ISSN 2096-7071
CN 10-1629/R1

CHINA CDC WEEKLY

Vol. 2 No. 15 Apr. 10, 2020

CCDC weekly

中国疾病预防控制中心周报

ISSN 2096-7071

Announcements

The 24th World Parkinson's Day — April 11, 2020

Parkinson's disease (PD) is the second most common chronic progressive neurodegenerative disorder among the elderly after Alzheimer's disease. Affecting 1%–2% of the population over the age of 65 years old, patients under the age of 50 years old have seen a continuous rise in recent years due to environmental pollution or poisonous chemical substances (*1*). The most notable symptoms in PD patients are hand tremors, stiff or rigid movements, poor balance, and a shuffling gait. Symptoms begin gradually and typically worsen over time, resulting in permanent disability.

Since 1997, the European Parkinson's Disease Association (EPDA) has designated April 11, the birthday of Dr James Parkinson, as "World Parkinson's Day." Many governmental departments and sectors of society in many countries choose to hold Parkinson's disease theme activities on April 11. On this day there are efforts made to increase public awareness of this disease, promote early detection, scientific treatment, joint prevention, and control of Parkinson's disease to improve the quality of life of patients with Parkinson's disease.

According to statistics, it is estimated that in China at least 3 million people are currently affected by Parkinson's disease, and the number of patients will be increasing to 5 million by 2030, which will represent more than 50 percent of the cases worldwide (*2*–*3*).

REFERENCES

1. Kim KS. Toward neuroprotective treatments of Parkinson's disease. Proc Natl Acda Sci USA 2017;114(15):3795 – 7. http://dx.doi.org/10.1073/pnas.1703362114.
2. Zhang ZX, Roman GC, Hong Z, Wu CB, Qu QM, Huang JB, et al. Parkinson's disease in China: prevalence in Beijing, Xian, and Shanghai. Lancet 2005;365(9459):595 – 7. http://dx.doi.org/10.1016/S0140-6736(05)17909-4.
3. Dorsey ER, Constantinescu R, Thompson JP, Biglan KM, Holloway RG, Kieburtz K, et al. Projected number of people with Parkinson disease in the most populous nations, 2005 through 2030. Neurology 2007;68(5):384 – 6. http://dx.doi.org/10.1212/01.wnl.0000247740.47667.03.

Preplanned Studies

Awareness, Treatment, and Rehabilitation of Elderly with Parkinson's Disease — China, 2015–2017

Han Zhang[1]; Zhihui Wang[1,#]; Shige Qi[1]; Jing Wu[1]; Zhixin Li[1]

Summary

What is already known about this topic?

Parkinson's disease (PD) affects 1% of the population over the age of 60 years old and 4% or more over the age of 80 years old. An estimated nearly 3 million elderly people are currently affected by Parkinson's disease in China, and the number of patients of all ages will be close to 5 million by 2030.

What is added by this report?

Rates of awareness, drug treatment, and rehabilitation among PD patients were 32.4%, 37.8%, and 16.0%, respectively. The rates of awareness and treatment were lower in rural areas than in urban areas and in older age groups.

What are the implications for public health practice?

Efforts should be made to improve health education among the elderly, to improve professional training of primary care and other health care institutions, and to strengthen the construction of community-based rehabilitative intervention for the elderly with PD.

Parkinson's disease (PD) is the second most common chronic progressive neurodegenerative disorder among the elderly after Alzheimer's disease, which led to a huge burden to patients' families as well as the medical system, and limited information was published about the awareness, treatment, and rehabilitation among elderly PD patients from actual communities in China. By summarizing and analyzing the data of Prevention and Intervention on Neurodegenerative Disease for the Elderly in China (PINDEC), rates of awareness, treatment, and rehabilitation were estimated based on PD patients' diagnostic and follow-up records. The differences of awareness, drug treatment, and rehabilitation between subgroups were analyzed via Rao Scott chi-square test.

This study reported that rates of awareness, drug treatment, and rehabilitation were low among elderly PD patients in China, especially among older patients and patients in rural area. Efforts should be made to carry out health education and professional training, reduce PD drug prices, raise the percentage of health insurance, and strengthen the construction of community-based rehabilitation for patients with PD.

According to the report of the National Bureau of Statistics of China, by the end of 2019, population aged 60 years and above was 25.38 million, accounting for 18.1% of the total population, of which 17.63 million are aged 65 years and above, accounting for 12.6% of the total population. Along with the aging population, we are facing numerous potential PD patients in the elderly. PD is currently affecting 1% of the population over the age of 60 years old , 4% or more over the age of 80 years old (*1*). According to statistics, it is estimated that 3 million elderly people are currently affected by PD in China, and the number of patients of all ages will be home to 5 million by 2030, — more than 50 percent of the cases in the world (*2*–*3*). Lots of efforts have done to update the local diagnosis criteria, to evaluating the effect of drug treatments, surgeries, and new rehabilitation therapies. However, limited information was published about the elderly PD patients from actual communities in China, especially about the awareness that they knew they had PD, and about whether they accepted drug treatment or rehabilitation.

Rates of awareness, treatment, and rehabilitation in elderly PD patients and the corresponding subgroups were estimated in this study. All patients were from the PINDEC project. In 2015–2016, more than 24,000 community residents aged 60 years and above were recruited in the PD screening-diagnosis procedure of PINDEC, 77 of whom reported being diagnosed with PD by doctors before screening (self-reported PD) while the other 161 were diagnosed with PD after the screening-diagnosis procedure (screen-detected PD). In 2017, all diagnosed PD patients were followed up to know if they received drug treatment and rehabilitation in the past year.

