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Menezes, Ana M.; Landis, Sarah H.; Han, MeiLan K.; Muellerova, Hana; Aisanov, Zaurbek; van der Molen, Thys; Oh, Yeon-Mok; Ichinose, Masakazu; Mannino, David M.; and Davis, Kourtney J., "Continuing to Confront COPD International Surveys: Comparison of Patient and Physician Perceptions about COPD Risk and Management" (2015). *Preventive Medicine and Environmental Health Faculty Publications*. 35. https://uknowledge.uky.edu/pmeh_facpub/35

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Digital Object Identifier (DOI)

<http://dx.doi.org/10.2147/COPD.S74315>

Notes/Citation Information

Published in *International Journal of Chronic Obstructive Pulmonary Disease*, v. 10, no. 1, p. 159-172.

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Continuing to Confront COPD International Surveys: comparison of patient and physician perceptions about COPD risk and management

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Purpose: Using data from the Continuing to Confront COPD International Physician and Patient Surveys, this paper describes physicians' attitudes and beliefs regarding chronic obstructive pulmonary disease (COPD) prognosis, and compares physician and patient perceptions with respect to COPD.

Methods: In 12 countries worldwide, 4,343 patients with COPD were identified through systematic screening of population samples, and 1,307 physicians who regularly saw patients with COPD were sampled from in-country professional databases. Both patients and physicians completed surveys about their COPD knowledge, beliefs, and perceptions; physicians answered further questions about diagnostic methods and treatment choices for COPD.

Results: Most physicians (79%) responded that the long-term health outlook for patients with COPD has improved over the past decade, largely attributed to the introduction of better medications. However, patient access to medication remains an issue in many countries, and some physicians (39%) and patients (46%) agreed/strongly agreed with the statement "there are no truly effective treatments for COPD". There was strong concordance between physicians and patients regarding COPD management practices, including the use of spirometry (86% of physicians and 76% of patients reporting they used/had undergone a spirometry test) and smoking cessation counseling (76% of physicians reported they counseled their smoking patients at every clinic visit, and 71% of smoking patients stated that they had received counseling in the past year). However, the groups differed in their perception about the role of smoking in COPD, with 78% of physicians versus 38% of patients strongly agreeing with the statement "smoking is the cause of most cases of COPD".

Conclusion: The Continuing to Confront COPD International Surveys demonstrate that while physicians and patients largely agreed about COPD management practices and the need for more effective treatments for COPD, a gap exists about the causal role of smoking in COPD.

Keywords: chronic obstructive pulmonary disease, physician survey, patient survey, beliefs, perceptions

Introduction

Although chronic obstructive pulmonary disease (COPD) is a preventable and treatable disease,¹ it is associated with significant morbidity and mortality, giving rise to an enormous social and economic burden.^{1,2} In 2010, COPD was ranked as the third leading cause of mortality and the ninth leading cause of disability-adjusted life years lost worldwide.^{2,3}

The evidence-based guidelines available to aid physicians in the management and treatment of patients are frequently not fully implemented in clinical practice, as demonstrated across many regions worldwide.⁴⁻¹¹ Reasons for this include a lack

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of familiarity with guidelines and a lack of confidence in implementation and access/time constraints,^{9–11} but have also been shown to be associated with physician perceptions and beliefs about COPD management. Yawn et al¹⁰ reported that among 278 primary care physicians (PCPs) and practice nurses/assistants, only 15% thought COPD treatments were very or somewhat useful and 3% thought pulmonary rehabilitation was useful or very useful, despite its availability to 32% of those sampled. In a Swiss study of 455 PCPs, 52% stated that they were uncomfortable with smoking cessation counseling, 72% underused pulmonary rehabilitation programs, and the indications and effects of COPD treatments were poorly recognized.⁷

Few studies have investigated the perceptions and beliefs about COPD from both a physician and a patient perspective. Hernandez et al¹² surveyed 58 respiratory specialists and 640 patients with COPD and reported that perceived knowledge needs and preferred methods of education differed between physicians and patients. For example, physicians identified smoking cessation counseling as an educational priority, while patients wanted to be informed more about their disease progression.

The Continuing to Confront COPD International Survey aimed to describe COPD disease burden and perceptions about the disease from both the patient and physician perspectives across 12 countries. This paper describes physicians' attitudes and beliefs regarding COPD prognosis and treatment, and how physician and patient perceptions compare with respect to multiple aspects of COPD.

Methods

A detailed description of the study design, methodology, and response rates for the Continuing to Confront COPD International Physician and Patient Surveys have been reported previously.^{13,14} Briefly, both surveys were conducted during 2012–2013 in Brazil, France, Germany, Italy, Japan, Mexico, the Netherlands, Russia, South Korea, Spain, the UK, and the USA.

The Physician Survey sampled PCPs and respiratory specialists who regularly saw patients with COPD, emphysema, or chronic bronchitis (contact with ≥ 5 patients per month, on average) from in-country databases of professional associations to achieve an a priori 3:1 ratio of PCP to respiratory specialists in each country.¹³ In total, 1,307 physicians (74% PCPs, 26% respiratory specialists) agreed to participate. A single survey covering knowledge and behavior around diagnosis and treatment of COPD and beliefs about COPD risk and prognosis was translated into local language,

and interviews were conducted online, by telephone, or face-to-face. The response rate by country ranged from 10% (USA) to 38% (Spain).

