International Journal of Nursing and Health Care Research
Wang L, et al. Int J Nurs Health Care Res 5: 1277.
www.doi.org/10.29011/2688-9501.101277
www.gavinpublishers.com

GAVIN PUBLISHERS

Research Article

Validation of a Brief ICF Core Set for COPD from the Perspective of Multidisciplinary Experts: A Delphi Study

Lan Wang[1], Jinping Zheng[1], Yuehao Shen[3], Xi Yu[4], Lin Zhao[2*]

[1]School of Nursing, Tianjin Medical University, Tianjin, China

[2]International Medical School, Tianjin Medical University, Tianjin, China

[3]Department of Respiratory Care, General Hospital of Tianjin Medical University, Tianjin, China

[4]Department of Respiratory Care, Tianjin First Center Hospital, Tianjin, China

[*]**Corresponding author:** Lin Zhao, International Medical School, Tianjin Medical University, Tianjin, China.

Citation: Wang L, Zheng J, Shen Y, Yu X, Zhao L (2022) Validation of a Brief ICF Core Set for COPD from the Perspective of Multidisciplinary Experts: A Delphi Study. Int J Nurs Health Care Res 5: 1277. DOI: 10.29011/2688-9501.101277

Received Date: 07 February, 2022; **Accepted Date**: 15 February, 2022; **Published Date**: 21 February, 2022

Abstract

To validity the Brief International Classification of Function, Disability, and Health Core Set from the perspective of multidisciplinary experts in China in order to apply it to global function assessment for Chinese patients with Chronic Obstructive Pulmonary Disease (COPD). Twenty-one experts who engaged in COPD clinical treatment or nursing, clinical rehabilitation therapy, chronic disease management, and clinical psychology research for more than 10 years' experience were selected for the two rounds of Delphi consultations. Six out of 21 participants (28.6%) were males, and the average age was 48.19 (6.32) years old. The average length of working years was 24.95 (7.63) years. The authority coefficients for two rounds of Delphi consultation were both 0.836, and Kendall's coordination coefficients were 0.215 and 0.344, respectively. The average importance value of indexes ranged from 3.52 to 4.90. The Brief ICF-COPD Core Set in Chinese version consisted of 4 first-level and 14 second-level categories finally, which is scientific and rational, which can be applied as a simple and standardized tool in multidisciplinary rehabilitation strategy for implementation and evaluation of follow-up.

Keywords: International classification of function; Disability and Health; COPD; Multidisciplinary; Delphi

Introduction

Chronic Obstructive Pulmonary Disease (COPD) is not only characterized by progressive deterioration of pulmonary function, but also leads to restrictions in daily activities and societal participation, worse quality of life, and psychological problems, including anxiety and depression [1].In China, COPD is the third leading cause of death, [2] and the most recent epidemiology survey shows that the prevalence among individuals aged above 40 years old is 13.7% [3] as compared with a global prevalence of 11.7% [4]. Pulmonary rehabilitation, which is recognized as a core component in the management of COPD, [5,6] offers an integrated approach for personalized management of patients with COPD through thorough assessment of treatable traits [7]. Although pulmonary rehabilitation has been clearly shown to improve exercise capacity and quality of life, the lack of consistent standards to evaluate the effects remains a global challenge [8]. Therefore, an effective specific assessment instrument which could evaluate patients' global functioning should be developed.

The World Health Organization International Classification of Function, Disability, and Health (ICF) provides an international standard and global agreed-on language for description and measurement of function limitation and rehabilitation in a unified view of various dimensions of health [9]. The ICF is composed of

two parts, with Functioning & Disability and Contextual factors. Functioning & Disability covers Body functions (b), Body structure (s), and Activities and participation (d). Contextual factors consist of environment factors (e), which encompasses physical, social, and attitudinal categories, and personal factors that include gender, age, educational level, and so on. Personal factors with various categories are not included in the current ICF version. Body function and structure domains describe the impairment of anatomical and physiological function of different body systems [10]. The activity and participation domain refers to the limitation or difficulty an individual experiences to perform a particular task in a certain environment and restrictions to participate in life situation and interact with society. The contextual factors involving environmental and personal factors are linked to the first three domains [11].