The PD screening-diagnosis procedure was divided into three steps: 1) subjects were screened using the Parkinson's Disease Symptom Inventory (PDSI), which has been validated among Chinese population (*4*). Two or more of the nine questions of PDSI answered "yes" suggesting that the subject belonged to high-risk populations with PD, and entered the next step of screening; 2) according to Parkinson's core symptoms: I. Is it obviously slower when you get up, walk, or turn? II. Does your hand often tremble? III. Has your body become a bit stiff? High-risk people who had problem 1 and at least one of problems 2 and 3 were classified as suspected PD and then move forward to the clinical diagnosis step; 3) the diagnosis of PD was made by neurologist of collaborative hospitals mainly based on "Chinese Diagnostic Criteria for Parkinson's Disease (2016)", using the clinical diagnostic criteria for Parkinson's disease of UK Parkinson's Disease Society Brain Bank and Movement Disorder Society (2015) as references.

Descriptive statistical analyses of different PD patients were performed among different gender, age, and area subgroups by using software SAS (version 9.4; SAS Institute, Inc. Cary, NC, USA). Chi-square test was adopted to analyze the differences of awareness, drug treatment, and rehabilitation between subgroups, with a p-value of <0.05 considered statistically significant. Rate of awareness was defined as the percentage of self-reported PD patients, rates of treatment and rehabilitation were defined as the percentage of patients received drug treatment and rehabilitation respectively in total PD patients.

A total of 238 PD patients were included, of which 77 were self-reported and 161 were screen-detected through the project. The overall rate of awareness was 32.4%, and significant differences were found in both age and area subgroups. The rate of awareness declined with aging (p=0.03). The rate of awareness was higher in urban than rural (p<0.01). No gender difference was found. Of all the 238 PD patients, 37.8% received drug treatment and 16.0% received rehabilitation. The rate of drug treatment declined with aging (p=0.04). The rate of drug treatment was higher in urban than rural (p<0.01). No statistically difference was found in rehabilitation for all subgroups. (Table 1)

DISCUSSION

This study suggested that rates of awareness, drug treatment, and rehabilitation were low among elderly PD patients in China, especially among older patients and patients in rural area. Among the 238 PD patients found in actual communities, only 32.4% were diagnosed before screening, in other words, the rest 67.6% were undetected or misdiagnosed. In 2017, after all 238 PD patients were followed up and interviewed, the overall rate of drug treatment and

TABLE 1. Awareness, treatment, and rehabilitation of Parkinson's disease (PD) patients in different subgroups in China, 2015–2017.

Characteristics	Number of total PD	Awareness			Drug treatment			Rehabilitation		
		Number of self-reported PD	%	*p**	Number of treated	%	*p**	Number of received	%	*p**
Sex										
Male	116	39	33.6	0.68	42	36.2	0.95	16	13.8	0.81
Female	122	38	31.1		48	39.3		22	18	
Age (Years)										
60–64	15	7	46.7		9	60.0		3	20.0	
65-69	63	24	38.1		24	38.1		9	14.3	
70–74	52	19	36.5	0.03	20	38.5	0.04	10	19.2	0.57
75–79	48	12	25.0		16	33.3		7	14.6	
≥80	60	15	25.0		21	35.0		9	15.0	
Area										
Urban	137	67	48.9	<0.01	56	40.9	<0.01	17	12.4	0.62
Rural	101	10	9.9		34	33.7		21	20.8	
All	238	77	32.4	NA	90	37.8	NA	38	16	NA

Abbreviation: NA=not applicable.
**p* value for difference.

rehabilitation was 37.8% and 16.0%, respectively. The awareness, drug treatment, and rehabilitation are some of the key factors affecting the effect of self-management. Without clinical interventions, symptoms like hand tremors, stiff movements, poor balance, and shuffling gaits would gradually and typically get worsen over time, resulting in permanent disability. This makes it extremely important to get the PD patients detected and diagnosed earlier, involved in more specific, individualized treatment or rehabilitation, in order to control their symptoms and improve their quality of life.

The reason for awareness rate declining with aging is that older people, due to the cultural and educational backgrounds, have less recognition of PD. We noticed in our investigation that older people were more likely to regard PD symptoms as common phenomena of aging other than a disease, which might affect their decisions to see a doctor. That also explained the very low awareness rate in rural areas where lacked relevant health education. Another reason is the little access for potential patients to local specialists. Evidence from a southwest China study proved that general neurologists lacked information about some aspects of PD (*5*), which suggested qualified specialists were not so accessible. Furthermore, PD nonmotor symptoms predate the onset of motor symptoms. However, diagnostic criteria for PD are validated based on motor features. Premotor symptoms like impaired olfaction, gastrointestinal disturbances (constipation), and depression may occur up to 10 years prior to motor symptoms and diagnosis (*6*). As for motor symptoms, even in developed regions like Shanghai, the median time from motor symptom onset to clinical diagnosis of PD was 10 months (*7*).

Cost of PD drugs is a core factor influencing the compliance to medication among PD patients. Many PD patients complained about the expensive drugs during our follow-up. Under current situation and policy of China's health insurance, older PD patients struggle to afford the expensive drug treatment, and this problem is particularly prominent in rural areas. Although a large percentage of patients (91.0%) knew that PD requires lifelong treatment, only about half of the patients (52.3%) thought that pharmacotherapy was necessary in the early stages of PD when the disease affects daily activity (*5*). Both lack of consciousness and economic consideration contributed to the lower drug treatment rate in rural areas. As for rehabilitation, it was reported that rehabilitation could induce clinically important benefits, particularly those affecting gait and balance (*8*). However, rehabilitation is quite a novel therapy for most PD patients and most have little faith in its effect. We can also see a big shortage of registered therapists in China, which makes specific, individualized rehabilitation even harder.