The Patient Survey was primarily designed to estimate the prevalence of COPD in each country, and therefore, patients with COPD were identified systematically by screening probability samples of households followed by telephone or face-to-face interviews of eligible patients. A single survey that incorporated questions about patients' perception of their disease severity and its impact on daily living, and validated patient-reported outcome instruments to assess disease severity, medication adherence, and patient engagement was translated into local language.¹⁴ Eligible patients were adults aged 40 years and older who reported either 1) a physician diagnosis of COPD/emphysema or 2) a physician diagnosis of chronic bronchitis, or 3) met a symptom-based definition of chronic bronchitis and either were taking respiratory medication for their condition or had chronic cough with phlegm most days. The Patient Survey identified 106,876 households with at least one person aged ≥ 40 years, of which 4,343 respondents fulfilled the earlier-mentioned case definition of COPD and completed the full survey. Response rates for the Patient Survey ranged from 25% (UK) to 74% (Brazil).

To elicit physician and patient perceptions regarding COPD, respondents were asked to indicate their level of agreement with a series of statements using a 4-point scale (strongly disagree, somewhat disagree, somewhat agree, strongly agree). The statements were not designed to have a "correct" answer, but rather to evaluate respondent perception. Most statements were based on the original Confronting COPD International Survey or other published surveys to allow for comparison across time points and different study populations.^{15–17}

As the Patient Survey sample was identified from screening general population probability samples, we were able to weight the results included herein by age and sex according to the latest census data available in each country to obtain representative countrywide estimates. The Physician Survey results are not weighted as standardized reliable estimates of the universe of physicians in each country are not readily available for all countries.

The comparison between physician and patient perceptions on topics addressed in both surveys are qualitative in nature, as we did not have an a priori hypothesis about the expected concordance nor were we able to conduct statistical testing due to slight differences in the wording of questions between surveys.

Results

Demographics

The demographic characteristics of the physician and patient samples have been described in detail elsewhere.^{13,14} Among the total physician sample, 75% were male, 81% practiced in an outpatient setting, and 54% worked in a multispecialty practice, with the majority of practices found in small cities/towns (50%) or in central cities (42%). Approximately half had graduated from medical school later than 1990.

Patient respondents had a mean age of 61 years; 48% were male, with a mean body mass index of 26.9 (standard deviation, 6.5) kg/m². Smoking status was reported as 36% nonsmokers, 37% former smokers, and 28% current smokers. Most commonly reported comorbidities were hypertension (45%) and asthma (42%).

Physician beliefs about COPD prognosis and treatment

The majority of physicians surveyed (79%) reported that they believe the long-term health outlook for patients with COPD has improved compared to 10 years ago, and this view was generally consistent across countries (range, 55%–94%; Table S1). The most common reasons given for the improved outlook were “better medications for COPD” (86%; range, 75%–90%) and “increased smoking cessation/less passive smoking” (28%; range, 15%–51%). Other common reasons included “more public acceptance and knowledge about COPD” (22%) and “better diagnostics/earlier diagnosis of COPD” (21%). Despite the view of an improved health outlook for patients with COPD, a large proportion of physicians still felt that their patients find it difficult to cope with their disease (Table 1 and Table S2).

While physicians largely attributed the improved prognosis to the availability of better medications, unmet needs for modifying the natural history of the disease were noted; about half (46%; range, 28%–81%) agreed or somewhat agreed that “there are no current treatments that can reduce mortality or halt COPD progression” (Table 1 and Table S2). With regard to COPD physiology, physicians universally agreed

that “inflammation is a key component of COPD that should be treated” (92%; range, 86%–97%) and that “more frequent exacerbations are linked to a greater loss in lung function” (93%; range, 86%–100%) (Table 1 and Table S2).

When queried about patient access to medication, one in three physicians (30%) stated that none of their patients had any issues accessing the treatments they prescribed; 7% reported that more than half their patients could not access preferred treatments (Figure 1). However, these proportions varied greatly by country, with the highest rates of treatment access restrictions reported in the USA, Mexico, and Brazil (Table S3). The most frequently reported barrier to medication access across most countries was related to cost (“too expensive for patient” or “insurance barriers”). Exceptions included Italy, where “patient refusal to use prescribed medicine”, and the Netherlands where “side effects of preferred treatment” was commonly cited. As well, one-third to one half of physicians in the UK, Mexico, Russia, and South Korea mentioned that they were not able to use preferred treatments as they were “not recommended by local guidelines” or were “not on the clinic/hospital formulary”.

When asked to estimate the percentage of their patients on COPD maintenance medication who fully comply with treatment instructions, only 15% reported that more than three-quarters were fully compliant (range, 5%–26%) (Table S4). Major problems associated with poor compliance were reported to be “poor inhaler technique” (60%; range, 34%–87%), “low patient education/poor understanding of the disease” (57%; range, 47%–69%), “difficulties in managing multiple dosing regimens” (52%; range, 40%–64%), “no perceived benefit of treatment” (46%; range, 30%–66%), and “medication costs” (44%; range, 6%–89%). While physicians in most countries regarded “troublesome side effects” as a minor problem affecting patient compliance with treatment instructions, over 50% of physicians in Russia and Japan reported it as a major problem. “Medication costs” was reported as a leading challenge related to compliance by fewer than 10% of physicians in France, UK, and the Netherlands, in contrast to more than 80% in the USA, Mexico, and Brazil.

