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General practitioners' needs for ongoing support for the interpretation of spirometry tests

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Abstract

Background: Although one out of three general practitioners (GPs) carries out spirometry, the diagnostic interpretation of spirometric test results appears to be a common barrier for GPs towards its routine application. *Methods:* Multivariate cross-sectional analysis of a questionnaire survey among 137 GPs who participated in a spirometry evaluation programme in the Netherlands. We identified characteristics of GPs and their practice settings associated with GPs' need for ongoing support for spirometry interpretation. *Results:* Response rate on the survey questionnaire was 98%. The need for ongoing support among the participating GPs was 69%. GPs' recent spirometry training showed a statistically significant association with the need for ongoing support for the interpretation of spirometry (odds ratio 0.43, 95% CI 0.20–0.92).

Conclusion: There is a need for ongoing support for spirometry interpretation among GPs. Recent spirometry training partially diminished this need.

Key words: *COPD, decision, feedback, general practice, spirometry, support systems*

Introduction

Chronic obstructive pulmonary disease (COPD) is a highly prevalent condition that will contribute to global disability for many years to come. Timely and adequate diagnosis of the disease in new patients and accurate severity staging in patients who have previously been diagnosed requires spirometry. Regardless of which COPD guideline (1,2) one uses, spirometry plays a central role in diagnosing the disease, and this requires its widespread implementation in primary care. However, the mere existence of the guidelines does not guarantee that general practitioners (GPs) will actually embrace spirometry and apply it consistently in the diagnosis and management of their patients (3). There are still a number of practical barriers that impede implementation of good-quality spirometry in primary care. Examples are the absence of properly trained practice staff (4), the lack of time and practice support (e.g., practice nurses) to fit spirometry into the daily practice routine (5), and simply the absence of a spirometer in the practice (6,7).

In addition to the practical barriers, GPs' lack of confidence in their ability to interpret the test results (8) is a crucial issue, often completely neglected in the guidelines but nonetheless a real impediment to effective implementation of spirometry. Low levels of self-confidence in the interpretation of spirometric tests influences GPs' interpretative skills (8). Ideally, the interpretative skills and confidence levels of GPs are supported after appropriate initial spirometry training. However, it is largely unknown what kind of ongoing support GPs prefer or which factors are related to a GP's wish to receive this support.

Therefore, the aim of the present study was to identify characteristics of GPs and their practice settings that were associated with GPs' need for ongoing support for the interpretation of spirometric tests.

Methods

Design and data collection

We performed a multivariate cross-sectional analysis of questionnaire survey data from 137 GPs

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(Table I) who participated in a spirometry evaluation programme in the Netherlands (9). We have reported on the study design, data collection and questionnaires used elsewhere (5). In short, all GPs involved were sent a questionnaire regarding their professional experience, general training level, attended continuous medical education, practice equipment, barriers to spirometry applications, and their need for ongoing support for spirometry interpretation.

Outcomes and analyses

Potential GP-related and practice-related characteristics for GPs' need for ongoing spirometry interpretation support *(dependent variable)* were assessed. Because of the clustering of GPs within practices, we performed a multilevel logistic regression analysis. Multivariate multilevel analyses were applied to assess the association between *GPs' need for ongoing support* and 13 explanatory variables (e.g., type of practice, practice nurse support available). *GPs' need for ongoing support* was dichotomized (yes/no question). Backward elimination was used to remove variables with $P > 0.05$ (Table II). The intraclass correlation coefficient (ICC) was calculated to give insight into the proportion of variance that was accounted for by practice level. Also, the fraction of explained variance was calculated. Analyses were performed in SAS version 8.2 for Windows (SAS Institute Inc., Cary, USA, 1999–2001).

Table I. Characteristics of the GPs and general practices involved in the study and from national data in the Netherlands (right).

