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To cite this article: Min J. Joo, Lisa K. Sharp, David H. Au, Todd A. Lee & Marian L Fitzgibbon (2013) Use of Spirometry in the Diagnosis of COPD: A Qualitative Study in Primary Care, COPD: Journal of Chronic Obstructive Pulmonary Disease, 10:4, 444-449, DOI: [10.3109/15412555.2013.766683](https://doi.org/10.3109/15412555.2013.766683)

To link to this article: <https://doi.org/10.3109/15412555.2013.766683>



Published online: 28 Mar 2013.



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ORIGINAL RESEARCH

Use of Spirometry in the Diagnosis of COPD: A Qualitative Study in Primary Care

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Abstract

Guidelines that recommend spirometry to confirm airflow obstruction among patients with suspected COPD are not routinely followed. We conducted a qualitative study to identify attitudes and barriers of primary care physicians to performing spirometry for patients with possible COPD. We conducted four focus groups, each with three primary care physicians (PCPs) who practice in an urban, academic medical center. In general, PCPs believed that spirometry was not necessary to confirm the diagnosis of COPD. Compared to other co-morbid conditions, in a patient with a diagnosis of COPD without self-reported symptoms, COPD was not a priority during a clinic visit. This was in part due to the belief that there was lack of evidence that medication used in COPD lead to improved outcomes and that there was no point of care measure for COPD compared to other co-morbid conditions such as diabetes mellitus or hypertension. Health system barriers specific to spirometry use was not identified. In conclusion, in our sample of PCPs, there was skepticism that spirometry is warranted to diagnose and manage COPD. Availability of spirometry was not a perceived barrier. Our results explain, in part, why previous interventions to improve access to spirometry and diagnosis of COPD in primary care settings have been difficult to conduct and/or have had marginal success. Our findings strongly suggest that a first step toward increasing the use of spirometry among primary care physicians is to have them believe in its utility in the diagnosis of COPD.

Introduction

The presence of airflow obstruction that is not fully reversible as measured by spirometry is the most common and easiest means to confirm the diagnosis of chronic obstructive pulmonary disease (COPD). Studies suggest, however, that only one third of newly diagnosed COPD patients have spirometry performed (1–3). Current studies suggest that provider factors may be associated with the underutilization of spirometry, but the specific factors involved have not been delineated (2). Several studies indicate that COPD is under-diagnosed among patients with disease as well as over-diagnosed for patients without disease (4–9). It is unclear why use of spirometry is limited, but because the majority of COPD care occurs in the primary care setting primary care physicians are key in understanding barriers at both the provider and healthcare systems levels.

Previous research from Australia designed to identify barriers to spirometry utilization identified provider attitudes and practice patterns that may

Keywords: chronic disease, diagnosis, pulmonary diseases, qualitative research.

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explain low uptake of spirometry to diagnose COPD (10, 11). These studies used qualitative methods which can be useful in assessing attitudes of primary care providers and identifying barriers to care. In these Australian studies, general practitioners (GPs) relied upon smoking history and presence of risk factors more highly than spirometry in diagnosing COPD. GPs often viewed COPD as a low priority chronic illness in the context of patients with numerous and more critical co-morbidities. It is unclear if these findings are generalizable to physicians in the United States.

One U.S. study used a series of qualitative interviews with primary care physicians (PCPs) to identify management problems that constrain the ability of PCPs to better diagnose and manage COPD (12). Physicians were consistently frustrated with the time constraints during a single clinic visit which reportedly led to most practices being unable to incorporate spirometry as part of the diagnostic process. However, since spirometry can be obtained outside of a primary care visit, this may not completely explain the limited use for the diagnosis of COPD. Another U.S. study used a survey to identify barriers to the implementation of COPD guidelines (13). This study found that the lack of guideline familiarity was not a major barrier and that agreement with guideline recommendations may play a more significant role in predicting adherence to guidelines.