Table 1 Physician beliefs and knowledge about COPD prognosis and treatment: Continuing to Confront COPD International Survey, 2012–2013

Question	Response (%)			
	Strongly agree	Somewhat agree	Somewhat disagree	Strongly disagree
No current treatments reduce mortality or halt COPD progression	16	30	34	18
Inflammation is a key component of COPD and should be treated	58	34	5	1
More frequent exacerbations are linked to a greater loss in lung function	55	38	6	1
It is difficult for most patients to cope with COPD	29	50	19	2

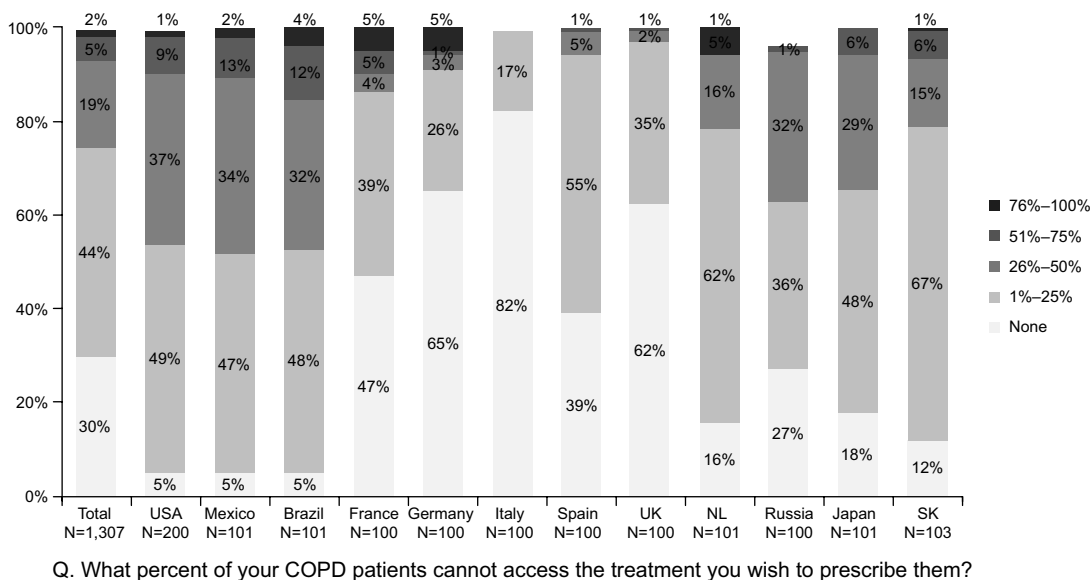


Figure 1 Physician perception about patient access to treatment: Continuing to Confront COPD International Survey, 2012–2013.

Note: Columns do not always sum to 100% due to rounding or missing values.

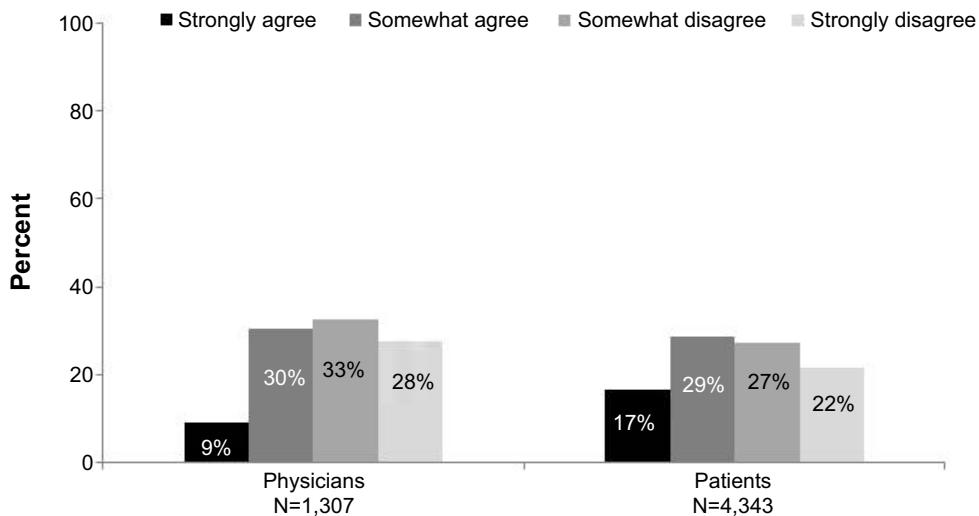
Abbreviations: NL, the Netherlands; SK, South Korea.

Comparison between physician and patient beliefs and reporting of management practices

Several questions about COPD perceptions were asked in both the physician and patient surveys. A similar proportion of both physicians (39%) and patients (46%) strongly or somewhat agreed with the statement “there are no truly effective treatments for COPD” (Figure 2). There was some variation across countries in physician response

from 19% (USA) to 72% (Russia), while this belief among patients ranged from 26% (Italy) to 63% (South Korea) (Table S5).

In contrast, there was a considerable difference between physicians and patients regarding their views on the statement “smoking is the cause of most cases of COPD” with 78% of physicians strongly agreeing, compared with only 38% of patients (Figure 3). One-third of patients somewhat (17%) or strongly (14%) disagreed with this statement, compared with



Physician and patient question: please indicate whether you strongly agree, somewhat agree, somewhat disagree, or strongly disagree with the following statement: “there are no truly effective treatments for COPD”.

Figure 2 Comparison of physician and patient beliefs about treatment effectiveness: Continuing to Confront COPD International Survey, 2012–2013.