For public health practice, we can take four steps to achieve early diagnosis, drug treatment, and

rehabilitation intervention. Health education via various means is the first step in order to improve the public awareness of PD. The second step is professional training in order to improve the ability of diagnosis and treatment for local CDC staff, doctors from hospitals, and primary care agencies. The third step is to reduce PD drug prices and raise the percentage of health insurance in order to improve patient medication adherence. The fourth step is to strengthen the construction of community-based rehabilitation, including policy support, investment, and physical therapist training.

In conclusion, the rates of awareness, drug treatment, and rehabilitation for elderly PD patients were lower in China. Efforts should be made to increase health education among the elderly and professional training of primary medical and health service institutions, reduce PD drug prices, raise the percentage of health insurance, and strengthen the construction of community-based rehabilitative intervention for patients with PD.

[#] Corresponding author: Zhihui Wang, wangzhihui@ncncd.chinacdc.cn.

[1] National Center for Chronic and Non-Communicable Disease Control and Prevention, Chinese Center for Disease Control and Prevention, Beijing, China.

Submitted: March 18, 2020; Accepted: April 03, 2020

REFERENCES

1. de Lau LML, Breteler MMB. Epidemiology of Parkinson's disease. Lancet Neurol 2006;5(6):525 – 35. http://dx.doi.org/10.1016/S1474-4422(06)70471-9.
2. Zhang ZX, Roman GC, Hong Z, Wu CB, Qu QM, Huang JB, et al. Parkinson's disease in China: prevalence in Beijing, Xian, and Shanghai. Lancet 2005;365(9459):595 – 7. http://dx.doi.org/10.1016/S0140-6736(05)17909-4.
3. Dorsey ER, Constantinescu R, Thompson JP, Biglan KM, Holloway RG, Kieburtz K, et al. Projected number of people with Parkinson disease in the most populous nations, 2005 through 2030. Neurology 2007;68(5):384 – 6. http://dx.doi.org/10.1212/01.wnl.0000247740.47667.03.
4. Zhang W, Niu XY, Gao SW, Hou ZZ, Li JY, Li Y. Evaluation of a screening questionnaire for Parkinson's disease in a Chinese population. J Clin Neurosci 2014;21(2):278 – 81. http://dx.doi.org/10.1016/j.jocn.2013.03.027.
5. Li JP, Chen DZ, Song W, Chen K, Cao B, Huang R, et al. Survey on general knowledge on Parkinson's disease in patients with Parkinson's disease and current clinical practice for Parkinson's disease among general neurologists from Southwest China. Clin Neurol Neurosurg 2014;118:16 – 20. http://dx.doi.org/10.1016/j.clineuro.2013.12.009.
6. Chen JJ. Parkinson's disease: health-related quality of life, economic cost, and implications of early treatment. Am J Manag Care 2010;16 Suppl Implications: S87-93. https://www.ajmc.com/journals/supplement/2010/a280_10mar_parkinsons/a280_10mar_chen.
7. Zhu YY, Wan Y, Luo Y, Li Y, Shi JJ, Wei YR, et al. Potential influencing factors of time from onset to clinical diagnosis and misdiagnosis rate of Parkinson's patients in Shanghai. Chin J Neurol 2015;48(11):995 – 9. http://dx.doi.org/10.3760/cma.j.issn.1006-7876.2015.11.013. (In Chinese).
8. Abbruzzese G, Marchese R, Avanzino L, Pelosin E. Rehabilitation for Parkinson's disease: current outlook and future challenges. Parkinsonism Relat Disord 2016;22(Suppl 1):S60 – 4. http://dx.doi.org/10.1016/j.parkreldis.2015.09.005.

Vital Surveillances

Distribution of Chronic Obstructive Pulmonary Disease — China, 2014–2015

Ning Wang[1]; Shu Cong[1]; Jing Fan[1]; Heling Bao[1]; Baohua Wang[1]; Linhong Wang[1]; Liwen Fang[1,#]

ABSTRACT

Introduction: Chronic obstructive pulmonary disease (COPD) has become a major public health problem in China. However, prevalence of COPD by demographics in different regions has not been estimated. This analysis aims to compare the prevalence of COPD by age and sex and the prevalence of disease severity by Global Initiative for Chronic Obstructive Lung Disease (GOLD) stages in the East, Central, and West of China.

Methods: Data from a nationwide surveillance in China between 2014 and 2015 were used, which recruited 66,752 adults aged 40 years or over. All participants underwent pre- and post-bronchodilator pulmonary function tests. COPD and the severity of disease were defined based on the 2018 GOLD lung function criteria.

Results: The prevalence of COPD was 13.7%, 10.9%, and 16.9% in the East, Central, and West, respectively. In all age and gender groups, the prevalence was highest in the West, followed by the East, with the lowest prevalence in Central. The prevalence of mild disease (GOLD stage I), moderate disease (GOLD stage II), severe disease (GOLD stage III), and very severe disease (GOLD stage IV) was also the highest in the West. The prevalence of COPD in each region increased significantly with age and was consistently higher in men than in women.

Conclusions and Implications for Public Health Practice: With the support of Healthy China 2030, the government should widely publicize the risk factors and early symptoms of COPD to promote the prevention on COPD and the awareness of early detection among population. The capacity of diagnosis and treatment of COPD among primary healthcare institutions and healthcare workers should be strengthened, particularly in the West, where the prevalence of COPD is comparatively high and health resources are relatively scarce.

