a patient and a pharmacist, and collaborative practices involving the patient and the health care provider;
 - c) Strategies on creating a caring environment will address factors that hindered patients' community of care such as patients' perception of pharmacists being too busy and patients' poor awareness of pharmacy services, and patients' expectations of their pharmacists in chronic diseases/COPD care. Strategies and tools on how to overcome these barriers will be incorporated in the training. Previously discussed effective communication and patient-centeredness will enhance maintaining a caring environment, through the pharmacists' knowledge of patients and proactivity in identifying and addressing patients' unique challenges, extensive pharmacist-patient interactions, active patient engagement and patient empowerment. Others are pharmacists' availability to address patient needs, forming of connections, provision of education and health promotion services, and consistency in provision of high quality service;
2. Training of pharmacists on the use of a microspirometry device;
 3. Consenting patients' completion of questionnaire on demographics, risk factors, respiratory symptoms, co-morbidities;

4. Patient education on COPD using the lung association COPD brochure as a guide to improve patients awareness on COPD, its associated symptoms and risk factors;
5. Initial use of the COPD Assessment Test TM, (CAT) questionnaire and vitalograph COPD-6 device;
6. Referral of patients with a CAT score of ≥ 10 and a microspirometry reading of FEV1 < 80% by the pharmacist to a pulmonary function laboratory for confirmatory diagnostic testing. Pharmacists will fill a study documentation form which includes details on case-finding, a short patient history and reasons for referral for diagnosis. The patient may be given a copy if they decide to have it. A requisition for a pulmonary function test which has been pre-signed by the collaborating pulmonologist on the team will also be given to the patients to take to a pulmonary function laboratory. Pharmacists may fax the lung function test requests to the laboratory on behalf of patients who consent to the pharmacist doing so (if not available on Netcare). Follow up with patients will be 7, 14, and 21 days post screening to confirm that patients have visited the laboratory. If patients had not visited the laboratory for testing at the first call, the importance of early diagnosis will be reinforced and patients informed they will be called in another week. There will be three phone calls in total to encourage patients to visit the laboratory for testing;
7. Confirmation of diagnosis (or ruling out) after the study pulmonologist receives the test results, and this will be documented and shared with the pharmacist. The pulmonologist will then refer confirmed COPD cases to their family physicians for follow up and initiation of treatment, if needed.

Control group (usual care)

1. Consenting patients' completion of questionnaire on demographics, risk factors, respiratory symptoms, co-morbidities
2. Initial use of the COPD Assessment Test™ (CAT) questionnaire and vitalograph COPD-6 device and referral of patients with a CAT score of ≥ 10 and a microspirometry reading of FEV1 $< 80\%$ to the patients' family physician for further investigation/diagnosis. Pharmacist will provide a study documentation form for a physician (family doctor or unspecified if a participant has no family doctor) with case-finding details, short patient history, and reasons for referral. Patients will be given the options of handing over the form to the physician by themselves or the form being sent directly to the physician by the pharmacist.
3. Follow up with patients will be 7, 14, and 21 days post referral to confirm patients have visited their physicians. If patients had not visited the physician at the first call, the importance of early diagnosis will be reinforced and patients informed they will be called in another week. There will be three phone calls in total to encourage patients to visit their physicians for confirmatory diagnosis. Thereafter, all participants will be contacted through email or phone call to obtain the number of confirmed cases.

Outcomes:

Primary outcomes:

1. Difference in proportion of new cases between groups

Secondary outcomes:

1. Patient assessment of and satisfaction with case-finding intervention

2. Pharmacists attitude to and assessment of case-finding in practice

Information from this study will provide more insight into the practicability of COPD case-finding in routine pharmacy practice in the Canadian setting. It will also be important for future studies to assess the long-term benefits of pharmacists conducting case-finding services and the subsequent effect on patient, clinical, and economic outcomes.

4.3 Conclusion

The two studies presented in this thesis identified COPD case-finding approaches, the characteristics of approaches with the highest yields, and the perception and experiences of patients living with COPD of pharmacists' provided care. These are essential elements that may inform pharmacists' involvement in COPD case-finding and management, and may subsequently improve the pharmacy care experience of people living with COPD. Lastly, from these two studies, a case-finding intervention has been proposed.

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APPENDICES

Appendix 3.1: Interview guide

1. How were you diagnosed with COPD and what role did your pharmacist play in your diagnosis?
2. Who helps you manage your COPD?
3. Tell me about your experiences with your pharmacists' provided care
4. What is the pharmacist role in caring for you?
5. Imagine that your pharmacist can do more, what would help you to manage your COPD?

Prompt used include;

1. Can you tell me more about that?
2. How did that make you feel?
3. Could you give me an example?
4. Why was that important to you?