A better understanding of the barriers to spirometry use among primary care physicians in the United States could lead to the development of interventions aimed at improving the diagnosis and management of COPD. The objectives of this study were to use qualitative methods to characterize primary care physicians' perspectives on the use of spirometry in COPD and to identify attitudes and patterns of care associated with the use of spirometry in the diagnosis of COPD.

Methods

Selection of Subjects

All internal medicine primary care physicians (PCPs) from one urban academic medical center who had at least one outpatient general medicine clinic a week were invited to participate in a focus group. Letters of invitation were sent to 18 PCPs asking them to respond by email, phone, or an enclosed post card. We contacted each PCP that responded with an interest in participating by phone to schedule attendance at a focus group. Upon arrival to the focus group, written informed consent was obtained from each participant. This study had approval from the Institutional Review Board of the University of Illinois.

Focus Groups

The focus groups were conducted in a private room at the medical center. Each one hour session was co-facilitated by an experienced qualitative researcher and the principal investigator. A research assistant managed

the audio recording and kept observation notes. The co-facilitators followed an interview guide with open-ended questions that were used to stimulate discussion around PCPs perspectives on the use of spirometry in the diagnosis and management of COPD. Lunch was provided at the beginning of the focus group session. Upon completion of the focus group, participants were given a \$25 gift card to a local department store.

Data analysis

Audio recordings of each focus group were transcribed verbatim after the completion of the focus group. The transcriptions were then loaded into Atlas.ti.6.0 for coding and analysis of themes. Two coders (Investigator MJ and research assistant RM) independently read the initial transcript and generated a list of codes. Subsequently, they met to discuss and agree upon a set of initial codes. Additional transcripts were independently coded as they were transcribed with a few additional codes emerging. Iterative content analysis was performed to identify major content area that addressed the objectives of the study.

Results

Of 18 invited physicians, 12 completed a focus group. The sample was equally split across sex (6 each) with a mean age of 40.0 ($SD = 8.3$) years. The average years in practice was 11.9 ($SD = 6.7$) years.

Our analysis identified four major themes about the use of spirometry in the diagnosis of COPD: 1) preexisting diagnosis of COPD and use of spirometry, 2) newly suspected of having COPD and use of spirometry, 3) prioritization of COPD during a primary care visit, and 4) patient and health systems barriers to the use of spirometry.

Physicians' perspective on the use of spirometry differed based upon whether the patient had a pre-existing diagnosis by another physician or was a new diagnosis. Most PCPs agreed that the majority of patients with COPD had a pre-existing diagnosis prior to first being seen by them.

(1) Preexisting diagnosis of COPD and use of spirometry: When PCPs took care of a patient who had a COPD diagnosis and were using respiratory medications prior to being seen by them, they did not routinely confirm the diagnosis when past spirometry was not available, especially if the patient had other medical problems.

"If there are 20 other things as issues and the (patient) says, "COPD, it doesn't bother me," it's not going to be on the top of my list to reinvestigate."

"I wouldn't go through the whole, if they've had spirometry, if they've had PFT's (pulmonary function test) done or not. If I feel like it's a reasonable history, I'm not sure that I'd go back and reinvent the wheel."

If the patient was of the appropriate age with a smoking history and/or did not have any self-reported symptoms and/or had other acute medical problems, most physicians would not reinvestigate the diagnosis of COPD.

"So if the patient's a smoker or an ex-smoker who has a label of COPD, who is at least middle-aged, I'm going to feel fairly confident that person has tobacco-related COPD and I'm not going to look further unless the patient has developed symptoms that are unusual. For the most part in that kind of scenario I'm going to believe that's an accurate diagnosis..."

2) Newly suspected of having COPD and use of spirometry: For those suspected of having COPD for the first time, the majority of the PCPs believe that spirometry is not always needed to diagnose COPD. There were several explanations for this belief. First, they felt very confident in their diagnosis after obtaining a history from the patient, especially if the patient responds to a trial of inhaler pharmacotherapy.

"I would say I'd probably feel fairly confident about the diagnosis after the history before the spirometry is back."

