1. Liu H, Zhang D, Zhang F, Yin [illegible]ediate and long-term outcomes of endovascular treatment for massive hemoptysis. Int Angiol. 2016;35:469–76.
2. Yakushiji E, Ota S, Komatsu T, Ayaori M, Ikewaki K. Massive hemoptysis due to right inferior phrenic artery-to-right pulmonary artery fistula in the right middle lobe of the lung. Intern Med. 2017;56:687–9.
3. Gorospe Sarasúa L, Farfán-Leal FE, García-Latorre R. Embolization of acquired bronchial artery-pulmonary artery fistula in a patient with HIV infection. Arch Bronconeumol. 2016; 52(10.).
4. Wong HH, Chan RP, Klatt R, Faughnan ME. Idiopathic pulmonary arteriovenous malformations: clinical and imaging characteristics. Eur Respir J. 2011;38:368–75.

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Practice of spirometry among physicians caring for children with asthma in Portugal – The EspiroPed survey

KEYWORDS
Children;
Spirometry;
Asthma

Introduction

Spirometry is a key component of the asthma management guidelines' workup for diagnosis, assessment and monitoring of severity and control.[1] However, evidence from practice pattern studies and surveys suggests there is limited use of spirometry in patients of all ages with asthma,[2] for reasons that remain unclear.[3,4] In Portugal, the National Program for Respiratory Diseases warns that this is also the case for chronic obstructive pulmonary disease.[5]

Our main objective was to evaluate and compare current knowledge and practice of spirometry prescription and interpretation among the four groups of physicians caring for children/adolescents with asthma in Portugal: Paediatricians (Ped), Pulmonologists (Pn), Allergologists (AI) and General Practitioners (GP). Secondary objectives were to identify determinants of spirometry prescription and limitations of use, and to assess the need for a training program.

Methods

Study design

The EspiroPed survey was a cross-sectional electronic survey targeting Ped, Pn, AI and GP who follow asthmatic children/adolescents and work in Portugal. These were current members of their respective scientific societies i.e.: *Sociedades Portuguesas de Pediatria, de Pneumologia e de Alergologia e Imunologia Clínica* and *Associação Portuguesa de Medicina Geral e Familiar*. Each scientific society reviewed and approved the research protocol.

Questionnaire

A questionnaire on various topics of spirometry use in asthmatic children/adolescents was developed in Portuguese through informal consensus and with different response formats (multiple choice, 5-point Likert items and categories of frequency of use) (available as a supplementary appendix). We collected anonymized data on physicians' training and workplace; knowledge of national asthma guidelines and ATS/ERS spirometry recommendations; accessibility to and practices of spirometry prescription. The survey was developed using the SurveyMonkey platform (www.surveymonkey.com) and was pilot tested for acceptability and feasibility.

Implementation

The survey ran for six weeks in 2015 (July-August for Ped/Pn, and October-November for AI/GP) An invitation with an open link was sent to each society's mailing list. Four reminder e-mailswere used to optimize the response rate. Consent was implied by survey completion. The Ethics Committee of *Centro Académico de Medicina de Lisboa* approved this study.

Statistical analysis

Descriptive analysis, stratified by physician specialty, was performed on fully completed surveys. We compared results between physician specialties using univariable analysis (Chi-square test), considering a significance level of 5%. Statistical Package for the Social Sciences 21.0 (SPSS®, Chicago, USA) was used to perform all tests.

Table 1 Conditions in which spirometry is used by the physicians.

	Ped	Pn	AI	GP	p-value
Diagnosis of asthma	42%	75%	80%	53%	0.001
Stratification of asthma severity	43%	68%	68%	28%	<0.001
Evaluation of asthma control	51%	58%	60%	16%	<0.001
Diagnosis of other chronic diseases	27%	63%	57%	47%	<0.001

Results

Complete responses were available from 423 physicians: 89 Ped, 40 Pn, 30 AI and 264 GP (approximately 5–7% of eligible members from each Society). Most were specialists [241(57%)], worked in Lisbon [98(23%)] or Porto [92(22%)] and in public hospitals/clinics [269(64%)]. Non-asthma chronic respiratory diseases were managed by 58% Ped, 65% Pn, 70% AI, 62% GP ($p = 0.6$). Overall, only 17(4%) reported having had training in Paediatric Respiratory Medicine.