Appendix 3.2. Participants' demographic questionnaire

1. Gender: Male ____ Female _____ Prefer not to say _____
2. Year of birth: _____?
3. What year were you diagnosed with COPD?
4. How often do you visit a community pharmacy to access health services?
 - More than once a month
 - Monthly
 - Once in two months
 - Once in three months
 - Less than every three months
 - Never
5. In the past year (past 12 months), how many times have you experienced a COPD flare-up which required either additional medications (e.g., antibiotic), a visit to the emergency room, or hospitalization?
 - 0
 - 1
 - 2
 - 3
 - Other: _____
6. Do you have any of the following health conditions? Please select all that apply.
 - Diabetes
 - High blood pressure
 - Lung cancer
 - Sleep apnea
 - Heart disease
 - Asthma
 - Musculo-skeletal disorder
 - Other _____

Appendix 3.3 COREQ checklist

	Item No	Guide Guides /Description	Location in manuscript/ Reported on page no
Domain 1: Research team and reflexivity			
Personal Characteristics			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group? TM and OI conducted interviews 1 to 4 together. MQ and OI conducted interviews 7 to 9 together while OI conducted interviews 5,6,10 to 12 alone.	Methods-74
Credentials	2	What were the researcher's credentials? OI- BPharm MSc candidate MQ- RD MSc PhD TM- BS Pharm, PhD	Title page
Occupation	3	What was their occupation at the time of the study? OI- Master's student MQ- Qualitative researcher TM- Assistant Professor	Methods-79
Gender	4	Was the researcher male or female? Females	Methods-78
Experience and training	5	What experience or training did the researcher have? OI- Took a graduate study course on qualitative research MQ- Over 11 years of experience as a qualitative researcher TM-	Methods-79
Relationship with participants			
Relationship established	6	Was a relationship established prior to study commencement? No	
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research Participants were briefed on the purpose of the study. Participants also reviewed the study information sheet before they gave written informed consent to be involved in the study.	Methods-74
Interviewer characteristics	8	What characteristics were reported about the inter viewer/facilitator? e.g. Bias,	Methods-79

		assumptions, reasons and interests in the research topic OI and TM acknowledged to be non-practicing pharmacists with interests in improving pharmacy care of COPD patients	
Domain 2: Study design			
Theoretical framework			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis Qualitative descriptive methodology with qualitative content analysis	Methods-72
Participant selection			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball Convenience	Methods-73
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email Recruitment involved use of posters and face-to-face invitation	Methods-73
Sample size	12	How many participants were in the study? 12	Methods-74
Non-participation	13	How many people refused to participate or dropped out? Reasons? Two. One person declined to participate in the interview and another individual could not be interviewed due to the global pandemic.	Methods-73
Setting			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace Majority of the participants were interviewed at home. Other settings for data collection were; a meeting room at the University of Alberta and a pulmonary rehabilitation centre.	Methods-74
Presence of non-participants	15	Was anyone else present besides the participants and researchers? A non-participant (participant's spouse) was present during one of the interviews	Methods-74
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	Methods-74

		Interviews were conducted from October 1st, 2019 to January 8th, 2020. Twelve participants- six females and six males. Their ages ranged from 46 to 85 years and they had been living with COPD between two to 22 years.	Results- 80
Data collection			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested? Interviews were semi-structured, using a guide which is attached as an appendix. The interview guide was iterated during the data collection process to enrich the collected data.	Methods- 74 to 75
Repeat interviews	18	Were repeat inter views carried out? If yes, how many? No	
Audio/visual recording	19	Did the research use audio or visual recording to collect the data? All interviews were audio-recorded and transcribed	Methods- 74
Field notes	20	Were field notes made during and/or after the interview or focus group? Field notes were made during and after the interviews.	Methods- 75
Duration	21	What was the duration of the inter views or focus group? The semi-structured interviews ranged from 20 to 114 minutes.	Methods- 74
Data saturation	22	Was data saturation discussed? In the methods section, we discussed data saturation was reached by the 12th interview.	Methods- 73
Transcripts returned	23	Were transcripts returned to participants for comment and/or correction No	
Domain 3: analysis and findings			
Data analysis			
Number of data coders	24	How many data coders coded the data? At the start, OI and MQ independently coded a transcript and discussed consistency of the codes and he coding process. Thereafter, OI coded all the transcripts, with supervision and feedback by MQ.	Methods- 76

Description of the coding tree	25	Did authors provide a description of the coding tree? Yes	Methods-77
Derivation of themes	26	Were themes identified in advance or derived from the data? Themes were derived from the data	Methods-76
Software	27	What software, if applicable, was used to manage the data? NVivo 12 software	Methods-76
Participant checking	28	Did participants provide feedback on the findings? No	
Reporting			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number Comments were supported with direct quotes from participants who were anonymized by participant number and sex.	Results- 81 to 97
Data and findings consistent	30	Was there consistency between the data presented and the findings? Yes	
Clarity of major themes	31	Were major themes clearly presented in the findings? Yes	
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes? No	