"If I had a patient who I suspected had COPD because of their symptoms and their history, what I typically do is start them on a trial of medications to treat their symptoms and I follow their symptoms and if they seem to be getting better then I confirm to myself this was COPD."

Second, when PCPs felt confident in their diagnosis, they were unlikely to change their management regardless of the spirometry results.

"So if I'm very confident they have COPD and the therapy's helping them, I just see it as a waste of money in the sense that you're not supposed to do a test that doesn't change the management."

"If my patient is coughing a lot and they have dyspnea on exertion, they've smoked a lot, they wheeze, I almost don't care what the PFTs show. If I give them Atrovent or Spiriva and they feel a lot better, I'm going to keep them on it even if the PFTs show an FEV₁/FVC of 79% or 74% or 76%..."

Finally, some PCPs did not believe that spirometry actually made any difference in patient outcomes in those with COPD.

"Is there any evidence to show that it makes a difference having spirometry?...If they are in other ways doing fine and they respond to medications, what's the benefit of the spirometry?"

PCPs were also not confident of and/or confused by the pulmonologist and their definition of airways obstruction.

This seemed to further their confidence in their own diagnosis of COPD in the absence of spirometry.

"If for pulmonologist A, 70% is their number, and for pulmonologist B, 75% is their number, and the patient's at 74%, so pulmonologist B says there is no obstruction. If I see something that I consider abnormal, maybe not diagnostically pathologic, and the patient has classic symptoms then I'll probably treat them."

3) Prioritization of COPD during a primary care visit:

For a patient with multiple medical problems, COPD was not routinely addressed during all outpatient clinic visits. When a patient with COPD had self-reported symptoms that were beyond baseline, the PCPs would address management and consider changes. However, without self-reported symptoms, PCPs stated at most they would only make sure medication refills were ordered. In general, they considered other medical conditions such as diabetes mellitus, hypertension, and hyperlipidemia to have priority during an outpatient clinical visit. There were three reasons that lead to this prioritization. First, most PCPs thought that there was no evidence that any medication use in COPD lead to improved outcomes such as mortality, whereas, they felt that close monitoring and treatment of the other comorbid conditions did improve outcomes.

"I think it's different than some of the other chronic diseases because there's not a lot of good mortality data in the therapies (for COPD). Whereas in diabetes they can say I feel fine, but if their LDL (low density lipids) is 130 I have studies showing I can make them live longer and not have a stroke if I put them on a statin... With COPD there's not a lot of mortality data on a lot of the therapies so if the patient feels fine and is asymptomatic and they haven't had recent admissions, it's not clear to me why spending a lot of time on (COPD), with the exception of smoking cessation, is actually going to do anything for them."

Second, PCPs stated that there was no point of care measure for COPD that would change management. For example, they had glucose level and/or a hemoglobin A1C for diabetes, a blood pressure measurement for hypertension, and a lipid profile for hyperlipidemia. When these values are available, they feel the need to address them, whereas they did not believe there is a similar measure for COPD.

"We see a lot of obesity, diabetes, hypertension, and hyperlipidemia in our practice. If (patients) really don't have many complaints, I tend to deal with these chronic diseases first, rather than COPD... there are also more data being thrown at you for the other disease...the nurse takes the glucose and blood pressure during check-in, so you're getting

feedback right away so it's just very easy to get focused on those issues."

Third, PCPs thought that the overall evaluation of COPD was subjective and based only on patient's perceptions of symptoms. If there was more objective evidence or test of how well a patient was doing, they may address COPD more frequently during clinic visits.

"COPD is very subjective to evaluate so some individuals may say something like, "my breathing is OK" but for diabetes, high blood pressure, and some of these other chronic diseases there's more exact ways to evaluate their status. If there was a blood test or something like it for COPD that marked how well it was controlled or some other vital sign aside from the respiratory rate or oxygen saturation which you see at most visits, I think that it would probably be a little higher on my list."