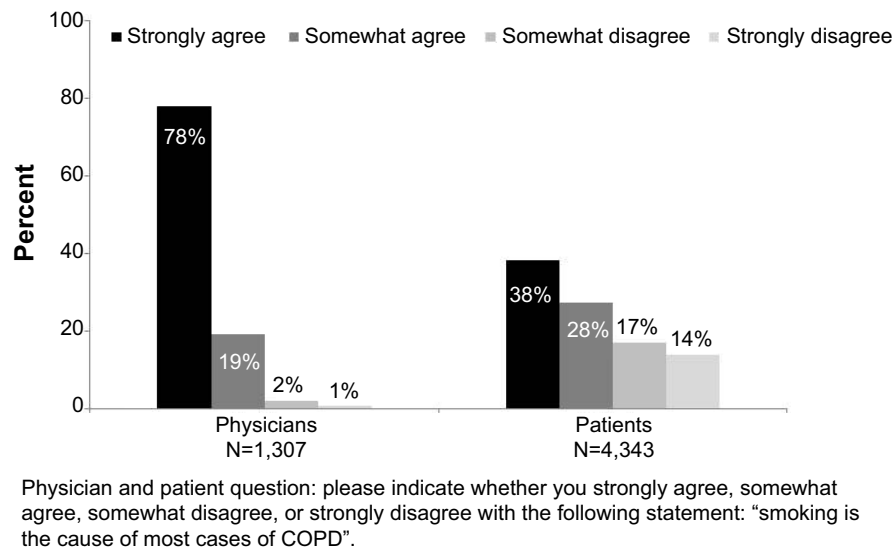


Figure 3 Comparison of physician and patient beliefs about smoking as a risk factor for COPD: Continuing to Confront COPD International Survey, 2012–2013.

3% of physicians (Table S5). Given this large disparity, we explored patient characteristics associated with disagreement in a multivariate logistic regression model (Table S6). Factors independently associated with disagreeing that "smoking is the cause of most cases of COPD" were as follows: never smoking (OR [odds ratio], 4.4; 95% CI [confidence interval], 3.6–5.4), former smoking (OR, 1.6; 95% CI, 1.3–1.9), exposure to dust and fumes at home or in the workplace (OR, 1.2; 95% CI, 1.0–1.4), and female sex (OR, 1.5; 95% CI, 1.3–1.7). Younger patients and those with more than secondary school education were also more likely to disagree that smoking is the primary cause of COPD. In contrast, patients with a physician diagnosis of COPD (OR,

0.6; 95% CI, 0.4–0.7) or chronic bronchitis (OR, 0.5; 95% CI, 0.4–0.6) were less likely than those who qualified based on a symptom-based definition of chronic bronchitis to disagree about the causal role of smoking in COPD.

Questions regarding how physicians manage COPD, including smoking cessation counseling for smoking patients, and the use of lung function tests, were also asked of both physicians and patients. Physicians and patients largely agreed about the provision of smoking cessation counseling to current (or recently quitting) smokers (Figure 4 and Table S5). Sixty-seven percent (range, 44%–88%) of physicians reported that they counseled their smoking patients at every clinic visit and 29% (range, 11%–48%)

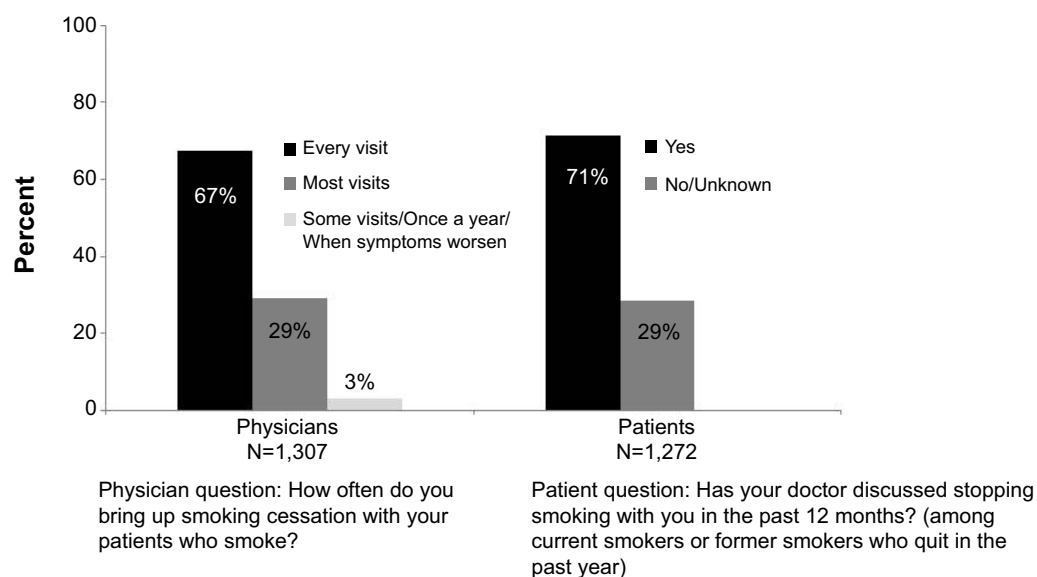


Figure 4 Comparison of physician- and patient-reported smoking cessation counseling practices: Continuing to Confront COPD International Survey, 2012–2013.

at most visits. This was corroborated by 71% (range, 35%–87%) of smoking patients, indicating that they had received smoking cessation counseling in the past year. When examining patient–physician comparisons within individual countries, Japanese, Dutch, and German physicians were slightly less likely to report that they counseled their patients at every/most clinic visit, which corresponded with rates of smoking cessation counseling reported by patients in these same countries.