Rehabilitation intervention for patients with COPD should be conducted according to ICF framework in order to improve communication among all individuals who could be involved in the development of a multidisciplinary rehabilitation strategy, such as patients, families, health professionals, researchers, and policy-makers. To facilitate the implementation of the ICF into clinical application in rehabilitation of patients with COPD, ICF Core Sets for obstructive pulmonary disease containing COPD and asthma have been developed, and two types of comprehensive and brief core set are involved [12]. The brief core set is composed by minimum data to be used in clinical practice [13]. The ICF-OPD Core Set was developed from COPD and asthma which differed with age, risk factors, disease trajectory, and treatment strategy [10]. Therefore, usage of the ICF-OPD Core Set for patients with COPD is not feasible, which contributed to the development of a specific ICF-COPD Core Set to guide health professionals to provide rehabilitation intervention. Huang only applied the Brief ICF-OPD Core Set in Chinese patients with COPD to test its validation directly, and the results showed that one category was not confirmed, while the other eight categories were not considered in the Brief ICF-OPD Core Set. However, lack of perspectives in Brief ICF-OPD Core Set from health professionals can lead to difficulty implementing it in clinical practice [14]. Therefore, the objective of this study was to validate the brief ICF-COPD Core Set from the perspective of multidisciplinary experts in China in order to apply it to global function assessment for Chinese patients with COPD.

Material and Methods

Construct ICF Categories

To construct a preliminary category system for the Delphi questionnaire, we applied brief ICF-OPD Core Sets, which include four first-level categories and 14 second-level categories. There are four second-level categories in the body function component: respiration function (b440), additional respiratory function (b450), exercise tolerance functions (b455), and sensations associated with cardiovascular and respiratory function (b460). Two second-level categories consist of structure of cardiovascular system (s410), and structure of respiratory system (s430) in the body structure component. Four second-level categories involving carrying out daily routine (d230), walking (d450), moving around (d455), and doing housework (d640) are included in the activity and participation component. The environmental component consists of products and substances for personal consumption (e110), products and technology for personal use in daily living (e115), climate (e225), and air quality (e260). After this process, a preliminary Delphi questionnaire was completed. The flowchart of the study process is shown (Figure 1). The study protocol was approved by the local ethics committee of Tianjin Medical University, China. The structure of this paper was assessed by SQUIRE reporting guidelines [15].

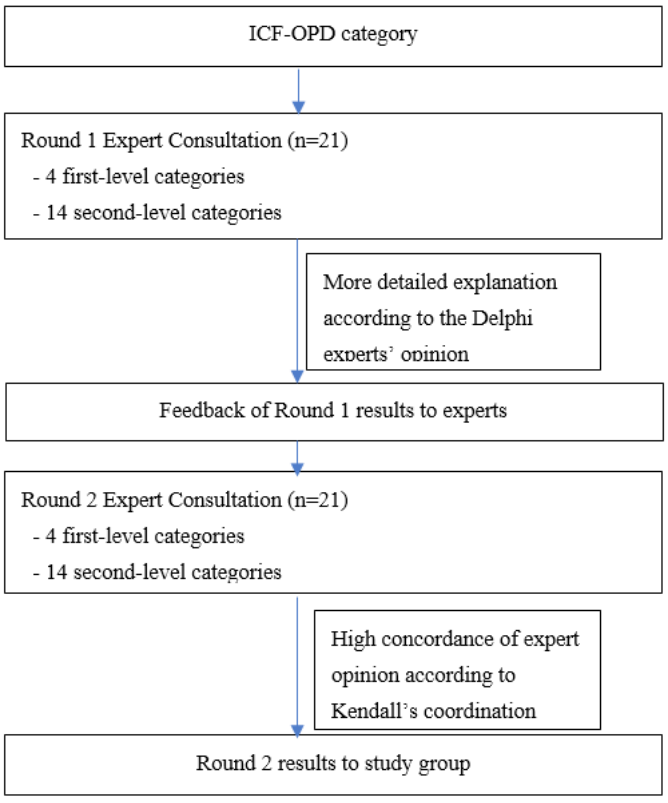

Figure 1: The flowchart of the study process.