	This study	National data
General practitioners	$n = 144$	$N = 8209$[a]
Age,% <40 years	25.7	21
Professional experience, years	14.3 (8.2)	N/A
Gender,% female	30.6	31.4
Patients per GP, number per practice	1862 (771)	2392
General practices	$n = 59$	$N = 4564$[a]
Type of practice,%		
Single-handed	33.9	60.7
Duo	27.1	26.4
Group (≥3 GPs)	30.5	12.9
Multidisciplinary healthcare centre	8.5	—
GPs, number per practice	2.5 (1.4)	N/A
Practice assistants, number per practice	3.1 (1.4)	N/A
Time since introduction of spirometry, years	4.3 (2.9)	N/A

Values are means (SD), unless stated otherwise.
[a]Data (1 January 2004) from the Netherlands Institute for Health Service Research (URL: www.nivel.nl).
N/A: not available.

Results

Characteristics of general practices and GPs

In Table I, we compare certain characteristics of the general practices and GPs involved in our study with national data. We excluded seven GPs from this table due to incomplete data. These seven GPs were slightly younger and had less professional experience than the remaining 137 GPs.

Need for ongoing support for spirometry interpretation

Ninety-four GPs (69%) expressed a need for ongoing support for spirometry interpretation. The most preferred mode of support was either a local chest physician or pulmonary function laboratory (51%), or a computerized clinical decision support system (46%). Clustering of GPs within practices accounted for 20.9% of the total variation in GPs' need for ongoing support (ICC 0.209).

Characteristics of GPs and their practice settings associated with GPs' need for ongoing support

Table II shows the results of the multivariate analyses. The only practitioner-related factor associated with *GPs' need for ongoing support* was GP's recent spirometry training (odds ratio 0.43, 95% CI 0.20–0.92). The associations with three other factors, i.e., availability of different rooms to perform spirometry in the practice, some mode of spirometry expert support already being in place, and the presence of a practice nurse, showed borderline statistical significance ($P = 0.08$, $P = 0.09$, and $P = 0.15$, respectively). The proportion of explained variance of this model was 4.1%.

Discussion

The results of this study indicate that a majority of the GPs in our study expressed a need for ongoing support for spirometry interpretation. Characteristics of the practice setting were not associated with the need for ongoing support, and characteristics of the GP (recent spirometry training) were only marginally associated with the need for ongoing support.

Comparison with previous studies

This is the first study that has assessed factors associated with GPs' need for ongoing support for spirometry interpretation among GPs working in practices that are already equipped with a spirometer. We assume that, if these GPs already expressed a need for ongoing support, other GPs with less interest in spirometry would have at least the same need for support.

Table II. Results of the multivariate multilevel analyses.

Explanatory variable	Reference category	β	P	Odds ratio	95% confidence interval
GP-related characteristics					
GPs' professional experience	Years	0.013	0.58	1.01	(0.97, 1.06)
Gender	Female	−0.399	0.33	0.67	(0.30, 1.50)
General interest in scientific research	Non-participant	0.095	0.81	1.10	(0.51, 2.37)
Spirometry training prior to study	No	−0.500	0.22	0.61	(0.27, 1.34)
Recent limited spirometry training in study	Non-attender	−0.844	0.03	0.43	(0.20, 0.92)
Continuous medical education	Point on sum score [a]	0.219	0.57	1.24	(0.58, 2.66)
Complexity of spirometry interpretation	No	0.038	0.94	1.04	(0.36, 2.94)
Present support for spirometry interpretation (e.g., feedback from chest physician or computerized expert support)	No	0.717	0.08	2.05	(0.92, 4.55)
Practice-related characteristics					
Type of practice	No single-handed	−0.649	0.26	0.52	(0.17, 1.60)
Use of protocols in practice	Point on sum score [b]	−0.251	0.30	0.78	(0.48, 1.25)
Practice-nurse support	No [c]	0.926	0.15	2.52	(0.72, 8.83)
Spirometry used in different rooms	No	0.765	0.09	2.15	(0.90, 5.14)
Delegation medical tasks – practice assistants [d]	% point delegated tasks	−0.023	0.11	0.98	(1.01, 0.95)

Explained fraction of variance: $R^2 = 4.1\%$.

[a]Sum score (range 0–10) of five questions (Likert scale) concerning GP's satisfaction with available time for patients, work, continuous medical education, family, and leisure time.

[b]Sum score (range 0–4) of five questions (yes = 1, no = 0) with regard to the presence of protocols for visiting patients admitted to hospital; separate office hours for diabetes care or cardiovascular disease; invitation system for cervical cancer screening; invitation system for annual influenza vaccination.