No differences were found between groups concerning knowledge of national asthma guidelines. The majority of Pn/AI (90%/93%) knew the ATS/ERS guidelines on spirometry compared to only 30%Ped and 19%GP ($p < 0.001$) and, accordingly, 53%Pn and 37%AI also mentioned having ''very good knowledge'' of how to perform a spirometry, as opposed to 7%Ped and 3%GP ($p < 0.001$). All groups agreed that besides age, comprehension and collaboration were the most important factors to be taken into consideration when performing spirometry in children. Most physicians considered 6 years of age or below to order spirometry, and the majority preferred public/state laboratories (72% Ped, 55% Pn, 63% AI and 62% GP). Regarding the interpretation of spirometry, 65%Pn and 70%AI reported having ''very good knowledge'' compared to 10%Ped and 5%GP ($p < 0.001$). No differences among groups were found on which parameters (FEV_1, FVC, FEV_1/FVC, $FEF_{25-75\%}$, morphology of the flow-volume loop) were used when interpreting a spirometry.

The conditions in which spirometry is used by physicians are depicted in Table 1.

Almost all agreed/totally agreed that spirometry results influence treatment decisions [94%Ped, 90%Pn, 100%AI, 81%GP ($p = 0.003$)].

The majority of Ped, AI and GP (>85%) were interested in further training compared to 68% of Pn ($p < 0.001$).

Discussion

GP/Ped report less familiarity on how to interpret and perform spirometry in asthmatic children, and less knowledge of ATS/ERS guidelines, than AI/Pn. However, almost all agreed that spirometric results influence their management decisions.

A multilevel approach is needed to change practices including identifying knowledge barriers and limitations in access across different settings and specialties, raising awareness and training.[2,6] This study has several limitations, including the small sample size (<10% of members of each society) and likely bias due to preferences and increased interest of respondents. However, significant differences between the four specialities were identified. Acknowledgment of these gaps by the responsible authorities will facilitate the implementation of specific strategies adjusted to each specialty to improve the use of spirometry in the management of asthmatic children. Strategies should be considered across medical curricula and health directories on spirometry use. These are urgently needed to fulfil the goals of the National Program on Respiratory Diseases on this topic.

Conflicts of interest

The authors have no conflicts of interest to declare.

References

1. Gina Science Committe, Available at: Global Strategy for Asthma Management and Prevention. Gina [Internet]; 2016. p. 1–147 http://ginasthma.org/wp-content/uploads/2016/04/GINA-2016-main-report_tracked
2. Gupta S, Moosa D, MacPherson A, Allen C, Tamari IE. Effects of a 12-month multi-faceted mentoring intervention on knowledge, quality, and usage of spirometry in primary care: A before-and-after study. BMC Pulm Med. 2016;16(1):1–9.
3. Dombkowski KJ, Hassan F, Wasilevich EA, Clark SJ. Spirometry use among pediatric primary care physicians. Pediatrics. 2010;126:682–7.
4. Al-Saadi MM. Knowledge and practice of spirometry among pediatricians in Riyadh, Kingdom of Saudi Arabia. Ann Thorac Med. 2008;3:52–6.
5. Observatório Nacional das Doenças Respiratórias, Available at: Relatório 2017. Relatório 2017; 2017. p. 88 https://www.ondr.pt
6. Patout M, Sesé L, Gille T, et al. Does training respiratory physicians in clinical respiratory physiology and interpretation of pulmonary function tests improve core knowledge? Thorax. 2017;0(0):3–6.

