

## Respiratory Physicians' Awareness And Referral Of Pulmonary Rehabilitation: A Cross-Sectional Study

Faris Awadh Allah Mohammed Aljuaid<sup>1</sup>, Fahad Thaar Hudhayban Almuqati<sup>2</sup>, Hassan Mohsin Hassan Alkhamash<sup>1</sup>, Fahad Dukhayn Mohammed Alqahtani<sup>3</sup>, Abraham Muhamad Aleumayri<sup>4</sup>, Daifallah Zaid Alotaibi<sup>5</sup>, Mohammed Lahiq Alotaibi<sup>5</sup>, Saad Saeed Sharar Alotaibi<sup>5</sup>, Fahad Masha Almutairi<sup>6</sup>, Faisal Abdulrahman Mohammed Alluhaybi<sup>7</sup>, Mazin Mubarak Alotaibi<sup>8</sup>, Mohammed Bader ALQARNI<sup>9</sup>

### Abstract:

*Background: Pulmonary rehabilitation (PR) has demonstrated physiological, symptom reducing, psychosocial, and health care savings benefits in multiple outcome areas for patients with chronic respiratory diseases. Physicians' PR awareness and PR referral practices are key in PR promotion. However, PR awareness and referral among respiratory physicians in China have rarely been studied. This study aims to explore respiratory physicians' perceptions towards PR and assess the referral of PR in Makkah. Methods: A self-administered questionnaire was distributed via WeChat and emails to respiratory physicians in hospitals to assess their attitudes toward and knowledge of PR and identify treatment barriers. The study was conducted from June through October 2022. Results: As reported in the 520 questionnaires collected through October 2022 most respondents had heard about PR, and many had knowledge of PR practice, but relatively few had referred patients to PR before having responded to the survey. Education, region of practice, and duration of practice are significant factors that influenced the participating respiratory physicians' awareness of PR. The percentage of referral was influenced by physicians' education, region, and duration of practice. The absence of PR facilities was the main barrier to respiratory physicians' referral of patients to PR. Conclusions: Chinese respiratory physicians' awareness of PR and referral to PR remain insufficient to support the delivery of PR to patients with chronic respiratory diseases. PR training for respiratory physicians and building PR centers are necessary to remedy these conditions.*

**Keywords:** *Pulmonary rehabilitation (PR); awareness; physician referral practices; respiratory physicians*

---

<sup>1</sup>Emergency medical technician (EMT), King Faisal Medical Complex.Taif (KFMC), Saudi Arabia.

<sup>2</sup>Male emergency medical services technician, Dawadmi General Hospital), Saudi Arabia.

<sup>3</sup>Ambulance and emergency technician, Al Quwayiyah Hospital), Saudi Arabia.

<sup>4</sup>Ambulance and emergency, Al-Rain General Hospital-Al-Muthanna Health Center), Saudi Arabia.

<sup>5</sup>Nursing technician, Albjadyah general hospital, Saudi Arabia

<sup>6</sup>Emergency medicine, Al-Thagher General Hospital in Jeddah), Saudi Arabia.

<sup>7</sup>Emergency medical services, King ABDULAZIZ hospital in Makkah), Saudi Arabia.

<sup>8</sup>Nursing technician, Azizia Primary Healthcare Center), Saudi Arabia.

<sup>9</sup>Respiratory Therapy - Technician, King Suad Medical City, Saudi Arabia.

## **Introduction**

Chronic obstructive pulmonary disease (COPD) is a common respiratory disease with high morbidity and mortality found in Saudi Arabia and worldwide. Pulmonary rehabilitation (PR) has demonstrated physiological, symptom reducing, psychosocial, and health care savings benefits in multiple outcome areas for patients with chronic respiratory diseases (1). Furthermore, it has been used in the treatment and management of patients with COPD since the 1990s. As such, it should be a standard of care applied alongside other well-established treatments for COPD patients such as pharmacotherapy, supplemental oxygen, and noninvasive ventilation. Yet, PR remains grossly underutilized worldwide (2,3). Reasons PR is not accessible to COPD patients are complex and involve the healthcare system, health care providers, and patient-related factors. One major contributory factor is the lack of physician referral, which may be due to low PR awareness/knowledge (5).

