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Case finding for chronic obstructive pulmonary disease in people attending long-term condition clinics in primary care

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Abstract

Despite increased interest and awareness of chronic obstructive pulmonary disease (COPD), nearly half of the people with COPD remain undiagnosed. Inviting people at risk for screening is unlikely to be effective as many will not attend. Co-morbidities are common in people with COPD but COPD is also a comorbidity of other long-term conditions and people with these conditions are under regular review in primary care clinics. This study aimed to develop a pilot programme to case find people with COPD among patients attending other long-term clinics in primary care. Twenty-three general practices were recruited to participate in South West England. All current or ex-smokers aged $\geq$35 attending a long-term condition clinic who were not known to have COPD were asked to complete a questionnaire designed to help identify people with COPD and to perform microspirometry. Practices were asked to collect data on up to 100 patients. One thousand three hundred and thirty-three patients were assessed. Four hundred and ten people (31%) were current smokers. Six hundred and thirteen (46%) had high questionnaire scores and 287 (22%) of these also had a forced expiratory volume in 1 second (FEV_1) below the lower limit of normal (LLN). The mean FEV_1 in these patients was 59.0% of predicted (range 22–79.0%). Two hundred and twenty-four had an FEV_1 between 50% and 80% of predicted, 50 had an FEV_1 between 30% and 50% of predicted. One hundred and sixteen (40%) of the people with an FEV_1 below the LLN were still smoking and 55 accepted referral to cessation services. A total of 56% of the other smokers assessed but not thought to have COPD also accepted referral. Assessing symptoms and performing microspirometry in people attending long-term condition clinics in primary care is feasible and has a high yield of identifying people likely to have previously undiagnosed COPD.

Keywords

COPD, diagnosis, long-term conditions, case finding, microspirometry

Introduction

Despite increased interest and awareness of chronic obstructive pulmonary disease (COPD) as a major cause of morbidity and mortality, a substantial number of people with COPD remain undiagnosed.

A recent study suggested that the overall estimated prevalence of COPD in people over 15 years old in England was 3.58%, that is, just over 1.4 million people, but only 52% had a diagnosis.[1] The proportion of diagnosed patients varied from 20% to 95% across the country and was worse in urban areas, especially London. Similar rates of under-diagnosis have been reported in the United States and Spain[2,3] and these rates are substantially higher than those for other chronic conditions such as hypertension.[4]

At present, COPD is usually only diagnosed when people present with symptoms, but people living with COPD may not consult as they may not see their

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breathlessness as abnormal.[5] There has been debate about the value of screening or case finding for early COPD as it has been suggested that the only intervention would be smoking cessation advice which, it has been argued, is indicated in all smokers. However, when case finding or screening has been undertaken in small-scale studies, many of the people identified had symptoms and significant airflow obstruction.[6–11]

Screening or case finding by inviting people at risk of COPD for spirometric testing is unlikely to be effective as many will not attend and the yield would be low. It may result in considerable further testing and potentially unjustified anxiety and health-care resource utilization making it unlikely to be cost effective.[12] Alternative strategies are needed.

Co-morbidities are common in people with COPD, but COPD is also a co-morbidity of other long-term conditions[13] and people with these conditions are under regular review in primary care clinics. As National Health Service (NHS) respiratory leads in south west (SW) England, we used this fact to develop a pilot programme to case find people with COPD among patients attending other long-term clinics in primary care.

Methods

General design of the study

Initially, 6 general practices across the SW of England (4 in Somerset and 2 in Devon) were recruited to participate in the study. Later, the project was also adopted by Bristol Clinical Commissioning Group South Locality who offered a financial incentive of UK£2000 to all 19 of their practices to screen either 1% of practice population or 100 patients (whichever was less). Seventeen practices were eventually participated.