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a common disease in middle-aged and elderly people. COPD is characterized by persistent respiratory symptoms and airflow limitations that develop progressively. The main symptoms of COPD include shortness of breath, sputum, chronic cough, and wheezing, and further disease progression would lead to chronic pulmonary heart disease or heart and respiratory failure. COPD has become the third leading cause of death in China according to the results of the latest disease burden study (*1*). Our previous reports found that the prevalence of COPD among Chinese adults aged 40 years or older reached 13.6% (*2*) and increased by 60% when compared to an investigation of ten years ago (*3*). Better knowledge on the region-specific prevalence of COPD and the prevalence of different severities of COPD is crucial for the government to effectively allocate health resources and formulate tailored intervention policies. In this study, data from the National COPD Surveillance in China between 2014 and 2015 were used to estimate the prevalence of COPD in the East, Central, and West* of China, and evaluate the prevalence of various severities of airflow limitation among the patients with COPD in China.

METHODS

National COPD Surveillance was initiated in 2014–2015 and will be carried out every five years. The surveillance in 2014 and 2015 (the most recent available data) was conducted in 125 counties/districts in all 31 provincial-level administrative divisions (PLADs) across China based on National Disease Surveillance Points (DSPs) with national

* East: Beijing, Tianjin, Hebei, Shanghai, Jiangsu, Zhejiang, Fujian, Liaoning, Shandong, Guangdong, and Hainan. Central: Shanxi, Anhui, Jiangxi, Heilongjiang, Jilin, Henan, Hubei, and Hun. West: Inner Mongolia, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Qinghai, Ningxia, and Xinjiang. There are two reasons for this division. First, the East, Central, and West have the significantly different levels of economic development across China. It is a traditional geographical classification in disease surveillance in China. Second, the sample of 125 DSPs in the national COPD surveillance were selected based on the stratification of all DSPs into the East, Central, and West across the country.

representativeness (*4*). A multi-stage stratified cluster random sampling method was used to select the participants. Detailed sampling methods can be found in our previous paper (*2*). After estimating a sufficient sample size, 75,000 individuals were planned to be investigated. Finally, a total of 75,107 participants completed the interview (*2*,*5*).

The surveillance included interviews, anthropometric measurements, and pulmonary function tests that were conducted in local health stations or community clinics (*6*–*10*). All subjects underwent pulmonary function tests after excluding contraindications. Both pre-bronchodilator and post-bronchodilator forced expiratory volume in 1s (FEV_1) and forced vital capacity (FVC) were measured. The pulmonary function test was conducted with a portable spirometer by using forced expiratory volume (deep inhalation, flow-volume curve).

COPD was defined according to GOLD 2018 (a post-bronchodilator FEV_1: FVC was less than 70%). COPD was classified in accordance with GOLD staging standard: stage I (mild disease, $FEV_1 \geq 80\%$ predicted), stage II (moderate disease, $FEV_1 \geq 50\%$ to <80% predicted), stage III (severe disease, $FEV_1 \geq 30\%$ to <50% predicted), and stage IV (very severe disease, $FEV_1 < 30\%$ predicted).

Prevalence by region (east, central, and west), age, and sex were estimated. Weighted prevalence was calculated using weighted coefficients to represent the overall Chinese adults aged 40 years or over. Weighted coefficients accommodated the sampling scheme for unequal probabilities of sample selection and the post-stratification weights, which harmonized the sample structure of the surveillance with that of the 2010 census of the Chinese population. The prevalence of different stages of the disease in the three regions were also estimated. All statistical analyses were conducted using the "*survey*" package in software R (version 3.4.2, R Foundation for Statistical Computing).

RESULTS

After removing participants with unqualified pulmonary function tests, 66,752 participants were included for analysis. The numbers of participants in the East, Central, and West were 23,703, 19,721, and 23,328, respectively. Participants aged 50–69 years accounted for the greatest proportion in the East, while participants aged 40–49 years accounted for the greatest proportion in the Central and West. There were more female participants in the East and Central, and more male participants in the West (Table 1).

Figure 1 shows the age- and sex-specific COPD prevalence. The prevalence of COPD in the overall population was 13.6%, and it increased with age and was consistently higher among men than women in all age groups. COPD prevalence was highest among men aged 75 years or older (42.9%) and the lowest among women aged 40 to 44 (3.1%).

Table 1 shows the prevalence of COPD by region, age, and sex. In all age and gender groups, the prevalence was highest in the West, followed by the East, with the lowest prevalence in Central. Men aged 70 years or older in the West had the highest prevalence (49.0%), while women aged 40 to 49 years in Central had the lowest prevalence (3.2%).

TABLE 1. Chronic obstructive pulmonary disease (COPD) prevalence by region, age, and sex among Chinese adults aged 40 years or older, 2014–2015*.

Item	East (23,703)		Central (19,721)		West (23,328)	
	Case/Total	Prevalence (%)	Case/Total	Prevalence (%)	Case/Total	Prevalence (%)
Men						
40–49 yr	47/3,079	8.6	264/3,126	7.7	403/4,196	11.1
50–59 yr	679/3,804	17.5	452/3,023	15.3	663/3,646	21.5
60–69 yr	967/3,314	28.8	708/2,756	27.3	963/2,975	36.3
≥70 yr	511/1,225	44.5	319/938	33.1	459/1,055	49.0
Women						
40–49 yr	120/3,547	3.8	97/3,498	3.2	184/4,174	5.2
50–59 yr	284/4,347	7.8	187/3,380	5.9	277/3,934	8.9
60–69 yr	386/3,364	12.2	188/2,321	8.4	327/2,591	14.7
≥70 yr	218/1,023	21.5	78/679	9.7	153/757	24.7

* East: Beijing, Tianjin, Hebei, Shanghai, Jiangsu, Zhejiang, Fujian; Liaoning; Shandong; Guangdong; Hainan. Central: Shanxi, Anhui, Jiangxi, Heilongjiang, Jilin, Henan, Hubei, Hunan. West: Inner Mongolia; Guangxi; Chongqing; Sichuan; Guizhou; Yunnan; Tibet; Shaanxi; Gansu; Qinghai; Ningxia; Xinjiang.