In recent years, several evidence-based guidelines have been published to assist clinicians in PR practice and standardize the management of PR (1). A previous study investigating PR in China reported low PR performance and limited PR knowledge among physicians in China as an example (4). However, at present, the details of the factors that influence Chinese respiratory physicians' PR awareness and PR referral practice in have rarely been studied.

respiratory physicians are the first point of diagnosis and treatment for COPD patients. The referral and treatment provided by respiratory physicians are important to long- term condition management for COPD patients. To address this situation and to provide information for the future development of PR, we conducted a nationwide survey of respiratory physicians' awareness of PR, referral to PR, and obstacles to referral.

## **Methods**

### **Study**

The study was conducted from June 2022 to October 2022. A self-administered questionnaire was developed according to the practice guidelines and other literature on PR (1,6) and was distributed to physicians in hospital via WeChat and email. Association of respiratory physicians and their subspecialty groups in different provinces agreed to internally distribute the link or email to respiratory physicians.

### **Participants**

The participants were a convenience sample of respiratory physicians working in hospitals from different provinces. Participants' education levels were classified as less than a college degree, college degree, postgraduate degree, and doctoral and post-doctoral degree (9). Doctors' PR awareness and PR referral practices were assessed through a cross-sectional questionnaire survey.

### **Questionnaire**

There was no validated questionnaire on this aspect suitable for use. Thus, a questionnaire was developed for this study. It was designed by the author in collaboration with a professor of PR. The initial draft was critiqued by an expert panel comprising two respiratory physicians, two health care professionals, and a statistician. Each question was evaluated by the panel as either essential, useful, or irrelevant to achieving the study

objectives. The accuracy and clarity of the questionnaire was also commented on and improved by the expert panel. It was finalized after collecting all the comments from the expert panel. The final questionnaire passed the appraisal of two experts in each corresponding field.

The final questionnaire included a brief introduction to PR, followed by 20 questions into three sections, interviewees' demographic information, attitudes toward PR, and PR technique. Participants provided their responses voluntarily and under the condition of anonymity, and they received no compensation.

### Statistical analysis

Study data were collected and managed using the SPSS version 22. The app was used to manage study data and perform the descriptive analysis. The data were also analyzed using Microsoft Excel and SPSS software. Continuous data are presented as the mean  $\pm$  SD and analyzed by ANOVA. Univariate analysis and multivariate logistic regression analysis were employed to identify the impact of various factors on physicians' awareness of PR and referral to PR. Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated, and a P value less than 0.05 was considered statistically significant.

### Ethical statement

The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by the ethics committees

## Results

### Respondent characteristics

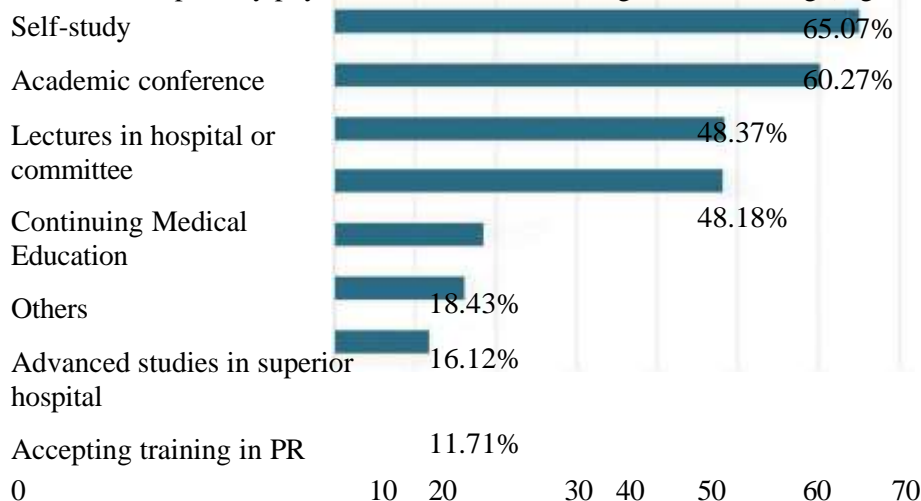
Through Oct 2022, 520 questionnaires were received out of the 612 distributed, with an effective rate of 85%. Respondents. Participants comprised 317 (60.96%) females and 203 (39.04%) males with an average age of  $38.20 \pm 8.05$  years (age range, 21–61 years). Most respiratory physicians were associated with tertiary hospitals (283/520, 54.42%). More than half of the physicians were qualified with postgraduate degrees or above and almost half had worked in respiratory care for over 10 years (Table 1).