The initial group of 6 practices were offered support provided by members of the SW NHS Respiratory Programme Pharmaceutical Alliance via the SW NHS Respiratory Programme to reduce the additional work for practice staff. The companies providing support were AstraZeneca, Boehringer Ingelheim, Chiesi, Novartis and TEVA. The different companies provided support in different ways. Some funded additional respiratory nurse time, either from within the practice or external to undertake the additional work. One company used pharmacist members of its Clinical Support Service Plus team to undertake the additional work. The practices in Bristol received training in microspirometry and worked to the same protocol and used the same data collection sheets as the original practices, but the work was done by practice staff as part of their normal duties.

Patients were recruited when they attended their practice for clinic appointments unrelated to this project. The assessments were carried out in the practices during or after the original clinic appointment.

Practices were asked to show all current or ex-smokers aged $\geq$35 attending a long-term condition clinic who were not known to have COPD an information sheet about the project. No other inclusion or exclusion criteria were used to select participants. After explaining what COPD is, the information sheet explained that the assessment 'was designed to identify people who might have COPD', 'in order to make a diagnosis further assessment would be needed' and 'this would be undertaken in the practice within the next 2 weeks'.

People who agreed to participate were asked to complete a questionnaire designed and validated to help identify people with COPD.[14] In different populations, this questionnaire has been shown to have a sensitivity of 50–80% and specificity of 58–77% for detecting COPD with a negative predictive value of 89–93% and a positive predictive value of 30–37%.[15] These values are comparable to the predictive ability of other screening tests for breast or colorectal cancer and if combined with a measure of airflow obstruction, its predictive ability is substantially improved.

Patients were also asked to perform microspirometry using an ASMA-1 device (Vitalograph Ltd, Buckingham, UK). Their age, height and smoking status were recorded.

If their score on the case finding questionnaire suggested that they might have COPD (above 16.5) and they had an forced expiratory volume in 1 second (FEV_1) below the lower limit of normal (LLN), their Medical Research Council (MRC) breathlessness and COPD Assessment Test (CAT) scores were recorded and they were offered further assessment within the practice to confirm the diagnosis as described in the patient information sheet.

Smokers were offered referral to cessation services.

Ethical approval

The study was reviewed by the chair of the Devon ethics committee who concluded it came under the service evaluation/audit umbrella and thus did not require ethical approval.

Table 1. Demographics of people assessed.

Total participants (*n*)	1333
Men (*n*)	762 (57%)
Mean age (range)	64.3 years (30–90[a])
Current smokers (*n*)	410 (31%)
LTCs	
Any (*n*)	1313 (98%)
Patients with two LTCs (*n*)	281 (21%)
Patients with three or more LTCs (*n*)	72 (5%)
Specific long-term conditions	
Hypertension (*n*)	560 (42%)
Cardiac disease (*n*)	242 (18%)
Diabetes (*n*)	353 (26%)
Asthma (n)	143 (11%)
Chronic kidney disease (*n*)	72 (5%)
Depression (*n*)	53 (4%)
Stroke (*n*)	41 (3%)

LTC: long-term condition.
[a]Three people were included who were aged under 35, that is, were outside the inclusion criteria.

Results

One thousand three hundred and thirty-three patients were assessed in 23 practices. Their ages, sex, smoking status and their long-term conditions are shown in Table 1.

There were no significant differences in the proportion of patients in older age groups, deprivation scores and percentage of the practice population with a long-term condition between the practices participating and all practices in England (Table 2).

The number of people seen in the different types of clinics run by the practices are shown in Table 3. Several practices ran generic nurse-led clinics for people with long-term conditions rather than separate clinics for each condition, a few people were assessed when attending for cervical smears,[15] travel vaccinations[2] for NHS health checks,[3] or when attending a smoking cessation clinic.[16]