When questioned about lung function testing practices, the majority of physicians (86%) and patients (76%) reported that they used (or had undergone) spirometry testing (Figure 5 and Table S5). Physician responses were consistent across countries (>85% reported spirometry use) except Italy (37%) and France (63%), where a high proportion of PCPs indicated that this testing option was not available in their practice. These findings from France and Italy were supported by responses from the patient survey, as French (28%) and Italian (56%) patients were among the lowest to report that they had received lung function testing. Of interest, discordance between physicians and patients on this topic was seen in Russia (100% of physicians reported that they use spirometry versus 59% of patients indicating they received a lung function test) and Mexico (88% of physicians versus 57% of patients).

Discussion

The Continuing to Confront COPD International Surveys provide an insight into physicians' views about COPD outlook and management, and an opportunity to compare physician

and patient attitudes and beliefs about COPD. Key findings from the physician survey include a perceived improvement about the health outlook for patients with COPD, primarily associated with the availability of better treatments. Despite these better treatments, physicians highlighted patient access to preferred treatment and patient compliance to maintenance treatment as problematic in many regions. Across most countries, physicians reported regular use of spirometry to diagnose COPD and indicated that smoking cessation counseling to smoking patients was a routine part of their COPD management; these findings were corroborated by the patient survey. We observed discordance between physicians and patients regarding the statement “smoking is the cause of most cases of COPD”.

The majority of physicians reported that the long-term health outlook for patients with COPD has improved compared with 10 years ago, and while this was largely attributed to the availability of better medications (86% of physicians), approximately a quarter also attributed the better outlook to smoking cessation and improved public awareness about COPD. Only a third of physicians felt that their patients had no problems accessing preferred treatments; cost and issues of insurance coverage were reported as the biggest factors associated with problems of access to medicines. These data varied greatly by country; physicians from USA, Brazil, and Mexico reported the most issues with access (>90% physicians) compared with lower reporting in the UK (34%), Italy (12%), and the Netherlands (11%), reflecting differences in health care delivery and direct costs to patients between countries (eg, national versus privatized systems). In the COPD

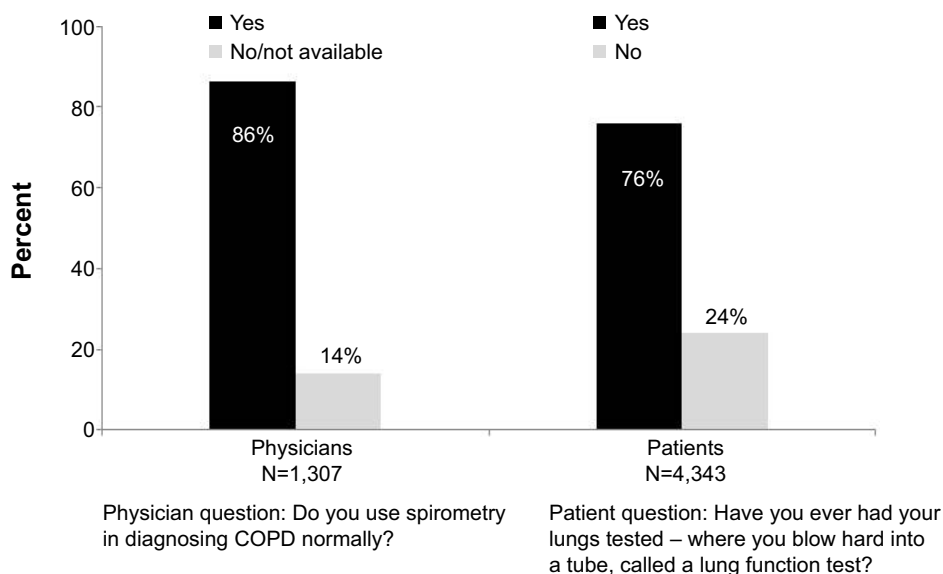


Figure 5 Comparison of physician- and patient-reported lung function testing practices: Continuing to Confront COPD International Survey, 2012–2013.

Resource Network Needs Assessment Survey conducted in the USA in 2003–2004, approximately two-thirds believed that reimbursement standards for medical management of patients with COPD were inadequate or very unreasonable, showing that this issue is pervasive in the USA and continues to be a barrier to COPD care.¹⁶

Only 15% of physicians in our survey reported that more than three-quarters of their patients on maintenance therapy for COPD were fully compliant in taking their medications, highlighting noncompliance as a major challenge in COPD management. Across countries, the two most common reasons associated with noncompliance were poor inhaler technique and poor patient education/understanding of disease. These findings are consistent with those reported in a recent review of treatment adherence issues in COPD, in which on average 40%–60% of patients were considered adherent to their medications and only one in ten of those prescribed a metered dose inhaler was reported to use it completely correctly.¹⁸ Similar to our findings, previous reviews cite many possible reasons for poor compliance, including those related to medicine/device factors (eg, difficulties with inhalers, complex regimens, side effects) and patient factors (eg, misunderstanding medication instructions, undiscussed fears/concerns, cultural issues).^{18,19} To achieve optimal compliance, patients should have a clear understanding of the need for their treatment, which takes account of specific concerns, and treatment should be convenient and as easy to use as possible.²⁰

For topics covered in both surveys, there was good agreement between responses about COPD treatment effectiveness, smoking cessation practices, and use of spirometry, both overall and within countries, suggesting a good degree of credibility in the self-reported physician responses. Approximately two fifths of both patients and physicians strongly or somewhat agreed with the statement “there are no truly effective treatments for COPD”, despite many physicians noting that the introduction of better treatments has played a role in improving the long-term health outlook for patients with COPD. A similar pattern was reported by Barr et al¹⁶ in the COPD Resource Network Needs Assessment Survey, where 68% of physicians reported an improved COPD outlook due primarily to better medications, yet almost a third agreed or strongly agreed that “there are no truly effective treatments for COPD”.