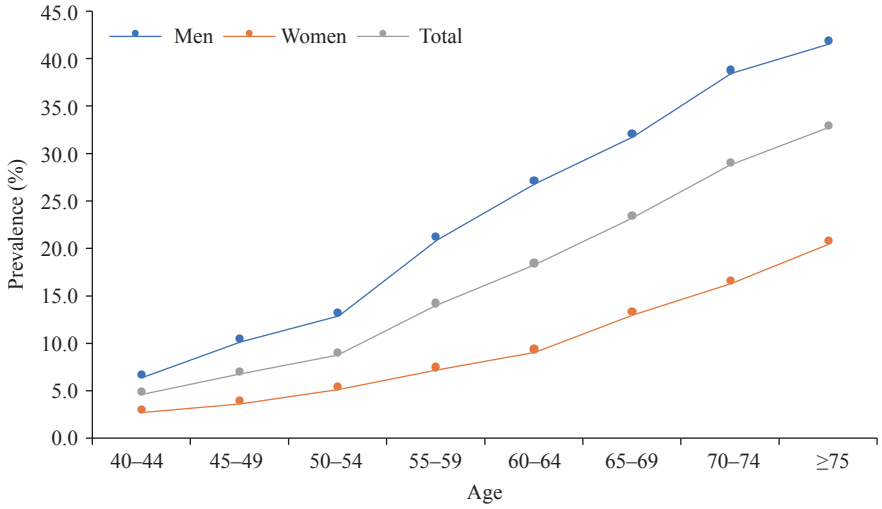

FIGURE 1. Age- and sex-specific chronic obstructive pulmonary disease (COPD) prevalence among Chinese adults aged 40 years or older, 2014–2015.

Region-specific prevalence of COPD and different disease stages are presented in Figure 2. The prevalence of COPD was 13.7%, 10.9%, and 16.9% in the East, Central, and West, respectively. In the overall patients, the prevalence of mild disease (GOLD stage I), moderate disease (GOLD stage II), severe disease (GOLD stage III), and very severe disease (GOLD stage IV) were 7.7%, 4.9%, 0.9%, and 0.1%, respectively. The prevalence of moderate and more severe disease were 6.0%, 5.4%, and 6.7% in the East, Central, and West, respectively.

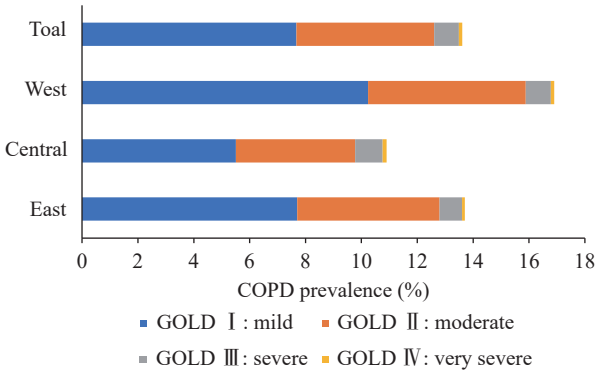

FIGURE 2. Region-specific prevalence of chronic obstructive pulmonary disease (COPD) and different disease stages among Chinese adults aged 40 years or older, 2014–2015. GOLD=global initiative for chronic obstructive lung disease.

DISCUSSION

The results of this surveillance found a varied prevalence of COPD and a varied prevalence of the four disease stages in different regions. An estimated 43.6, 28.0, 5.0, and 0.7 million patients with COPD nationally were at mild, moderate, severe, and very severe stages, respectively, based on the population aged 40 years or older in 2010 (568.0 million). We found that the prevalence of COPD in all ages and gender groups in the West were the highest, and the prevalence of each disease stage were also the highest in the West.

The global prevalence of COPD was estimated at 11.7% (*11*), which is lower than the prevalence of COPD in China found in this study. The results of this study are similar to findings from a study in the US which presented the prevalence of COPD in the US population with same demographic characteristics was 14.0% (*12*). Another study in Latin American cities found that the prevalence in Mexico was 19.7% (*13*), which is higher than that found in this study.

This study found that more than half of the patients with COPD were at a mild stage and that the West had the highest prevalence of mild patients. Studies show that there were widespread under-recognition and under-diagnosis of COPD (*14*). At the mild stage, patients rarely have detectable symptoms and are less likely to be diagnosed. Health education on COPD-related risk factors and early symptoms among Chinese adults should be public health priorities, particularly in the West in order to improve the prevention and early diagnosis of the disease. Fortunately, the Chinese government has put several health policies in place such as Healthy China 2030, which emphasizes the importance of COPD prevention and control and sets the objective of undertaking spirometry test once a year

for population aged 40 years or over and for high-risk population with chronic respiratory diseases. This policy would greatly promote the early detection of the disease.