Six hundred and thirteen patients (46%) had high questionnaire scores and 287 of these also had FEV_1 below LLN. This represents 22% of all patients (Figure 1). The mean FEV_1 in these patients was 59.0% of predicted (range 22–79.0%). A total of 224 had an FEV_1 between 50% and 80% of predicted, 50 had an FEV_1 between 30% and 50% of predicted. The distribution of FEV_1 (as percentage of predicted) in patients with symptoms and a low FEV_1 is shown in Figure 2. The number of people identified as having symptoms and a low FEV_1 in each of the different clinic types and the percentage of all the people seen in these clinics are shown in Table 3. There were no obvious differences in the identification rates for people assessed in different clinic types, apart from renal clinics, but the number of people assessed in these clinics was small and the higher identification rate is likely to have occurred by chance. There was no significant difference between the identification rate in practices supported with additional resources (24%) and in the Bristol practices (20%).

MRC scores were only recorded in 64 of the patients with symptoms and an FEV_1 below the LLN. In these patients, the median score was 2, 13 patients had an MRC score of 1, 37 of 2, 9 of 3 and 5 of 4. The mean CAT score in 253 patients recorded was 9.7 (standard deviation 5.3; range 0–40) and the distribution of CAT scores is shown in Figure 3.

One hundred and sixteen (40%) of the people with symptoms and an FEV_1 below the LLN were still smoking and 55 of these were accepted referral to cessation services. One hundred and sixty-five of the other 294 smokers were assessed but not thought to have COPD also accepted referral.

Discussion

Summary

COPD is one of the major causes of morbidity, mortality and hospitalization in the United Kingdom and around the world. There is evidence of under-diagnosis[1] and this in part may reflect the insidious onset of symptoms which many patients regard as a normal part of ageing.[5] COPD has been described as a story with no beginning[17] but until we try to identify patients closer to the beginning, we are unlikely to make significant progress in improving long-term outcomes through interventions such as smoking cessation, encouraging exercise and appropriate pharmacotherapy. Moreover, an analysis of COPD admissions in England showed that over two out of three of winter admissions for COPD were of new patients not admitted in the previous year with the condition.[18] Admission rates could be reduced by better identification and management.

This study shows that assessing symptoms and performing microspirometry in ever smokers attending long-term condition clinics in primary care is feasible and has a high yield of identifying people likely to have previously undiagnosed COPD; one in four of the people assessed had respiratory symptoms and an FEV_1 below the LLN. There were no obvious differences in the identification rates for people assessed in

Table 2. Characteristics of practices (data from Public Health England's National General Practice Profiles (http://fingertips.phe.org.uk/profile/general-practice)).

	Participating practices	All practices in England
Percentage of population aged 65 + (mean (SD))	16.2 (4.6)	16.9 (6.5)
Percentage of population aged 75 + (mean (SD))	7.6 (2.2)	7.6 (3.3)
Percentage of population aged 75 + (mean (SD))	2.2 (0.8)	2.2 (1.2)
Deprivation score (IMD 2010)[a] (mean (SD))	27.2 (11.5)	23.8 (12.2)
Percentage of practice population with a long-term condition (mean (SD))	55.3 (9.1)	54.0 (8.3)

[a]'The English Indices of Deprivation 2010' (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6871/1871208.pdf).

Table 3. Assessments and yields by clinic type.

Type of clinic	Number of people assessed	Number of people with symptoms and FEV_1 below LLN	Percentage of people assessed in clinic type with symptoms and FEV_1 below LLN
Generic	455	78	17
Hypertension	223	44	20
Cardiac	97	17	18
Diabetic	231	46	20
Renal	10	4	40
Other	49	13	27
Not recorded	268	85	32

FEV_1: forced expiratory volume in 1 second; LLN: lower limit of normal.

different clinic types suggesting that targeting the approach to particular clinics would not increase the efficiency of the process.

It is clear from the CAT scores that many people had symptoms and some impairment of health status and one in five had a pre-bronchodilator FEV_1 of less than 50% of predicted. This confirms the finding of other studies that some undiagnosed patients have high levels of symptoms and poor lung function that requires specific management according to guidelines.