Regarding physician diagnosis and management practices, the high level (86%) of self-reported use of spirometry by physicians in the Continuing to Confront COPD International Physician Survey¹³ was corroborated with 76% of

patients reporting that they had undergone a lung function test. The provision of smoking cessation counseling to smokers was also reported by the majority of both physicians and patients; however, a key discordance was observed in their beliefs about the statement “smoking is the cause of most cases of COPD”. Other published studies comprised primarily of patients with COPD who currently smoke have also shown that patients more often cite non-smoking-related causes of COPD than physicians.^{16,21} There was some geographic variability regarding patient belief about the role of smoking, but this did not appear to be related to smoking prevalence rates in a particular country. For example, Japan and Korea have some of the highest global smoking rates,²² and respondents in these countries were also most likely to disagree with the statement (Table S5); however, this pattern did not hold in Russia, the UK, Spain, and France, which also feature medium-to-high smoking prevalence yet were least likely to disagree about the role of smoking in COPD. Also, the results did not track geographically with countries that have a higher use of biofuels, another recognized risk factor associated with COPD.²³ Thus, it appears that other patient factors may play a role in patient beliefs. We explored this further in our sample and identified that self-reported nonsmokers were the most likely group to disagree with the statement “smoking is the cause of most cases of COPD”, even after adjusting for other patient factors, and this finding was consistent in all countries (ORs for nonsmokers versus smokers ranged from 1.5 to 11.7; full data not shown). Despite implementation of awareness campaigns about the risks of smoking,²⁴ it may not be surprising that some nonsmokers express doubt that smoking is a primary cause of COPD given their lack of personal smoking exposure. Similarly, we saw that ex-smokers who may have quit years before their diagnosis were also slightly more likely to disagree with this statement. We also observed that patients with a physician-confirmed diagnosis of COPD or chronic bronchitis were half as likely as those who qualified with symptoms only to deny a causal role of smoking in COPD, suggesting that educational messages about the importance of smoking cessation are more effectively reaching patients with COPD than the general public. These results can be helpful in identifying groups, such as nonsmokers, women, and younger adults, who may most benefit from targeted educational interventions about the risks of smoking.

Our findings must be interpreted within the limitations of this type of survey. As discussed in detail in previous publications about this survey, the representativeness of the samples within certain countries may be limited due to variable

response rates in the Patient and Physician surveys.^{13,14} In addition, the comparison of physicians' and patients' perceptions may be impacted by differences in knowledge and priorities between these groups. For example, patients and physicians will bring underlying assumptions about treatment effectiveness that may impact their responses to statements such as "there are no truly effective treatments for COPD". Similarly, beliefs about smoking as a cause of the majority of cases of COPD will be subject to a patient's personal risk factor profile, as well as regional variation in the frequency of other established risk factors such as biomass fuel and other occupational exposures.

In conclusion, the Continuing to Confront COPD International Surveys demonstrated that physician perception about the health outlook for patients with COPD has improved in the past decade, largely attributed to improved medications, although patient access to therapy remains problematic in many areas. Many physicians and patients agreed with the statement that "there are no truly effective COPD treatments", suggesting that further efforts to move toward a precision medicine approach for treating specific COPD phenotypes are warranted. There was a considerable gap between physicians' and patients' perceptions about whether smoking is the cause of the majority of cases of COPD, highlighting a need for enhanced and targeted patient education about the risks of smoking.

Acknowledgments

The survey was conducted by Abt SRBI, a global survey research firm that specializes in health surveys. The authors acknowledge editorial support in the form of draft manuscript development, assembling tables, collating author comments, and copyediting, which was provided by Kate Hollingworth of Continuous Improvement Ltd. The authors further acknowledge the analytical support provided by Joe Maskell. This support was funded by GlaxoSmithKline (GSK).

Disclosure

This study was funded by GSK. All authors meet the International Committee for Medical Journal Editors criteria for authorship. SL, KD, and HM are employees of GSK and hold GSK shares. Y-MO, DM, MH, TvdM, ZA, AM, and MI served on the Scientific Advisory Committee for the Continuing to Confront COPD Survey and were paid for advisory services. Scientific Advisory Committee members were not paid for authorship services. The authors report no other conflicts of interest in this work.

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Supplementary materials

Table S1 Physician beliefs about COPD outlook compared to 10 years ago by country: Continuing to Confront COPD International Survey, 2012–2013

	Total (N=1,307)	USA (N=200)	Mexico (N=101)	Brazil (N=101)	France (N=100)	Germany (N=100)	Italy (N=100)	Spain (N=100)	UK (N=100)	NL (N=101)	Russia (N=100)	Japan (N=101)	SK (N=103)
Compared to 10 years ago, would you say the long-term health outlook for patients with COPD has become better, become worse, or has stayed about the same?													
Become worse (%)	4	2	13	0	5	2	1	5	0	1	10	4	8
About the same (%)	18	23	9	12	17	18	5	10	13	19	35	18	26
Become better (%)	79	76	78	88	78	80	94	85	87	80	55	78	66
Among physicians who reported that outlook had "become better", "Why has the long-term health outlook improved for patients with COPD?":*													
Better medications for COPD (%)	86	89	86	90	83	90	79	88	84	89	75	84	90
Increased smoking cessation/less passive smoking exposure (%)	28	39	15	19	19	15	16	20	40	36	38	32	51
More public acceptance and knowledge about COPD (%)	22	23	38	26	23	26	9	20	22	30	11	14	26
Better diagnostics/earlier diagnosis of COPD (%)	21	18	29	11	33	21	31	38	21	12	25	4	9
Increased access to COPD medication (%)	15	7	9	13	5	6	29	12	23	11	53	11	22
Better treatment of comorbidities and symptoms associated with COPD (%)	10	7	13	12	3	9	5	12	14	4	44	4	4
Better disease management/more frequent follow-up of patients with COPD (%)	10	2	9	3	29	14	1	16	13	21	0	0	12
Pulmonary rehabilitation/physiotherapy (%)	9	10	6	11	8	6	1	4	23	11	27	5	3
Better adherence to COPD treatment (%)	9	8	6	9	6	11	16	7	3	2	18	4	15
Better-trained physicians/Availability of guidelines and tools for physicians (%)	9	3	11	4	10	5	17	5	9	9	36	6	0
Long-term oxygen therapy (%)	6	3	3	3	5	5	1	2	11	4	27	10	7
Reduced exposure to harmful environmental factors (%)	2	1	3	0	3	3	0	0	1	2	0	4	18