In addition to mild stage, the prevalence of the patients with COPD at the moderate, severe, and very severe stages was also the highest in the West. These patients are susceptible to respiratory infectious diseases and are more likely to progress to severe conditions, which increases the risk of mortality. However, in the West, the level of socioeconomic development is relatively low, and health resources are relatively scarce. If respiratory infectious diseases such as 2019 coronavirus disease (COVID-19) spread in the West, there would be a big challenge for public health. This calls for a much stronger and more integrated public health system in the West. More specifically, programs to strengthen the capacities of early diagnosis and standardized treatment of COPD among primary healthcare institutions are urgently needed in the West including the training of healthcare workers and the investments of spirometers and drugs for diagnosis and treatment of COPD.

We also found that the prevalence of COPD in each region increased significantly with age. The future burden of COPD prevalence in China is anticipated to increase considerably due to rapid population aging, which calls for more powerful and more intensified strategies on COPD prevention and control.

Conflict of interest: No conflicts of interest were reported.

Acknowledgments: We thank all research staff from local Centers for Disease Control and Prevention and local hospitals for collection of data.

[#] Corresponding author: Liwen Fang, fangliwen@ncncd.chinacdc.cn.

[1] National Center for Chronic and Non-communicable Diseases Control and Prevention, Chinese Center for Disease Control and Prevention, Beijing, China.

Submitted: November 19, 2019; Accepted: February 26, 2020

REFERENCES

1. Zhou MG, Wang HD, Zeng XY, Yin P, Zhu J, Chen WQ, et al. Mortality, morbidity, and risk factors in China and its provinces, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017. Lancet 2019;394(10204):1145 – 58. http://dx.doi.org/10.1016/S0140-6736(19)30427-1.
2. Fang LW, Gao P, Bao HL, Tang X, Wang BH, Feng YJ, et al. Chronic obstructive pulmonary disease in China: a nationwide prevalence study. Lancet Respir Med 2018;6(6):421 – 30. http://dx.doi.org/10.1016/S2213-2600(18)30103-6.
3. Zhong NS, Wang C, Yao WZ, Chen P, Kang J, Huang SG, et al. Prevalence of chronic obstructive pulmonary disease in China: a large, population-based survey. Am J Respir Crit Care Med 2007;176(8):753 – 60. http://dx.doi.org/10.1164/rccm.200612-1749OC.
4. Liu SW, Wu XL, Lopez AD, Wang LJ, Cai Y, Page A, et al. An integrated national mortality surveillance system for death registration and mortality surveillance, China. Bull World Health Organ 2016;94(1):46 – 57. http://dx.doi.org/10.2471/BLT.15.153148.
5. Fang LW, Bao HL, Wang BH, Feng YJ, Cong S, Wang N, et al. A summary of item and method of national chronic obstructive pulmonary disease surveillance in China. Chin J Epidemiol 2018;39(5):546 – 50. http://dx.doi.org/10.3760/cma.j.issn.0254-6450.2018.05.002. (In Chinese).
6. Wang N, Feng YJ, Bao HL, Cong S, Fan J, Wang BH, et al. Survey of smoking prevalence in adults aged 40 years and older in China, 2014. Chin J Epidemiol 2018;39(5):551 – 6. http://dx.doi.org/10.3760/cma.j.issn.0254-6450.2018.05.003. (In Chinese).
7. Cong S, Feng YJ, Bao HL, Wang N, Fan J, Wang BH, et al. Analysis on passive smoking exposure in adults aged 40 years and older in China, 2014. Chin J Epidemiol 2018;39(5):557 – 62. http://dx.doi.org/10.3760/cma.j.issn.0254-6450.2018.05.004. (In Chinese).
8. Feng YJ, Fan J, Cong S, Wang BH, Wang N, Bao HL, et al. Current status of household polluting fuel use in adults aged 40 years and older in China, 2014. Chin J Epidemiol 2018;39(5):569 – 73. http://dx.doi.org/10.3760/cma.j.issn.0254-6450.2018.05.006. (In Chinese).
9. He YZ, Bao HL, Feng YJ, Cong S, Fan J, Wang N, et al. Prevalence of biomass fuel exposure in women aged 40 years and older in China, 2014. Chin J Epidemiol 2018;39(5):574 – 9. http://dx.doi.org/10.3760/cma.j.issn.0254-6450.2018.05.007. (In Chinese).
10. Wang BH, Cong S, Bao HL, Feng YJ, Fan J, Wang N, et al. Analysis on occupational exposure to dust and harmful gas and corresponding protection in adults aged 40 years and older in China, 2014. Chin J Epidemiol 2018;39(5):563 – 8. http://dx.doi.org/10.3760/cma.j.issn.0254-6450.2018.05.005. (In Chinese).
11. Adeloye D, Chua S, Lee C, Basquill C, Papana A, Theodoratou E, et al. Global and regional estimates of COPD prevalence: Systematic review and meta-analysis. J Glob Health 2015;5(2):020415. http://dx.doi.org/10.7189/jogh.05-020415.
12. Tilert T, Dillon C, Paulose-Ram R, Hnizdo E, Doney B. Estimating the U.S. prevalence of chronic obstructive pulmonary disease using pre- and post-bronchodilator spirometry: the National Health and Nutrition Examination Survey (NHANES) 2007-2010. Respir Res 2013;14(1):103. http://dx.doi.org/10.1186/1465-9921-14-103.
13. Menezes AM, Perez-Padilla R, Jardim JR, Muino A, Lopez MV, Valdivia G, et al. Chronic obstructive pulmonary disease in five Latin American cities (the PLATINO study): a prevalence study. Lancet 2005;366(9500):1875 – 81. http://dx.doi.org/10.1016/S0140-6736(05)67632-5.
14. Quach A, Giovannelli J, Cherot-Kornobis N, Ciuchete A, Clément G, Matran R, et al. Prevalence and underdiagnosis of airway obstruction among middle-aged adults in northern France: the ELISABET study 2011-2013. Respir Med 2015;109(12):1553 – 61. http://dx.doi.org/10.1016/j.rmed.2015.10.012.