Selection of Delphi Experts

Twenty-one experts were selected for the Delphi consultations. The selection criteria were as follows: professional level and engaged in COPD clinical treatment or nursing, clinical rehabilitation treatment, chronic disease management and clinical psychology research for more than 10 years' experience, and

consent to participate in the study. The characteristics of the experts are summarized in Additional File 1.

No. expert	Gender	Age	Institution	Title	Field of expertise
1	Female	51	China-Japan Friendship Hospital, Beijing, China.	Professor Chief physician	Clinical treatment and rehabilitation of COPD
2	Female	55	Tianjin Comprehensive Hospital, Tianjin, China	Professor Chief physician	Cardiopulmonary rehabilitation of COPD
3	Female	46	Tianjin Comprehensive Hospital, Tianjin, China	Associate Chief physician	Clinical treatment and rehabilitation of COPD
4	Female	56	Tianjin Comprehensive Hospital, Tianjin, China	Chief nurse	Clinical nursing and rehabilitation of COPD
5	Female	49	Tianjin First Center Hospital, Tianjin, China	Chief physician	Clinical treatment and rehabilitation of COPD
6	Female	49	Tianjin Comprehensive Hospital, Tianjin, China	Professor Chief physician	Clinical treatment and rehabilitation of COPD
7	Female	47	Tianjin First Center Hospital, Tianjin, China.	Associate Chief nurse	Clinical nursing and rehabilitation of COPD
8	Female	50	Tianjin First Center Hospital, Tianjin, China.	Chief physician	Clinical treatment and rehabilitation of COPD
9	Female	50	Tianjin First Center Hospital, Tianjin, China.	Chief physician	Clinical treatment and rehabilitation of COPD
10	Male	37	The Second Affiliated Hospital of Tianjin University of Traditional Chinese Medicine, Tianjin, China.	Associate Chief physician	Traditional Chinese medicine treatment and rehabilitation of COPD
11	Female	53	The Second Affiliated Hospital of Tianjin University of Traditional Chinese Medicine, Tianjin, China.	Chief physician	Traditional Chinese medicine treatment and rehabilitation of COPD
12	Female	46	The Third Hospital of Peking University, Beijing, China.	Professor Chief physician	Clinical treatment and rehabilitation of COPD
13	Male	45	Tianjin Nankai Hospital, Tianjin, China.	Associate Chief physician	Integrated Chinese and western medicine treatment and rehabilitation of COPD
14	Female	36	Tianjin Medical University, Tianjin, China.	Associate professor	Rehabilitation and management of COPD

15	Female	51	Tianjin Chest Hospital, Tianjin, China.	Associate Chief nurse	Clinical nursing and rehabilitation of COPD
16	Male	37	Tianjin Nankai Hospital, Tianjin, China.	Associate Chief physician	Integrated Chinese and western medicine treatment and rehabilitation of COPD
17	Male	50	Tianjin Anding Hospital, Tianjin, China.	Chief physician	Psychological treatment and rehabilitation of chronic disease
18	Female	53	Tianjin Chest Hospital, Tianjin, China.	Chief physician	Clinical treatment and rehabilitation of COPD
19	Male	39	Tianjin Chest Hospital, Tianjin, China.	Associate Chief physician	Clinical treatment and rehabilitation of COPD
20	Female	54	Tianjin Medical University, Tianjin, China.	Professor	Rehabilitation and management of COPD
21	Male	55	Institute of Respiratory Health/State Key Laboratory of Respiratory Diseases/The First Affiliated Hospital of Guangzhou Medical University, Guangzhou, China.	Professor Chief physician	Clinical treatment and rehabilitation of COPD

Additional File 1: Information of the Delphi experts.

Delphi Consultation Process

Two rounds of Delphi consultation were conducted. The questionnaire was sent to the experts by e-mail after receiving their permission. Experts rated each of the first-level and second-level categories based on the level of perceived importance, rated from 1 (least important) to 5 (most important) (Additional File 2). Experts also defined the basis of their judgment according to their views in practical experience, theoretical knowledge, literature review, and intuitive feeling, and expert's judgment criteria for the categories was between 0.1 and 0.5 (Additional File 2). The degree of familiarity with each of the categories was rated from 0 to 1 (Additional File 2). The results of each consultation round were assessed for completeness, and experts were also contacted if there were any omissions or unclear content. The results of the first-round consultation were analyzed and explained and were also provided to experts when the second-round questionnaire was delivered.