Characteristic	n=520
Age, mean $\pm$ SD [range]	38.13 $\pm$ 8.12 [21–61]
Gender, male (%)	204 (38.78)
Level of hospital (%)	
Tertiary hospital	286 (54.37)
Secondary hospital	233 (44.30)
Community hospital	7 (1.33)
Education (%)	
Under college degree	10 (1.92)
College degree	244 (46.92)
Postgraduate degree	229 (44.04)
Doctoral and post-doctoral degree	37 (7.12)
Professional title (%)	
Resident physician	121 (23.27)

Attending physician	219 (42.12)
Associated chief physician	101 (19.42)
Chief physician	79 (15.19)
Duration of practice (years) (%)	
<5	143 (27.50)
5≤<10	113 (21.73)
10≤<15	107 (20.58)
≥15	157 (30.19)

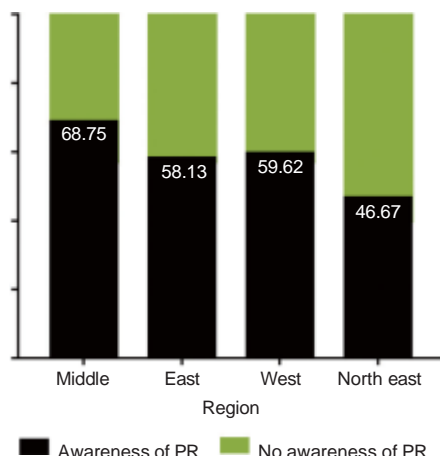
**PR awareness**

Most of the physicians, 508 (97.69%), had heard of PR before the survey, and 84% (442/529) had sufficient awareness or understanding of PR to provide their patients with information or guidance. Approaches to learning PR included learning by themselves (65.07%), attending an academic conference (60.27%), lectures at the hospital or in committees (48.37%), and through continuing medical education (48.18%). However, only 11.71% of respiratory physicians had taken advantage of PR training (Figure 1).



Results of univariate analysis indicate that significant factors ( $P<0.05$ ) that influenced physicians' PR awareness included age, educational background, professional title, and number of years working in respiratory care. Multivariate logistic regression analysis confirmed that physicians with higher education (OR =5.33, 95% CI: 1.08–26.33,  $P<0.05$ ) and more years of practice (OR =9.84, 95% CI: 2.84–34.09,  $P<0.001$ ) were more likely to understand OR. Conversely, stepwise analysis revealed that physicians in the northeast had lower PR awareness than physicians in other regions (OR=0.44, 95% CI: 0.19–1.03,  $P=0.046$ ) (Figure 2, Table 2).

Variable	P value	OR	95% CI
Age	0.80	1.01	0.94–1.08
Gender, male (%)			
Male			
Female	0.66	0.88	0.50–1.55
Education			
Under college degree			
College degree	0.09	3.78	0.80–17.81
Postgraduate degree	0.04*	5.33	1.08–26.33
Doctoral and post-doctoral degree	0.048*	9.01	1.02–79.27
Level of hospital			
Community hospital			
Secondary hospital	0.85	1.23	0.15–10.18
Tertiary hospital	0.78	1.35	0.16–11.54
Professional title			
Resident physician			
Attending physician	0.84	1.08	0.51–2.31
Associated chief physician	0.28	0.50	0.14–1.78
Chief physician	0.62	1.70	0.21–13.61
Duration of practice (years)			
<5			
5–<10	0.09	1.85	0.90–3.77
10–<15	0.00**	4.10	1.65–10.19
≥15	0.00**	9.84	2.84–34.09



#### PR referral

Of the participating physicians, 355 (68.27%) reported having provided PR referrals to patients before the study. Univariate analysis results indicated that significant factors

affecting PR referral included physician age, educational background, professional title, and duration of practice. The multivariate logistic regression analysis confirmed that physicians with higher education (OR =5.36, 95% CI: 1.12–25.73, P<0.05), a longer duration of practice (OR =2.61, 95% CI: 1.30–5.25, P<0.001), in the east and middle regions (OR =4.18, 95% CI: 1.90–9.23, P<0.001) were more likely to provide PR referral (Table 3).