Notes: *Percentages for each country will sum to greater than 100%; results from an open-ended question asking physicians to provide reasons why they believe the health outlook for patients with COPD has improved; no predefined list provided.

Abbreviations: COPD, chronic obstructive pulmonary disease; NL, the Netherlands; SK, South Korea.

Table S2 Physician beliefs and knowledge about COPD prognosis and treatment by country: Continuing to Confront COPD International Survey, 2012–2013

	Total (N=1,307)	USA (N=200)	Mexico (N=101)	Brazil (N=101)	France (N=100)	Germany (N=100)	Italy (N=100)	Spain (N=100)	UK (N=100)	NL (N=101)	Russia (N=100)	Japan (N=101)	SK (N=103)
No current treatments reduce mortality or halt COPD progression													
Strongly agree or somewhat agree (%)*	46	43	43	36	28	29	42	39	50	55	81	42	67
Inflammation is a key component of COPD and should be treated													
Strongly agree or somewhat agree (%)*	92	95	96	95	90	94	95	95	90	86	87	93	97
More frequent exacerbations are linked to a greater loss in lung function													
Strongly agree or somewhat agree (%)*	93	96	91	86	89	86	89	89	95	92	100	93	98
It is difficult for most patients to cope with COPD													
Strongly agree or somewhat agree (%)*	79	87	88	88	68	69	84	70	74	85	90	42	92

Notes: *From four possible responses (strongly agree, somewhat agree, strongly disagree, and somewhat disagree).

Abbreviations: COPD, chronic obstructive pulmonary disease; NL, the Netherlands; SK, South Korea.

Table S3 Reasons why patients with COPD do not have access to the treatment the physician wishes to prescribe, by country: Continuing to Confront COPD International Survey, 2012–2013

	Total (N=1,307)	USA (N=200)	Mexico (N=101)	Brazil (N=101)	France (N=100)	Germany (N=100)	Italy (N=100)	Spain (N=100)	UK (N=100)	NL (N=101)	Russia (N=100)	Japan (N=101)	SK (N=103)
Among physicians who indicated that 1%–100% of their patients have issues accessing their treatment: *Why do your chronic obstructive pulmonary disease patients not have access to their treatment?*													
Preferred treatment too expensive for patient/insurance issues (%)	70	98	93	94	58	69	12	75	34	11	81	57	49
Preferred treatment not on hospital/clinic formulary (%)	13	2	48	6	4	11	12	11	29	6	35	10	3
Local guidelines do not recommend preferred treatment (%)	10	1	4	4	4	3	18	13	29	11	1	8	46
Patient inability to use device or understand how to use preferred treatment (%)	4	3	1	0	2	3	0	7	3	16	0	12	4
Patient refuses to use the preferred treatment (%)	3	2	0	1	9	0	24	0	3	11	0	4	3
Poor patient adherence to preferred treatment (%)	3	1	1	1	4	0	12	0	0	11	0	2	5
Preferred treatment has side effects/risk of contraindication (%)	2	0	0	0	4	0	0	0	0	19	0	2	1
Preferred treatment has poor efficacy (%)	1	0	0	0	0	0	0	0	0	5	0	1	1
Patient lives alone or has transportation issues (%)	1	2	0	0	2	0	0	0	0	0	0	1	0

Notes: *Percentages for each country will sum to greater than 100%; results from an open-ended question asking physicians to provide reasons why they believe their patients with COPD cannot access treatment; no predefined list provided.

Abbreviations: COPD, chronic obstructive pulmonary disease; NL, the Netherlands; SK, South Korea.

Table S4 Physician perception of patient compliance with treatment instructions, by country: Continuing to Confront COPD International Survey, 2012–2013