Additional File 2: The Value Tables

Level of Importance	Score
Very important	5
Important	4
Moderately important	3
Unimportant	2
Most unimportant	1

Table 1: Level of importance of the categories.

Basis of judgment	The degree of influence on expert judgment		
	Great	General	Little
Theoretical analysis	0.3	0.2	0.1
Practical experience	0.5	0.4	0.3
Literature review	0.1	0.1	0.1
Intuitive feeling	0.1	0.1	0.1

Table 2: Expert's judgment criteria for the categories (Ca).

Familiarity Scale	Cs
Very familiar	1.0
Familiar	0.8
Moderately familiar	0.5
Unfamiliar	0.2
Most unfamiliar	0

Table 3: Expert's familiarity with the categories (Cs).

Inclusion and Exclusion of the Categories

When analyzing the results of the first round of expert consultations, it was possible to add new categories on the basis of outcomes of the consultation process. After the second consultation round, the inclusion criteria of the results were mean of the importance score≥3.5, Coefficient of Variation (CV) <0.25 [16]. At the same time, the implications, significance, and data availability of each category should be fully considered to screen and construct the Brief ICF-COPD Core Set system.

Statistical Analysis

All the questionnaire data were double entered. Data analysis was performed using Microsoft Excel 2013 (Microsoft Corporation, Redmond, Washington, USA) and SPSS 25.0 software (IBM Corporation, New York, USA). The expert authority coefficient was calculated according to the following formula: Cr= (Ca+Cs)/2. Ca refers to the expert's judgment criteria for the categories, and Cs refers to the familiarity degree for the categories. The importance score was represented by mean and standard deviation (SD). Consensus and coordination of experts were calculated by coefficient of variation (CV) and the Kendall's coefficient of concordance (Kendall's W). P<0.05 in the Kendall's W were the criteria for consensus in the study.

Results

Basic Information of Experts

A total of 21 experts participated in the consultation, among whom 28.6% were males (6/21) and 71.4% were females (15/21). The experts ranged in age from 36 to 55 years, with an average age of 48.19 (6.32) years old. The number of years working in COPD management ranged from 10 to 32 years, with an average length of 24.95 (7.63) years. With respect to academic level of expertise, 61.9% (13/21) were professionals, and 38.1% (8/21) were associate professionals. All of the experts were from tertiary hospitals and research institutions, including Beijing, Tianjin, and Guangzhou in China. Their major disciplines included clinical treatment, pulmonary rehabilitation, clinical nursing, psychological therapy, Chinese traditional therapy, and respiratory disease research of COPD.

Expert's Authority Coefficient

In two rounds, 21 questionnaires were issued and recovered with a recovery rate of 100%. Generally, the expert's authority coefficient greater than 0.7 was in an acceptable range [17].the authority coefficients for two rounds of Delphi consultation were both 0.836. This showed that the experts in this study had a high level of familiarity with the categories, including research and practical work in COPD. Therefore, the selection of categories and the results had high credibility [18].

Degree of expert coordination

Kendall's coordination coefficients (W) refers to whether there are big differences between experts in their opinions on an evaluation of each index. W is between 0 and 1, with a greater value, indicating a higher degree of concordance between experts. In two rounds of consultation, Kendall's coordination coefficients were 0.215 and 0.344, respectively (P<0.001) (Table 4).

Category	Round one			Round two		
	W	χ^2	*P*	*W*	χ^2	*P*
First-level	0.109	6.852	0.077	0.199	12.529	0.006
Second-level	0.203	55.416	<0.001	0.358	97.793	<0.001
Total	0.215	76.854	<0.001	0.344	122.643	<0.001

Table 4: Degree of expert coordination.