Commentary

An Important but Overlooked Measure for Containing the COVID-19 Epidemic: Protecting Patients with Chronic Diseases

Jing Wu[1,#]

The COVID-19 outbreak has rapidly spread around the world over the past several weeks. On March 11, 2020, the World Health Organization designated it as pandemic (*1*) and as of 23:59 CET March 19, 2020, there were a total of 234,073 confirmed cases and 9,840 deaths in 176 countries, areas, or territories (*2*). The COVID-19 global pandemic posts a significant global public health challenge to every individual around the world (*3–4*).

Eliminating sources of infection, cutting off routes of transmission, and protecting susceptible populations are routine measures for containing infectious diseases. At present, our understanding of the COVID-19 virus and its transmission is deepening, and scientists are racing to develop effective vaccines and drugs. In this context, protection of susceptible and vulnerable people is extremely important, especially for patients with underlying chronic diseases.

In China, more than 300 million individuals are living with a chronic disease or condition (*5*). Patients with chronic diseases, such as cancer, chronic obstructive pulmonary disease (COPD), cardiovascular diseases (CVDs), or diabetes, will have more serious consequences and need more complex treatment if they become infected with COVID-19. These patients are at extremely high risk of complications and death (*6–8*).

Patients with chronic diseases experience dilemmas. Their conditions require routine medical follow-ups and services where they may be more likely to be exposed to the virus when they visit clinics and hospitals. Likewise, if they do not go to clinics and hopitals for treatment due to city orders for social distancing and isolation during a public health emergency, they may not get timely and effective medical attention, resulting in increased risk of complications and even death (*9–11*).

In addition, patients with chronic disease who contract COVID-19 are also likely to spread the virus to their caretakers and signs and symptoms caused by the virus may be masked by their preexisting conditions or symptoms.

On the upside, patients with chronic diseases usually pay more attention to their own health or are cared for with personal protective equipment. They may have more health awareness and knowledge and are more compliant with epidemic prevention and control measures. These patients usually have more complete medical records, which are more helpful for epidemiological investigations.

We therefore make the following recommendations:

When preparing and respondiong to a potential public health emergency, local authorities shall fully identify the number of patients with chronic disease, estimate potential needs and demands, and fully consider the drug stockpile and medical resources.

Center for Disease Control and Prevention (CDC) and professional organizations should issue general protection guidance or guidelines for patients with chronic diseases, make every effort to promote their protection awareness and knowledge, and alert them to reduce external activities during the epidemic period and actively seek psychological consultations to relieve stress and anxiety.

Hospitals should take into consideration of patients' comorbidities when formulating criteria of diagnosis, differential diagnosis, and referral and discharge for infectious diseases.

Authorities should take comprehensive measures through hospitals, medical insurance, and community and disease control agencies to ensure that patients with chronic diseases can continue receiving proper diagnosis and treatment services such as medication prescriptions and retrieval with little interruption when they visit hospital or clinics and timely consultation and guidance from healthcare providers in case of emergencies.

Hospitals should develop and implement telemedicine and other forms of long-distance capacity to maintain communication with patients with chronic diseases. Community health centers should provide regular and sub-urgent care services for patients with chronic diseases nearby.

Health insurance departments should adjust

regulations allowing patients with stable chronic diseases to have prescription drugs extended up to 90 days.

In conclusion, in case of public health emergencies, protecting patients with chronic conditions requires significant and relevant public health consideration. Multi-departmental coordination and efforts are needed to safeguard the health and wellbeing of patients with underlying chronic diseases.

Acknowledgement: The author would like to thank all of those fighting COVID-19 on the frontlines home and abroad.

[#] Corresponding author: Jing Wu, wujing@chinacdc.cn.

[1] National Center for Chronic and Non-Communicable Disease Control and Prevention, Chinese Center for Disease Control and Prevention, Beijing, China.

Submitted: March 21, 2020; Accepted: March 22, 2020

REFERENCES

1. World Health Organization. Virtual press conference on COVID-19 - 11 March 2020. 2020. https://www.who.int/docs/default-source/coronaviruse/transcripts/who-audio-emergencies-coronavirus-press-conference-full-and-final-11mar2020.pdf?sfvrsn=cb432bb3_2. [2020-03-11].
2. World Health Organization. Novel coronavirus (COVID-19) situation. 2020. https://experience.arcgis.com/experience/685d0ace521648f8a5beeeee1b9125cd. [2020-03-20].
3. Mahase E. Coronavirus: covid-19 has killed more people than SARS and MERS combined, despite lower case fatality rate. BMJ 2020; 368:m641. http://dx.doi.org/10.1136/bmj.m641.
4. Sands P, EI Turabi A, Saynisch PA, Dzau VJ. Assessment of economic vulnerability to infectious disease crises. Lancet 2016;388(10058): 2443 – 8. http://dx.doi.org/10.1016/S0140-6736(16)30594-3.
5. National Health and Family Planning Commission. 2014 report on Chinese resident's chronic disease and nutrition. People's Medical Publishing House. 2015. http://www.chinadaily.com.cn/m/chinahealth/2015-06/15/content_21008408_2.htm.
6. Zhu N, Zhang DY, Wang WL, Li XW, Yang B, Song JD, et al. A novel coronavirus from patients with pneumonia in China, 2019. N Engl J Med 2020;382(8):727 – 33. http://dx.doi.org/10.1056/NEJMoa2001017.
7. Wu ZY, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report of 72 314 cases from the chinese center for disease control and prevention. JAMA 2020. http://dx.doi.org/10.1001/jama.2020.2648.
8. Huang CL, Wang YM, Li XW, Ren LL, Zhao JP, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet 2020;395(10223):497 – 506. http://dx.doi.org/10.1016/S0140-6736(20)30183-5.
9. Weston D, Hauck K, Amlôt R. Infection prevention behaviour and infectious disease modelling: a review of the literature and recommendations for the future. BMC Public Health 2018;18(1):336. http://dx.doi.org/10.1186/s12889-018-5223-1.
10. Zheng YY, Ma YT, Zhang JY, Xie X. COVID-19 and the cardiovascular system. Nat Rev Cardiol 2020. http://dx.doi.org/10.1038/s41569-020-0360-5.
11. Ji YP, Ma ZR, Peppelenbosch MP, Pan QW. Potential association between COVID-19 mortality and health-care resource availability. Lancet Glob Health 2020;8(4):PE480. http://dx.doi.org/10.1016/S2214-109X(20)30068-1.