We do not have data on the ultimate diagnoses made in people identified as having symptoms and a low FEV_1 as to gain practice engagement the project specifically excluded recommendations on further assessment and management of these patients as this would have been unacceptable to the participating practices. Therefore, we regard these results as representing a proof of the concept that it undiagnosed people with COPD can be identified using a strategy such as the one we employed, rather than the results being definitive.

Some of the people identified as having symptoms and a low FEV_1 may have had a restrictive lung disease, whilst in other cases, these may have been solely due to obesity. However, even if some of the people identified as having other causes for their symptoms, these may be important diagnoses to make and early diagnosis is important to encourage smoking cessation, physical exercise and appropriate treatment.

Forty percent of people identified as having symptoms and an FEV_1 below the LLN were still smoking and nearly half of them accepted referral to a smoking cessation service. The benefits of early diagnosis for smoking cessation have been questioned[19] as maximal efforts at smoking cessation are indicated in all smokers. However, there is evidence that whilst smoking cessation advice is indicated in all smokers, it may be more successful if people are shown the fact that they have abnormal lung function[16,20,21] and smoking cessation is the only intervention generally accepted to be disease modifying and thus crucial at an early stage of COPD. We believe the fact that nearly half of the people newly identified as possibly having COPD accepted referral is a clear benefit of this case finding approach.

Strengths and limitations

There are several strengths to this study. These include the large number of practices involved across

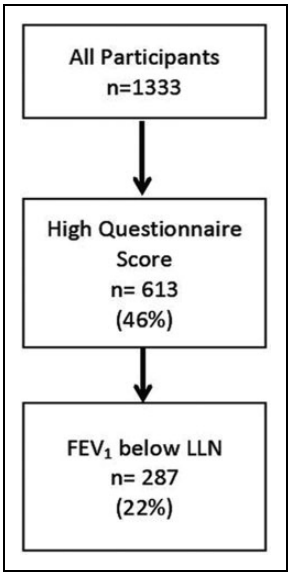

Figure 1. Flow chart showing the number of people assessed who had a high symptom questionnaire score and of those the number with an FEV_1 below LLN. FEV_1: forced expiratory volume in 1 second; LLN: lower limit of normal.

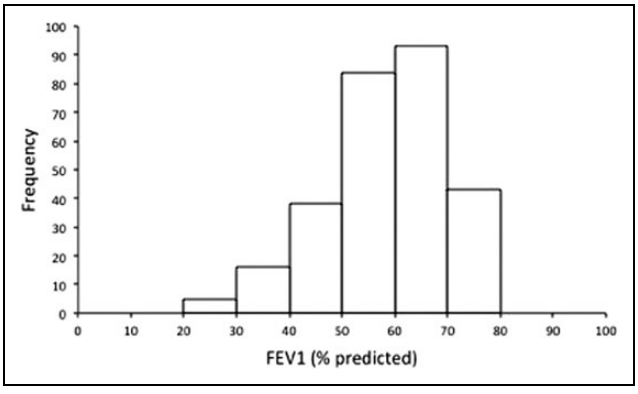

Figure 2. The distribution of FEV_1 as a percentage of predicted in people with low FEV_1 and an elevated questionnaire score. FEV_1: forced expiratory volume in 1 second.

a range of rural and urban settings and the large number of patients attending those practices for routine consultations who were assessed. A particular strength is the fact that this was essentially a real-world study with the majority of assessments done as part of patient's routine care in the practice by the staff delivering that care. We believe that this makes the yield generalizable to other primary care settings.