Validation of the Brief ICF-COPD Core Set Framework

The Brief ICF-COPD Core Set framework was validated after the second round of Delphi consultation. This was comprised of four first-level and 14 second-level categories (Table 5). For the first-level indexes, Body functions (b), Body structure (s), Activities and participation (d), and Environment factors (e), the index weights were 4.71, 4.57, 4.30, and 4.25, respectively. For the second-level indexes, the index weight was from 3.52–4.90, and the index weight of three top second-level indexes were Respiratory function (b440), Structure of respiratory system (s430) and Structure of cardiovascular system (s410), respectively.

ICF component	Brief ICF Core Set	Mean	SD	CV
Body function	b440 Respiratory function	4.90	0.30	0.06
	b450 Additional respiratory functions	4.48	0.60	0.13
	b455 Exercise tolerance function	4.43	0.60	0.13
	b460 Sensations associated with cardiovascular and respiratory function	4.43	0.68	0.15
Body structure	s410 Structure of cardiovascular system	4.57	0.60	0.13
	s430 Structure of respiratory system	4.81	0.40	0.08
Activities and participation	d230 Carrying out daily routine	3.81	1.03	0.27
	d450 Walking	3.90	0.94	0.24
	d455 Moving around	3.67	0.97	0.26
	d640 Doing housework	4.00	0.89	0.22
Environment factors	e110 Products or substances for personal consumption	3.67	0.97	0.26
	e115 Products and technology for personal use in daily living	3.52	0.81	0.23
	e225 Climate	4.14	0.73	0.18
	e260 Air quality	4.29	0.78	0.18

Table 5: Brief ICF-COPD Core Set in Chinese version.

Discussion

This study was the first to employ a Delphi technique to identify a Brief ICF-COPD Core Set, which was based on the ICF-OPD published by the World Health Organization (WHO) [19]. This study contributes to the current knowledge on the development of a multidisciplinary rehabilitation strategy as our findings reveal a high consensus among clinical experts regarding the most relevant and common categories of functioning in management of COPD. By linking all responses, it could be shown that the Brief ICF-COPD Core Set with 14 categories is a valid tool to evaluate patients' global functioning in China.

The study recruited 21 multidisciplinary experts, including physicians, nurses, rehabilitation specialists, and psychologists, experienced in the management of COPD from three cities in China, which can extend the field of expertise and represent more experts' advice [20]. Within all of the participants, 14 (66.7%) have a master's or doctoral degree, and all of them (100%) were professionals; meanwhile, 15 (71.4%) have more than 20 years experiences of management in COPD, which shows that the experts have deeper understanding of this subject that conforms to the screening conditions of the Delphi technique [17]. Effective recovery two-round surveys were both 100%, and the expert's authority coefficient were both 0.836, which showed that the experts in this study had a high level of familiarity with the categories and the selection of categories, and the results had high credibility [18]. After two rounds of expert surveys, the importance of the first-level indexes were 4.25–4.71, CV 0.09–0.18, and Kendall coordination coefficient 0.199. Meanwhile, the importance of the second-level indexes were 3.52–4.90, CV 0.06–0.26, and Kendall coordination coefficient 0.358. All of the results showed the good reliability of ICF-COPD [20].

The 14 categories in the Brief ICF core set have been proposed to guide the assessment of individuals with COPD in all body parts. Most participants agreed that the ICF category body function, which describes the damage function of physiological functions of various body systems (including mental functions), involving *Respiratory function (b440), Additional respiratory (b450) functions, exercise tolerance function (b455), and sensations associated with*

cardiovascular and respiratory function (b460), can represent common function problems in patients with COPD. Respiratory function *(b440)* refers to the function of taking air into the lungs, exchanging it with the blood, and exhaling it, such as respiratory rate, rhythm, and depth function. Additional respiratory functions *(b450)* refers to the auxiliary function related to breathing, such as coughing, sneezing, and yawning. Exercise tolerance function *(b455)* refers to functions related to respiratory and cardiovascular capacity as required for enduring physical exertion. *Sensations associated with cardiovascular and respiratory function (b460)* refers to arrhythmia, palpitations, shortness of breath, and other feelings. Respiratory muscle dysfunction, including inspiratory muscle impairment and expiratory muscle fatigue, is the major disorder in patients with COPD [21]. Approximately 10% of the patients with COPD from the Copenhagen General Population Study suffered from chronic cough and demonstrated lower lung function, more symptoms (including wheezing, dyspnea, and chest tightness) [22]. Ischemic heart disease, atrial fibrillation, and heart failure are also coexisting conditions in patients with COPD [23].