4) Patient-related and health systems related barriers to the use of spirometry: Although most PCPs agreed that provider preference was the most common reason spirometry was not obtained in a work-up of a patient for COPD, patient related factors were mentioned. Some providers felt that patient's would not follow up with the test even if it was ordered because it required taking time off from work, finding transportation, re-ordering patient priorities, and co-payments for services. Finally, health insurance was perceived as a barrier in that some insurances may not always cover spirometry and some require a referral to another physician. However, most PCPs did not believe these patient-related and health systems related barriers were unique to spirometry testing.

DISCUSSION

Focus groups were conducted to characterize primary care physicians' perspectives on the use of spirometry in COPD, and four major themes were identified. In general, PCPs believe that spirometry was not always needed to confirm the diagnosis of COPD when the prior probability of having COPD was felt to be high. For example, if a patient smoked, had symptoms and/or responded to inhaled therapy. PCPs felt comfortable treating COPD clinically without evidence of airways obstruction using a spirometry test.

Moreover, some providers did not feel there was any scientific evidence that supported use of spirometry to diagnose COPD compared to diagnosis and management based on symptoms and history alone. Compared to other co-morbidities, PCPs thought that the evaluation of COPD was more subjective and there was lack of scientific evidence showing improved outcomes such as mortality with COPD therapy. The majority of the providers did not consider access to spirometry a barrier in their everyday practice.

Our findings are similar to those of the Australian study by Walters et al. (10, 11) in that both studies found that physicians preferred to diagnosis COPD by history and clinical exam only, without the use of spirometry. In addition, both studies found that COPD was considered to be one of many chronic illnesses in a typical patient and often not the most important.

Contrary to Walters' studies which found that GPs were hesitant to formally diagnose COPD due to patient's lack of understanding and perceptions, PCPs in our study reported no reluctance to labeling patients with COPD. If clinically concordant in the absence of spirometry, most PCPs in our study were comfortable diagnosing patients with COPD and oftentimes initiated medications on the same day without spirometry testing showing chronic airways obstruction. As stated in Moore's study (12), time constraints during a busy clinic visit can limit the use of spirometry. However, the PCPs in our study did not believe that was a limiting factor for them in obtaining a spirometry in patients suspected of having COPD.

Our findings may highlight why prior attempts to improve spirometry use and diagnosis of COPD in the primary care setting have had limited effects. Studies have been limited by missed diagnosis in the presence of spirometry or lack of engagement from practice sites which may be because of the lack of importance placed on spirometry in the diagnosis of COPD by primary care physicians. Walters et al. randomized practices into two groups (14). One group included the introduction of visiting trained nurses (TN) to perform opportunistic spirometry in primary care and the other group included training existing physicians and staff to perform their own spirometry testing which was seen as usual care (UC).

Spirometry use in the UC group only increased by 8% versus an increase of 59% in the TN group. In the TN group, the spirometry result without interpretation was faxed to the providers within 48 hours. Medical records of 84% of the patients seen by a practitioner in the following 3 months were reviewed to see the impact on spirometry on the diagnosis of COPD. Of those in the TN group, 108 patients had evidence of chronic obstruction based on spirometry testing, but only 9 had a physician diagnosis. In a U.K. study, Walker et al. introduced open access spirometry to a primary care area and then reviewed the records of 235 patients with evidence of irreversible airflow obstruction consistent with COPD and only 139 (59%) had a new diagnosis of COPD (9). The practitioners in this study stated that the high rate of missed opportunities for new diagnosis of COPD may be due to time limitations and addressing patient's agenda versus being proactive, however, this may in part be explained by our study results. PCPs may not be relying on spirometry to diagnosis or rule out COPD. As the Walker study was open access spirometry, it is possible that many patients did not have self-reported symptoms.

Therefore even with spirometric evidence of COPD, a diagnosis was not applied. In another study, Kaminsky and colleagues introduced a 60-minute educational workshop to primary care providers as well as assuring an office spirometer was available for the practice and found an improvement in the rate of spirometry use of 59% from baseline (15).