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Embracing digital technology in chronic respiratory care: Surveying patients access and confidence

Dear Editor,

Pulmonary rehabilitation (PR) is an evidence-based intervention to improve symptoms, exercise capacity and quality of life of people with chronic respiratory diseases (CRD), such as those with chronic obstructive pulmonary disease (COPD) and asthma.[1] However, evidence from these specific CRD shows that these benefits diminish over time.[2,3] Non-adherence to health-enhancing behaviours is one of the key factors associated with this decline.[2,4] Therefore, novel approaches to promote long-term adherence and preserve the benefits gained are needed.

There is a growing evidence base for the use of internet/web-based approaches to support self-management and empowerment of patients with chronic diseases. Internet-based interventions have been shown to effectively improve health behaviours, such as physical activity.[5] A web-based self-management program for patients with CRD may have the potential to be a novel and effective approach to support patients' long-term compliance with health-enhancing behaviours.[5] However, few studies have evaluated the access to the internet or other digital technologies (e.g., smartphones) among patients with CRD, which are fundamental for the implementation of web-based approaches. The objective of this study was to explore if patients with CRD have access to digital technology and if they feel confident using it.

Patients with CRD were recruited from community-based PR programmes in seven healthcare centres of the centre region of Portugal, between October 2017 and September 2018. Inclusion criteria were having a diagnosis of CRD, at least 18 years old, and being referred by their general practitioner to a community-based PR programme. Exclusion criteria were history of a neoplasic/immunologic disease or presence of acute cardiac condition or a significant cardiac, musculoskeletal, neuromuscular or psychiatric condition. The study was approved by the Center Health Regional Administration (73/2016) and by the National Data Protection Committee (NDPC – 7295/2016).

All referred patients attended an initial visit at their primary healthcare centre, where they completed a structured questionnaire with the support of two trained physiotherapists. Sociodemographic (age, sex, marital status, education and occupation), anthropometric and clinical (diagnosis, smoking habits, history of exacerbations and health resources use in the previous year) data were first obtained. Disability resulting from dyspnoea was also collected using the modified Medical Research Council questionnaire (mMRC).[6] The primary outcome measures were access to technology and level of confidence in using it. Patients were surveyed regarding the use of internet; access to computers, smartphones (combination of mobile phone, web browser and computer capabilities)/tablets and cell phones (simple devices mainly for voice calls and text messages). Their level of confidence in using these technologies was assessed with two structured questions (*How confident do you feel using the internet? How confident do you feel using this device?*). Patients rated their confidence on a numerical scale from 0 (not at all confident) to 10 (completely confident) and were considered confident when a score of 6 or greater was selected. A previous study showed a mean of 6 represented confidence in computer experience.[7] All data, collected after obtaining the informed consent of patients, were anonymised and processed in bulk according to the requirements of the NDPC and to comply with the General Data Protection Regulation. Descriptive statistics were used to describe the sample. Chi-square tests for categorical data or independent t-tests for continuous data were used to explore if access to digital technology was related to patients' characteristics. Variables that were statistically different were used as independent variables in one multivariate logistic regression using the Stepwise method. The overall model was evaluated using the Nagelkerke's *R*-square.

A total of 141 patients were enrolled, with a mean age of 66.5 ± 11.4 [21–88] (Table 1). Patients were mostly married (73.1%) and almost half had only completed primary school (48.9%) (Table 1). COPD ($n = 84$; 59.6%) and asthma ($n = 26$; 18.4%) were the most common diagnosis (Table 1). A total of 115 (81.6%) patients reported having access to digital technology: 62 (44%) used the smartphone or tablet, 53 (37.6%) used the computer and 52 (36.9%) the cell phone. 81% of patients reported themselves to be confident using these technologies (median 7, interquartile range 5–9.5). Median confidence was similar across the distinct technologies (Fig. 1). More than half of the patients ($n = 75$; 53.2%) used the internet and, from these, 85% felt confident in using it (median 8, interquartile range 5.75–10) (Fig. 1).

Patients with access to the internet were younger ($p < 0.001$), were mostly married or single/divorced