Body *structure includes structure of cardiovascular system (s410) and structure of respiratory system (s430).* Pathological changes in the characteristics of COPD are found in the airways, lung parenchyma, and pulmonary vasculature [24].Chronic inflammation is the main pathological change, which induces parenchymal tissue destruction and disruption of normal repair and defense mechanisms in patients who develop COPD. Cardiovascular diseases are common and important comorbidities in patients with COPD due to left ventricular dysfunction [25].

Activities and participation include *Carrying out daily routine (d230), Walking (d450), Moving around (d455), and Doing housework (d640). Carrying out daily routine (d230)* refers to scheduling, planning, organizing, and completing some simple or complex coordinated activities. *Walking (d450)* refers to walking on the ground step by step, such as walking, pacing, forward, back, or sideways. *Moving around (d455)* refers to moving the body from one place to another other than walking, such as rock climbing, jumping, running, jogging and swimming. *Doing housework (d640)* refers to managing the home by cleaning the house, doing laundry, using appliances, storing food, and tiding up. The physical activity of patients with COPD, such as cleaning, working, and exercising, is substantially less than that of healthy persons of the same age and sex [26]. The GOLD guideline states that all patients with COPD could benefit from regular physical activity [27]. Physical activity was impaired early in the process of the disease with COPD, [28] which influences the patients' ability to perform and participate in activities. Generally, the attenuation of lower-limb and upper-limb endurance are present at the same time for patients with COPD, [30,31] and respiratory and muscle dysfunction leads to fatigue and a reduction in physical activity [29].

Environment factors involve *e110 Products or substances for personal consumption, e115 Products and technology for personal use in daily living, e225 Climate, and e260 Air quality. Products or substances for personal consumption (e110)* refers to any natural or human-made object or substance gathered, processed or manufactured for ingestion, such as food, drink, and drugs. *Products and technology for personal use in daily living (e115)* refers to equipment, products and technologies used by people in daily activities, including those adapted or specially designed, located in, on, or near the person using them. *Climate (e225)* refers to meteorological features and events, such as the weather. *Air quality (e260)* refers to characteristics of the atmosphere (outside buildings) or enclosed areas of air (inside buildings), and which may provide useful or distracting information about the world. Malnutrition with weight loss due to increasing energy expenditure and insufficient dietary intake is very common in patients with COPD, [31] and pharmacological therapy is the necessary treatment for patients in stable COPD [27]. Therefore, patients require the use of surrounding environmental equipment to acquire sufficient food and drugs. COPD is associated with exposure to tobacco smoke and other environmental substances, such as biomass fuel, and potential occupational irritants [32,33]. Cold weather is also a risk factor heightening the mortality [34].

However, there are some limitations regarding the external validity of this study. Firstly, experts in different disciplines were chosen through their published articles related to ICF or COPD in China. Due to a new perspective in ICF used in COPD, some participants have a lack knowledge of ICF even though they self-reported an expert's authority coefficient. Secondly, although the authors were successful in recruiting 21 experts from different professions, the participants consisted predominantly of physicians in clinical treatment, with a lack of experts who were skilled in rehabilitation of COPD, which led to limits of the generalizability of clinical practice. To minimize these, we chose more experienced and knowledgeable experts in management of COPD who mastered the comprehensive rehabilitation of COPD.

Conclusions

The Brief ICF-COPD Core Set assessment index system is scientific and rational. Thus, it can be applied as a simple and useful tool in a multidisciplinary rehabilitation strategy within multi-professional teams. Based on the Brief ICF Core Set for COPD, the impairment in body functions and structures, limitations in activities, restrictions in participation and the influences in environmental factors can be described and measured in a standardized way in China, which can also be used as a reference for implementation and evaluation of follow-up since the management of COPD requires longitudinal care involving multidisciplinary health professionals. Further research is necessary regarding the feasibility of the Brief ICF-COPD in

clinical practice which should elucidate the validity of Brief ICF-COPD from perspective of patients. The findings of all validation studies could be the basis for a revision and improvement of the Brief ICF-COPD.