The principal limitation of the study is the fact that we do not know the final diagnosis in the patients who were identified as having symptoms and an FEV_1 below the LLN. The fact that the microspirometry

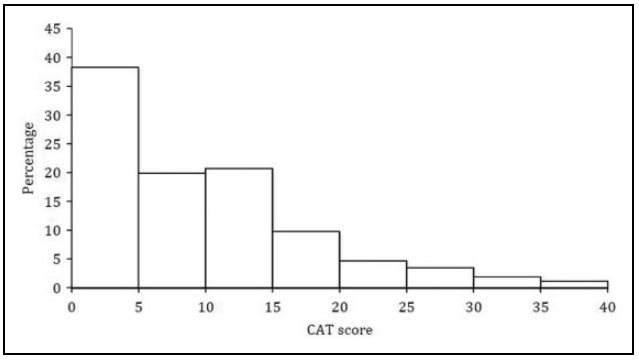

Figure 3. The distribution of CAT scores in people with low FEV_1 and an elevated questionnaire score. FEV_1: forced expiratory volume in 1 second.

was performed without giving a bronchodilator may have increased the number of people with low values; however, as these people also had symptoms whether or not their FEV_1 increased with a bronchodilator does not affect the fact that they would benefit from further assessment. We also do not know how many people were invited to take part in the study but declined and thus it is not possible to know whether the people taking part are representative of all people attending long-term condition clinics in primary care. It is also possible that people agreeing to take part in the study were more health-conscious and potentially more likely to accept referral to stop smoking services, although the fact that the smoking rate among participants was twice the national average suggests that this is unlikely to be the case.

Comparison with existing literature

Concentrating on people who are already attending a clinic and identifying undiagnosed COPD in them is likely to be more effective than inviting people to attend for screening when the response rates are generally very poor – less than 25%.[22,23] A case finding approach targeting all current or ex-smokers aged 40–70 using a questionnaire also appears less effective; using this approach in Belgium Vandevoorde et al. identified only 166 people with symptoms among 5755 people screened and only 49 new diagnoses of COPD were made after spirometry.[11] Case finding among high-risk patients attending smoking cessation clinics in Spain has recently been shown to be effective,[24] but if we had only targeted current smokers, we would have missed the two-thirds of patients who had already quit.

Implications for research and/or practice

We believe this study shows that case finding among current and ex-smokers with non-respiratory long-term conditions is feasible and is a relatively quick, inexpensive and effective way of finding people with undiagnosed COPD.

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Declaration of Conflicting Interests

In the last 5 years, DMGH has received sponsorship to attend international meetings, and honoraria for lecturing, attending advisory boards and preparing educational materials from Almirall, AstraZeneca, Boehringer Ingelheim, Chiesi, GSK, Intermune, MSD, Novartis, Nycomed and Pfizer. His department has received research funding from AstraZeneca. In the last 5 years, SH has received bursaries, speaker fees and/or advisory board payments from Almirall, AstraZeneca, Beximco, Boehringer Ingelheim, Chiesi, GSK, MSD, Napp, Novartis, Nycomed, Pfizer, Sandoz, Schering Plough and Teva. In the last 5 years, JC has received grants or speaker fees from Almirall, Astra Zeneca, Boehringer Ingelheim, Chiesi, GSK, Napp, Novartis, Pfizer and Teva. DM has no conflicts of interest to declare.