	Total (N=1,307)	USA (N=200)	Mexico (N=101)	Brazil (N=101)	France (N=100)	Germany (N=100)	Italy (N=100)	Spain (N=100)	UK (N=100)	NL (N=101)	Russia (N=100)	Japan (N=101)	SK (N=103)
Approximately what percentage of your patients on maintenance medication for their COPD comply fully to their treatment instructions?													
76%–100%	15	16	13	21	15	15	26	16	12	5	11	17	13
51%–75%	45	50	52	48	49	40	28	51	57	53	7	53	47
26%–50%	30	25	25	26	29	38	38	28	27	38	33	28	31
1%–25%	10	8	11	6	7	7	7	5	4	5	47	3	9
None	1	1	0	0	0	0	1	0	0	0	2	0	1
In your experience, how much of a problem are the following when it comes to patients' compliance with their medication regimens for COPD?													
Troublesome side effects (%)													
Major problem	26	13	26	28	32	27	19	34	14	11	54	58	13
Minor problem	59	77	58	53	53	69	48	56	73	58	39	40	60
Not a problem	15	10	16	19	15	4	33	10	13	31	6	2	27
Patients do not perceive a benefit of treatment (%)													
Major problem	46	47	48	30	55	39	40	37	45	47	55	66	44
Minor problem	43	44	41	49	34	48	38	51	47	46	34	31	51
Not a problem	11	9	12	22	11	13	21	12	8	8	9	3	5
The cost of medications (%)													
Major problem	44	89	81	86	8	18	18	32	8	6	62	50	24
Minor problem	34	10	16	12	48	48	30	54	30	40	33	43	69
Not a problem	22	1	3	2	44	34	51	14	62	54	5	7	7
Inconvenience of dosing schedule (%)													
Major problem	26	20	22	33	31	27	17	28	19	22	29	50	24
Minor problem	57	66	60	53	45	65	48	58	66	64	44	49	61
Not a problem	16	14	18	14	24	8	35	14	15	14	25	1	15
Low patient education or poor understanding of disease (%)													
Major problem	57	52	50	57	64	57	66	67	54	47	57	69	50
Minor problem	38	43	43	37	34	37	28	30	45	51	31	28	44
Not a problem	5	5	8	6	2	6	6	3	1	2	11	3	6
Poor inhaler technique (%)													
Major problem	60	43	52	34	72	67	70	87	71	79	60	60	46
Minor problem	35	52	37	55	26	30	19	13	28	21	34	38	50
Not a problem	5	5	11	11	2	3	11	0	1	0	5	2	5
Forgetfulness (%)													
Major problem	35	29	37	28	39	37	52	39	39	28	27	54	14
Minor problem	54	63	50	61	52	59	36	56	56	59	44	39	61
Not a problem	11	8	13	11	9	4	12	5	5	13	26	7	25
Difficulty managing multiple medication regimens (%)													
Major problem	52	61	47	62	40	56	52	64	60	51	48	41	34
Minor problem	41	38	49	34	52	40	36	32	34	45	25	53	59
Not a problem	7	1	5	4	8	4	12	4	6	4	27	6	7

Abbreviations: COPD, chronic obstructive pulmonary disease; NL, the Netherlands; SK, South Korea.

Table S5 Comparison of physician and patient beliefs by country: Continuing to Confront COPD International Survey, 2012–2013

	Total (N=1,307)	USA (N=200)	Mexico (N=101)	Brazil (N=101)	France (N=100)	Germany (N=100)	Italy (N=100)	Spain (N=100)	UK (N=100)	NL (N=101)	Russia (N=100)	Japan (N=101)	SK (N=103)
There are no truly effective treatments for COPD													
Physicians strongly agree or somewhat agree (%)*	39	19	53	38	37	22	38	32	48	39	72	39	59
Patients strongly agree or somewhat agree (%)*	46	40	50	46	53	50	26	45	55	37	43	47	63
Smoking is the cause of most cases of COPD													
Physicians strongly disagree or somewhat disagree (%)*	3	2	3	3	2	3	3	4	0	4	3	3	5
Patients strongly disagree or somewhat disagree (%)*	31	32	31	19	21	43	36	21	19	36	19	48	39
Smoking cessation counselling practices													
Physicians counsel smokers at every visit (%)	68	73	84	88	57	44	87	79	60	44	77	47	65
Patients who smoke or quit in the past year Doctor has discussed stopping smoking in the past 12 months (%)	71	82	66	87	72	35	86	74	81	59	66	47	70
Lung function testing practices													
Physicians use spirometry to diagnose COPD (%)	86	88	88	95	63	97	37	97	100	97	100	85	86
Patients ever had a lung function test (%)	76	89	57	76	28	95	56	89	88	91	59	85	78

Notes: *From four possible responses (strongly agree, somewhat agree, somewhat disagree, and somewhat disagree).
Abbreviations: COPD, chronic obstructive pulmonary disease; NL, the Netherlands; SK, South Korea.

Table S6 Multivariate model of predictors of patient's disagreement* with the statement "Smoking is the cause of most cases of COPD": Continuing to Confront COPD International Survey, 2012–2013

Patient characteristic	Odds ratio (95% CI)
Smoking status	
Current smoker	Ref
Former smoker	1.6 (1.3, 1.9)
Never smoker	4.4 (3.6, 5.4)
Exposed to dust or fumes from cooking, burning, mining, welding, etc, for a year or more	
Yes	1.2 (1.0, 1.4)
No	Ref
Age (years)	
40–49	1.8 (1.4, 2.2)
50–59	1.6 (1.3, 1.9)
60–69	1.1 (0.9, 1.4)
70+	Ref
Sex	
Male	Ref
Female	1.5 (1.3, 1.7)
Education level	
High school (secondary school) or less	Ref
Some/completed university or technical training	1.3 (1.1, 1.5)
Qualifying diagnosis	
Physician-diagnosed COPD	0.6 (0.4, 0.7)
Physician-diagnosed chronic bronchitis	0.5 (0.4, 0.6)
Symptom-based definition of chronic bronchitis	Ref

Notes: All factors associated with disagreement in univariate analysis were entered into a backward elimination model; only statistically significant variables (displayed above) and country were retained in the final model; *strongly disagreed or somewhat disagreed with the statement.

Abbreviations: COPD, chronic obstructive pulmonary disease; CI, confidence interval; Ref, reference category.

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