Acknowledgment

The authors thank all participants involved in this investigation.

Author Contributions

Study Design: Lan Wang and Lin Zhao

Data Collection and Analysis: Jinping Zheng, Yuehao Shen and Xi Yu

Manuscript Writing: Lan Wang and Lin Zhao

Funding

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article. This work was supported by Lan Wang and Lin Zhao grants form National Natural Science Foundation of China (Grant no 71804125 and 71704130).

References

1. Miravitlles M, Ribera A (2017) Understanding the impact of symptoms on the burden of COPD. Respir Res 18: 67.
2. Zhou M, Wang H, Zhu J, Chen W, Wang L, et al. (2016) Cause-specific mortality for 240 causes in China during 1990-2013: a systematic subnational analysis for the Global Burden of Disease Study 2013. Lancet. 387: 251-272
3. Wang C, Xu J, Yang L, Xu Y, Zhang X, et al. (2018) Prevalence and risk factors of chronic obstructive pulmonary disease in China (the ChinaPulmonary Health [CPH] study): a national cross-sectional study. Lancet. 391: 1706-1717.
4. Adeloye D, Chua S, Lee C, Basquill C, Papana A, et al. (2015) Global and regional estimates of COPD prevalence: Systematic review and meta-analysis. J Glob Health 5: 020415.
5. Blackstock FC, Lareau SC, Nici L, ZuWallack R, Bourbeau J, et al. (2018) Chronic Obstructive Pulmonary Disease Education in Pulmonary Rehabilitation. An Official American Thoracic Society/Thoracic Society of Australia and New Zealand/Canadian Thoracic Society/British Thoracic Society Workshop Report. Ann Am Thorac Soc 15: 769-784.
6. Rochester CL, Vogiatzis I, Holland AE, Lareau SC, Marciniuk DD, et al. (2015) ATS/ERS Task Force on Policy in Pulmonary Rehabilitation. An Official American Thoracic Society/European Respiratory Society Policy Statement: Enhancing Implementation, Use, and Delivery of Pulmonary Rehabilitation. Am J Respir Crit Care Med 192: 1373-1386.
7. Wouters EFM, Wouters BBREF, Augustin IML, Houben-Wilke S, Vanfleteren LEGW, et al. (2018) Personalised pulmonary rehabilitation in COPD. Eur Respir Rev 27: 170125.
8. Li W, Pu Y, Meng A, Zhi X, Xu G (2019) Effectiveness of pulmonary rehabilitation in elderly patients with COPD: A systematic review and meta-analysis of randomized controlled trials. Int J Nurs Pract 25: e12745.
9. World Health Organization (WHO) (2001) International classification of functioning, disability and health: ICF. Geneva, Switzerland: WHO.
10. Jobst A, Kirchberger I, Cieza A Stucki G, Stucki A (2013) Content Validity of the Comprehensive ICF Core Set for Chronic Obstructive Pulmonary Diseases: An International Delphi Survey. Open Respir Med J 7: 33-45.
11. Kim-Ly B, Nyberg A, Maltais F, Saey D (2017) Functional Tests in Chronic Obstructive Pulmonary Disease, Part 1: Clinical Relevance and Links to the International Classification of Functioning, Disability, and Health. 14: 778-784.
12. Jácome C, Marques A, Gabriel R, Figueiredo D (2013) Chronic obstructive pulmonary disease and functioning: implications for rehabilitation based on the ICF framework. Disabil Rehabil. 35:1534-1545.
13. Cieza A, Ewert T, Ustün B, Chatterji S, Kostanjsek N, et al. (2004) Development of ICF Core Sets for patients with chronic conditions. J Rehabil Med 44: 9-11.
14. Huang J, Reinhardt JD, Dai R, Wang P, Zhou M (2019) Validation of the brief international classification of functioning, disability, and health core set for obstructive pulmonary disease in the Chinese context. Chron Respir Dis 16: 1479973119843648.
15. Ogrinc G, Davies L, Goodman D, Batalden P, Davidoff F, et al. (2016) SQUIRE 2.0 (Standards for QUality Improvement Reporting Excellence): revised publication guidelines from a detailed consensus process. BMJ Qual Saf 25: 986-992.
16. Lei L, Richards JS, Li ZH, Gong YF, Zhang SZ, et al. (2019) A framework for assessing local transmission risk of imported malaria cases. Infect Dis Poverty 8: 43.
17. Wang Y, Huang LH, Feng ZX, et al. (2016) Study on establishing urethral catheter maintenance strategies on the basis of evidence-based practice an Delphi method. Zhong Hua Hu Li Za Zhi. 51: 155-160. (in Chinese)
18. Chang AM, Garder GE, Duffield C, Ramis MA (2010) A Delphi study to validate an advanced practice nursing tool. J Adv Nurs 66: 2320-2330.
19. Stucki A, Stoll T, Cieza A, Weigl M, Giardini A, et al. (2004) ICF Core Sets for obstructive pulmonary diseases. J Rehabil Med 44:114-120.
20. Guo XH (2009) Medical field investigation techniques and stastistics. Peking, People Medical Press. 58: 274-275 (in Chinese)
21. Vogelmeier CF, Criner GJ, Martinez FJ, Anzueto A, Barnes PJ, et al. (2017) Global strategy for the diagnosis, management, and prevention of chronic obstructive lung disease 2017 Report: GOLD Executive Summary. Eur Respir J 49:1700214.
22. Dahl M, Landt E, Colak Y, Lange P, Laursen L, et al. (2019) Impact of chronic cough in individuals with COPD: a population-based cohort study. Eur Respir J 54: Suppl: PA4427.
23. Divo M, Cote C, de Torres JP, Casanova C, Marin JM, et al. (2012) Comorbidities and risk of mortality in patients with chronic obstructive pulmonary disease. Am J Respir Crit Care Med 186: 155-161.
24. Hogg JC, Timens W (2009) The patholgy of chronic obstructive pulmonary disease. Annu Rev Pathol 4: 435-459.
25. MacDonald MI, Shafuddin E, King PT, Chang CL, Bardin, PG, et al. (2016) Cardiac dysfunction during exacerbations of chronic obstructive pulmonary disease. Lancet Respir Med 4: 138-148.