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References

1. Nacul L, Soljak M, Samarasundera E, et al. COPD in England: a comparison of expected, model-based prevalence and observed prevalence from general practice data. *J Public Health (Oxf)* 2011; 33(1): 108–116.
2. Mannino DM, Gagnon RC, Petty TL, et al. Obstructive lung disease and low lung function in adults in the United States: data from the National Health and Nutrition Examination Survey, 1988–1994. *Arch Intern Med* 2000; 160(11): 1683–1689.
3. Pena VS, Miravitlles M, Gabriel R, et al. Geographic variations in prevalence and underdiagnosis of COPD: results of the IBERPOC multicentre epidemiological study. *Chest* 2000; 118(4): 981–989.
4. Soriano JB, Zielinski J and Price D. Screening for and early detection of chronic obstructive pulmonary disease. *Lancet* 2009; 374(9691): 721–732.
5. Small N, Gardiner C, Barnes S, et al. "You get old, you get breathless, and you die": chronic obstructive pulmonary disease in Barnsley, UK. *Health Place* 2012; 18(6): 1396–1403.
6. Seamark DA, Williams S, Timon S, et al. Home or surgery based screening for chronic obstructive pulmonary disease (COPD)? *Prim Care Respir J* 2001; 10(2): 30–33.
7. Geijer RM, Sachs AP, Hoes AW, et al. Prevalence of undetected persistent airflow obstruction in male smokers 40–65 years old. *Fam Pract* 2005; 22(5): 485–489.
8. Stratelis G, Jakobsson P, Molstad S, et al. Early detection of COPD in primary care: screening by invitation of smokers aged 40 to 55 years. *Br J Gen Pract* 2004; 54(500): 201–206.
9. Zielinski J and Bednarek M. Early detection of COPD in a high-risk population using spirometric screening. *Chest* 2001; 119(3): 731–736.
10. Van Schayck CP, Loozen JM, Wagena E, et al. Detecting patients at a high risk of developing chronic obstructive pulmonary disease in general practice: cross sectional case finding study. *BMJ* 2002; 324(7350): 1370.
11. Vandevoorde J, Verbanck S, Gijssels L, et al. Early detection of COPD: a case finding study in general practice. *Respir Med* 2007; 101(3): 525–530.
12. Ramsey SD and Sullivan SD. Chronic obstructive pulmonary disease: is there a case for early intervention? *Am J Med* 2004; 117(Suppl 12A): 3S–10S.
13. Barnett K, Mercer SW, Norbury M, et al. Epidemiology of multimorbidity and implications for health care, research, and medical education: a cross-sectional study. *Lancet* 2012; 380(9836): 37–43.
14. Price DB, Tinkelman DG, Halbert RJ, et al. Symptom-based questionnaire for identifying COPD in smokers. *Respiration* 2006; 73: 285–295.
15. Price DB, Tinkelman DG, Nordyke RJ, et al. Scoring system and clinical application of COPD diagnostic questionnaires. *Chest* 2006; 129: 1531–1539.

16. Hueto J, Cebollero P, Pascal I, et al. La espirometria en atencion primaria en Navarra [Spirometry in primary care in Navarre, Spain]. *Arch Bronconeumol* 2006; 42(7): 326–331.
17. Pinnock H, Kendall M, Murray SA, et al. Living and dying with severe chronic obstructive pulmonary disease: multi-perspective longitudinal qualitative study. *BMJ* 2011; 342: d142.
18. Bryden C, Bird W, Titley HA, et al. Stratification of COPD patients by previous admission for targeting of preventative care. *Respir Med* 2009; 103(4): 558–565.
19. Boushey H, Enright P and Samet J. Spirometry for chronic obstructive pulmonary disease case finding in primary care? *Am J Respir Crit Care Med* 2005; 172(12): 1481–1482.
20. Bednarek M, Gorecka D, Wielgomas J, et al. Smokers with airway obstruction are more likely to quit smoking. *Thorax* 2006; 61: 869–873.
21. Parkes G, Greenhalgh T, Griffin M, et al. Effect on smoking quit rate of telling patients their lung age: the step2quit randomised controlled trial. *BMJ* 2008; 336(7644): 598–600.
22. Tinkelman DG, Price D, Nordyke RJ, et al. COPD screening efforts in primary care: what is the yield? *Prim Care Respir J* 2007; 16(1): 41–48.
23. Haroon S, Adab P, Griffin C, et al. Case finding for chronic obstructive pulmonary disease in primary care: a pilot randomised controlled trial. *Br J Gen Pract* 2013; 63(606): e55–e62.
24. Diez Pina JM, Quilez Ruiz-Rico N and Bilbao-Goyoaga Arenas T. Smoking cessation clinics as an aid for early diagnosis of chronic obstructive pulmonary disease [Las consultas de deshabituacion tabaquica como ayuda al diagnostico precoz de la enfermedad pulmonar obstructiva cronica]. *Arch Bronconeumol* 2015; 51(9): 470.