[c]In Dutch primary care, practice nurses are professionally trained for supporting tasks, predominantly in chronic diseases (COPD and asthma or diabetes). They work under supervision of a GP. They follow strict protocols for medical care and educate patients. They do not order additional investigations. They are not allowed to refer patients. Nowadays, they are often employed in multidisciplinary healthcare centres or group practices.

[d]In Dutch primary care, practice assistants are professionally trained for administrative and clinical patient-directed support tasks.

It is important to realise that—like electrocardiography—spirometry is a complex diagnostic tool, at least in the perception of many GPs. A systematic approach for judging the quality of tests and the subsequent assessment of the relevant lung function indices (i.e., FEV_1, FEV_1/FVC), the accompanying predicted values, and the graphical output that most electronic spirometers now provide (i.e., flow–volume and volume–time curves) seems difficult. This is clearly illustrated by the results of a recent UK study in which low levels of self-confidence in the interpretation of spirometric tests were observed among 160 general practices that had been trained for half a day: only 33% of the practices trusted their own interpretative skills with regard to spirometry (8). Unfortunately, this kind of very limited training is often what GPs commence with. Low confidence in the ability to interpret spirometry test results was recently reported by Walters et al. (7), although these results came from focus-group interviews and did not provide insight into GP- and practice-related factors.

Thus far, a New Zealand study, which was reported in 1999, presents the only randomized prospective evaluation of the implementation of spirometry in primary-care practice formally assessing the positive impact of limited training on GPs' spirometry performance (10). In our study, a recent limited training session diminished the need for ongoing support. However, whether a limited training session is sufficient to increase the confidence of GPs in their ability to interpret test results seems improbable.

The problem that still remains is that lack of expertise in spirometry testing seems to be *the* limiting factor for its routine application in general practice (4,5,7,8). This has clinical repercussions, with misclassification occurring in one out of three patients with a clinical diagnosis of COPD in primary care as a result (8). Therefore, the interpretative skills of GPs are ideally supported after an initial spirometry training programme. However, the results of our study and the current literature (7,8) do not give enough insight into which GPs in which practice settings will benefit most from ongoing support nor do they help us in deciding which mode of organizing this support would be best. This ongoing support could be organized by a fellow GP with a special interest in respiratory diseases in their own practice or in another practice nearby (11), by a computerized clinical decision support system (12), or by consultation or feedback from a chest physician (13). Empirical studies on the effect of this kind of ongoing expert support on the interpretative capacity of primary-care doctors are not available at this time.

Limitations of the study

A weakness of our study is the external validity. Due to selective participation of GPs who wanted to participate in a spirometry research project and the fact that—compared with national data—we included a relatively small proportion of single-handed practices, our findings may not fully reflect the situation in Dutch general practice. Despite the fact that we investigated 13 plausible characteristics concerning the GP and his/her practice setting, we were not able to predict the need for ongoing spirometry interpretation support with this model adequately. Our model explained only 4.1% of all variance in the dependent variable. Apparently, there are other factors that influence GPs' need for ongoing support that have not been investigated in the questionnaires. Qualitative studies (e.g., in-depth or focus-group interviews) are required to further address this issue (14).

Possible implications for future research

If GPs do not perform spirometry in their own practice due to insufficient expertise in the interpretation of results, the number of patients referred for spirometry testing may soon exceed the capacity of secondary care. From the current study, we know that a recent spirometry training session is not enough to decrease the need for ongoing support for spirometry interpretation.

As spirometry does indeed seem to influence the decision-making process of GPs (15), the focus on COPD in primary care should be directed at increasing the confidence of GPs in their ability to interpret spirometry test results.

Conclusions

We conclude that most ($\sim$70%) GPs who were already equipped to use spirometry in terms of training and facilities expressed a need for ongoing spirometry interpretation support. Recent spirometry training partially diminished this need, but ongoing support for the interpretation of spirometry tests in primary care certainly seems welcome. GPs' need for ongoing support for spirometry interpretation could only marginally be explained by the characteristics of GPs and their practice settings.

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