26. Troosters T, Sciurba F, Battaglia S, Langer D, Valluri SR, et al. (2010) Physical inactivity in patients with COPD, a controlled multi-center pilot-study. Respir Med 104:1005-1011.

27. (2020) Global Initiative for Chronic Obstructive Lung Disease. Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Lung Disease- Updated 2020. Global Initiative for Chronic Obstructive Lung Disease, Vancouver.

28. Van Remoortel H, Hornikx M, Langer D, Burtin C, Everaerts S, et al. (2014) Risk factors and comorbidities in the preclinical stages of chronic obstructive pulmonary disease. Am J Respir Crit Care Med 189: 30-38.

29. Kovarik M, Joskova V, Patkova A, Koblizek V, Zadak Z, et al. (2017) Hand grip endurance test relates to clinical state and prognosis in COPD patients better than 6-minute walk test distance. Int J Chron Obstruct Pulmon Dis12: 3429-3435

30. Franssen FME, Broekhuizen R, Janssen PP, Wouters EFM, Schols AMWJ (2005) Limb muscle dysfunction in COPD: effects of muscle wasting and exercise training. Med Sci Sport Exerc 37: 2-9.

31. Luo Y, Zhou L, Li Y, Guo S, Li X, et al. (2016) Fat-free mass index for evaluationg the nutritional status and disease severity in COPD. Respir Care 61: 680-688.

32. Liu S, Zhou Y, Wang X, Wang D, Lu J, et al. (2007) Biomass fuels are the probale risk factor for chronic obstructive pulmonary disease in rural South China. Thorax 62: 889-897.

33. Salvi S (2014) Tobacco Smoking and Environmental Risk Factors for Chronic Obstructive Pulmonary Disease. Clin Chest Med 35: 17-27.

34. Chen J, Yang J, Zhou M, Yin P, Wang B, et al. (2019) Cold spell and mortality in 31 Chineses capital cities: Definitions, vulnerability and implications. Environ Int 128: 271-278.