Variable	P value	OR	95% CI
Age	0.87	1.00	0.95–1.06
Gender, male (%)			
Male			
Female	0.85	0.96	0.63–1.46
Education			
Under college degree			
College degree	0.14	3.16	0.69–14.56
Postgraduate degree	0.04*	5.36	1.12–25.73
Doctoral and post-doctoral degree	0.04*	6.18	1.06–36.15
Level of hospital			
Community hospital	0.20	1.57	0.79–3.12
Secondary hospital			
Tertiary hospital	0.24	2.71	0.51–14.51
Professional title			
Resident physician	0.46	1.88	0.35–10.13
Attending physician			
Associated chief physician	0.20	1.49	0.81–2.77
Chief physician	0.42	1.48	0.57–3.84
Duration of practice (years)			
<5	0.44	1.63	0.47–5.72
5–<10			
10–<15	0.06	1.79	0.98–3.27
≥15	0.007**	2.61	1.30–5.24

Major barriers to PR application included absence of PR institution (43.65%), absence of PR facility or equipment (24.23%), clinical work overload (7.12%), limited PR knowledge (6.92%), poor doctor-patient relationship (1.35%) and other reasons (16.73%).

## Discussion

To the best of our knowledge, this is the first study to survey Saudi respiratory physicians on their current PR awareness and practices, and our findings provide some information about PR in Saudi Arabia. First, our data indicate that almost all respiratory physicians

had heard of PR; however, only about half of them had provided PR referrals. Second, education background, and duration of practice, were the factors associated with PR awareness and referral. Thirdly, self-study was the main access to PR knowledge, and the absence of PR infrastructure was the major barrier to providing PR referrals reported in the survey.

COPD is the third most prevalent chronic disease in Saudi Arabia, with 8.6% of the Chinese population suffering from it. With a rapidly aging population, high cigarette smoking prevalence, and heavy air pollution, the burden of COPD is anticipated to continue increasing in Saudi Arabia. PR has been known recently to Saudi Arabia; since then, physicians have gradually realized the importance of PR for COPD patients. Few studies have been conducted to explore the PR situation in Saudi Arabia.

Patients will not receive PR without a referral, and referral is unlikely to occur unless the healthcare professionals who treat COPD patients are aware of the existence of PR and have knowledge of its benefits (11). Our investigation found high levels of PR awareness among respiratory physicians, and most of them had heard of and understood PR before this survey. Physicians with higher educational background and more years of practice in respiratory care had a better awareness of PR, which were expected.

Hospital level did not influence physicians' PR awareness in our study. Doctors from Level 1 community hospitals constituted only 1.34% of participants. Furthermore, 98.08% of the surveyed physicians had bachelors or postdoctoral degrees. Thus, we speculate that the actual level of awareness is lower and the problem more serious than suggested by our results. It is especially important to note that patients in other countries mainly access PR through physicians in primary hospitals and community hospitals (11); Chinese patients place more trust in the advice and services of higher-level hospitals (7). Patient acceptance of PR and compliance with PR may be higher if they receive PR referrals from doctors in higher level hospitals. Thus, survey responses from the physicians from tertiary and secondary hospitals were also meaningful.

In United States (12), Canada (13), Australia (5), and New Zealand (14), lack of education and opportunities to learn about PR are the main barriers to physicians improved PR awareness and knowledge. In the present study, self-learning was the main approach to PR reported, and receiving PR training was the least common approach. Some postgraduate training is available but is not mandatory and is not standardized. This indicates a clear need for enhanced and more standardized exposure to PR among respiratory physicians.

Despite the broad base of evidence and COPD guidelines recommending PR, it is still grossly underutilized in the real world (3,15). In England and Wales, the prevalence of COPD patients eligible for PR was estimated at 446,000; however, only 68,000 patients (15% of normative need) were actually referred; of these only 69% (10% of normative need) attended an initial assessment (16). Much of the responsibility for the non-referral of COPD patients to PR rests with healthcare professionals (17). In our study, 355 physicians (68.27%) provided PR referrals, but the actual patient uptake for PR was not investigated. The absence of institutions for PR programs is the main barrier to providing PR referrals, followed by the absence of PR facilities or PR equipment in the hospital. These problems were also stressed in other research (18). A significant increase in funding support for PR will be needed to address these issues.