However, a lack of engagement was noted as only 14 of 21 practices enrolled in the study had viable data as the other 7 practices were not included in the analysis due to having only estimated number of tests performed, low testing rates, or a non-functional spirometer. In addition, the actual increase in the spirometry use over three months was from a median of 6 tests increasing to 16 tests (15). An Italian study sought to improve the utilization of spirometry in the primary care setting to improve the diagnosis of COPD and asthma (16).

The intervention randomized patients to conventional diagnosis (i.e., history and physical exam) or conventional diagnosis plus spirometry. However frequent protocol violations and inadequate sample size due to poor recruitment by the general practitioners limited the study results. When asked about the usefulness of office spirometry, the poststudy response was not as enthusiastic which coincided with the fading effect of spirometry use in the long term. The low enrollment rates and decrease in use of spirometry over the course of the study may be related to the baseline beliefs in the utility of spirometry in COPD. Many of these studies were primarily interventions aimed at improving provider knowledge and increasing availability of spirometry; however, they did not address physician attitudes and/or beliefs, which may explain the lack of compelling results.

Our study may also explain why decision support systems for COPD management have been largely ineffective. Clinical decision support systems, involving recommendations of evidence based guidelines for spirometry and chronic disease management via physician workstations, have resulted in no effect on the delivery or outcomes of care of patients with COPD (17). Again, physicians are less likely to follow recommendations or to act upon a prompting system if they do not believe it will change management or improve outcomes.

A limitation of our study is that the PCPs were from a single academic, urban institution. As a result, their beliefs, attitudes, and/or perceived barriers may not be generalizable to all PCPs. The barriers they face may also be similar because they work within the same system and provide care to similar patient populations which are largely low income. As in all qualitative research, generalizability is further limited by virtue of the method. However, qualitative studies can lead to a better understanding of beliefs and attitudes that are potential barriers to the use of spirometry. This deeper understanding can help guide future interventions that

can have meaningful impact as opposed to interventions that many not have targeted the true barriers in the past.

In general, there was a lack a concern about the misdiagnosis of COPD, whether it was an over diagnosis or an under diagnosis of COPD. It is well known that spirometry is necessary to accurately diagnosis COPD because approximately 15% of patients who smoke develop COPD and previous studies suggest that history and physical finding are neither sensitive nor specific for diagnosing COPD (18–23). Over diagnosis of COPD could lead to missed diagnosis of other conditions that may cause similar respiratory symptoms such as heart failure.

The use of pharmacotherapy in those with an over diagnosis of COPD can also lead to unnecessary risks, harm, and increased healthcare costs. However, there is lack of evidence that the misdiagnosis of COPD is associated with poor patient outcomes. For example, it is possible that the treatment and improvement of symptoms with respiratory medications in the absence of spirometry evidence of COPD or asthma may be beneficial, although this theory has not been adequately tested.

In conclusion, in our sample of PCPs, there was skepticism that spirometry is warranted to diagnose and treat COPD. Availability of spirometry was not a perceived barrier. Our results explain why previous interventions to improve access to spirometry and diagnosis of COPD in primary care settings have been difficult to conduct and/or have had marginal success. Our findings strongly suggest that a first step toward increasing the use of spirometry among primary care physicians is to have them believe in its utility in the diagnosis and management of COPD.

Declaration of Interest Statement

Min Joo has no conflicts of interest to disclose. Lisa Sharp has no conflicts of interest to disclose. David Au has received funding as a research consultant for Bosch Inc. and research funding from Gilead Sciences in the past three years. Todd Lee has no conflicts of interest to disclose. Marian Fitzgibbon has no conflicts of interest to disclose.

The project described was supported by Award Number K23HL094461 from the NHLBI and also supported, in part, by the National Center for Research Resources and the National Center for Advancing Translational Sciences, National Institutes of Health, through Grant UL1RR029879. Dr. Au was supported by the Department of Veterans Affairs. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Heart, Lung, And Blood Institute, the National Institutes of Health or the Department of Veterans Affairs.

The authors alone are responsible for the content and writing of the paper.

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