This study has several limitations. The main limitation was that the survey was conducted in a non-randomized way through social media, which may have led to selection bias. Additionally, our results are based on physicians' views as reported in the questionnaire. The actual patient uptake for PR and barriers from the patients' perspective need to be further investigated.



## Conclusions

The study includes the largest survey of physicians' regarding their PR awareness, PR referral practices, and barriers to providing PR referrals. The need to establish a standard procedure and protocol for PR referral should be stressed. Provider education should be carried out to increase disease awareness and to achieve affordable and effective PR in Saudi Arabia and facilitate the global fight against COPD.

## References

1. Rochester CL, Vogiatzis I, Holland AE, et al. An Official American Thoracic Society/European Respiratory Society Policy Statement: Enhancing Implementation, Use, and Delivery of Pulmonary Rehabilitation. *Am J Respir Crit Care Med* 2015;192:1373-86.
2. Spruit MA, Pitta F, Garvey C, et al. Differences in content and organisational aspects of pulmonary rehabilitation programmes. *Eur Respir J* 2014;43:1326-37.
3. Garvey C, Fullwood MD, Rigler J. Pulmonary rehabilitation exercise prescription in chronic obstructive lung disease: US survey and review of guidelines and clinical practices. *J Cardiopulm Rehabil Prev* 2013;33:314-22.
4. Gao LJ, Zhao HM. A nationwide online questionnaire survey of the understanding and implementation of pulmonary rehabilitation at all levels of medical institutions in China in 2017. *Zhonghua Jie He He Hu Xi Za Zhi* 2019;42:275-8.
5. Johnston KN, Young M, Grimmer KA, et al. Barriers to, and facilitators for, referral to pulmonary rehabilitation in COPD patients from the perspective of Australian general practitioners: a qualitative study. *Prim Care Respir J* 2013;22:319-24.
6. Yohannes AM, Connolly MJ. Pulmonary rehabilitation programmes in the UK: a national representative survey. *Clin Rehabil* 2004;18:444-9.
7. Li X, Lu J, Hu S, et al. The primary health-care system in China. *Lancet* 2017;390:2584-94.
8. Song P, Jin C, Tang W. New medical education reform in China: Towards healthy China 2030. *Biosci Trends* 2017;11:366-9.
9. Huang J. Medical education and medical education research and development activities in modern China. *Med Educ* 1992;26:333-9.
10. Wenjuan App. 2013. Available online: <https://www.wenjuan.com/>
11. Rochester CL, Vogiatzis I, Holland AE, et al. An Official American Thoracic Society/European Respiratory Society Policy Statement: Enhancing Implementation, Use, and Delivery of Pulmonary Rehabilitation. *Am J Respir Crit Care Med* 2015;192:1373-86.
12. 2010 Respiratory medicine single CCT decision aid. Joint Royal Colleges of Physician Training Board. Available online: <https://www.jrcptb.org.uk/documents/>
13. 2010- respiratory-medicine-single-cct-decision-aid-revised-2014
14. Camp PG, Hernandez P, Bourbeau J, et al. Pulmonary rehabilitation in Canada: A report from the Canadian Thoracic Society COPD Clinical Assembly. *Can Respir J* 2015;22:147-52.
15. Brooke ME, Spiliopoulos N, Collins M. A review of the availability and cost effectiveness of chronic obstructive pulmonary disease (COPD) management interventions in rural Australia and New Zealand. *Rural Remote Health* 2017;17:4017.
16. Hayton C, Clark A, Olive S, et al. Barriers to pulmonary rehabilitation: characteristics that predict patient attendance and adherence. *Respir Med* 2013;107:401-7.
17. Steiner M, Holzhauer-Barrie J, Lowe D, et al. Pulmonary rehabilitation: time to breathe better. National Chronic Obstructive Pulmonary Disease (COPD) Audit Programme: resources and organisation of pulmonary rehabilitation services in England and Wales 2015. National organisational audit report. London: RCP, 2015.
18. Nici L, Donner C, Wouters E, et al. American Thoracic Society/European Respiratory Society statement on pulmonary rehabilitation. *Am J Respir Crit Care Med* 2006;173:1390-



413.

19. Collins EG, Bauldoff G, Carlin B, et al. Clinical competency guidelines for pulmonary rehabilitation professionals: position statement of the American Association of Cardiovascular and Pulmonary Rehabilitation. *J Cardiopulm Rehabil Prev* 2014;34:291-302.