Jing WU, MD, PhD
Director, National Center for Chronic and Non-Communicable Disease Control and Prevention, Chinese Center for Disease Control and Prevention, Beijing, China

Notes from the Field

Weekly Assessment of the COVID-19 Pandemic and Risk of Importation — China, April 1, 2020

Mingfan Pang[1,&]; Zuoru Liang[1,&]; Xinping Yang[1]; Yufei Wang[1]; Zhongjie Li[1]; Yanping Zhang[1]; Ke Lyu[1]; Guoqing Shi[1]; Lei Zhou[1]; Xiaopeng Qi[1,#]; Xinhua Li[1,#]; Xiaoping Dong[1,#]

INTRODUCTION

Along with the announcement of COVID-19 as a global pandemic by the World Health Organization (WHO) on March 12, 2020, COVID-19 appeared to be spreading rapidly around the world. By 10:00 CET on April 1, 2020, a total of 740,995 confirmed cases and 37,277 deaths were reported from 204 foreign countries and regions on 6 continents plus the Diamond Princess international cruise ship; among them, 161 countries and regions had local transmission. Cumulatively, the WHO website reported 23,791 confirmed COVID-19 cases from 18 countries and regions in the Western Pacific (excluding China), 464,212 cases from 60 countries and regions in Europe, 5,175 cases from 10 countries and regions in South-East Asia, 54,281 cases from 21 countries and regions in the Eastern Mediterranean, 188,751 cases from 51 countries and regions in the Americas, and 4,785 cases from 44 countries and regions in Africa (*1*).

In this report, using publicly issued COIVD-19 data on the internet, particularly the data from March 26 to April 1, 2020, the pandemic trends globally, regionally, and by country were evaluated. The risk of case importation into China was also analyzed.

RESULTS

Equivalent-Mortality Lines of 19 Severely Affected Countries

To evaluate the severity and spread of COVID-19 in one special country in one framework, 19 countries with the fatal confirmed cases over 100 by April 1 were selected. The crude case fatality ratio (CFR, total deaths/total cases) and the cumulative incidence (CI, total cases/total population) of each country were calculated and showed on the Y-axis and the X-axis, respectively (Figure 1). The blue isolines of the mortality rate were obtained as the product of CI and CFR. The balloon size was proportional to the population size and the small rope of the balloon traced the history of changes related to the CI and CFR in each country in the past 7 days. As shown in Figure 1, Italy and Spain were located at the zone of mortality between 20 and 25 deaths per 100,000. Both the CI and CFR of Italy rose continually, whereas the CI of Spain increased more noticeably when compared to the data of the past 7 days. The Netherlands, France, Belgium, and Switzerland were in the mortality zone between 5 and 10 deaths per 100,000, with a higher CFR in the Netherlands and a higher CI in Switzerland. The rapidly increasing CI in Switzerland may be closely linked to the high percentage of people tested among the general population.

Eight countries were located at the mortality zone of 1–5 deaths per 100,000, including the UK, Iran, Sweden, Denmark, USA, Portugal, Austria, and Germany. Compared with the data of the past 7 days, the UK increased rapidly both in CFR and CI, while Iran seemed to decrease its CFR accompanying an increase in CI. USA and Germany moved from the lowest zone of mortality (0–1/100,000) to the next level in the past 7 days. Indonesia, China, Brazil, Republic of Korea, Turkey, and Canada were at the lowest zone, in which Indonesia revealed much higher CFR and low CI. Due to its large population size, more attention should be paid to potential changes in Indonesia in the coming week.

Rates of Increase of Confirmed Cases in Various Affected Countries in the Past 7 Days

In order to compare the COVID-19 growth rate in the past week, we calculated the average daily rate of increase in cumulative cases for each affected country with more than 100 total confirmed cases by April 1. The daily rate of increase was calculated by (cumulative cases of today-cumulative cases of yesterday)/

(cumulative cases of yesterday), and the 7-day average values of affected countries were shown on the Y-axis in Figure 2 corresponding to the numbers of cumulative cases on the X-axis. Turkey possessed the highest daily rate of increase of 33% with cumulative cases over 10,000. Other two countries, the daily rates of increase of Ghana and Ukraine were also higher than 30%, but the cumulative cases were still obviously less than 1,000, possibly due to their position in the early stages of rapid increases.

Israel, Russia, the Philippines, and several other countries were located in the range between 20%–30%

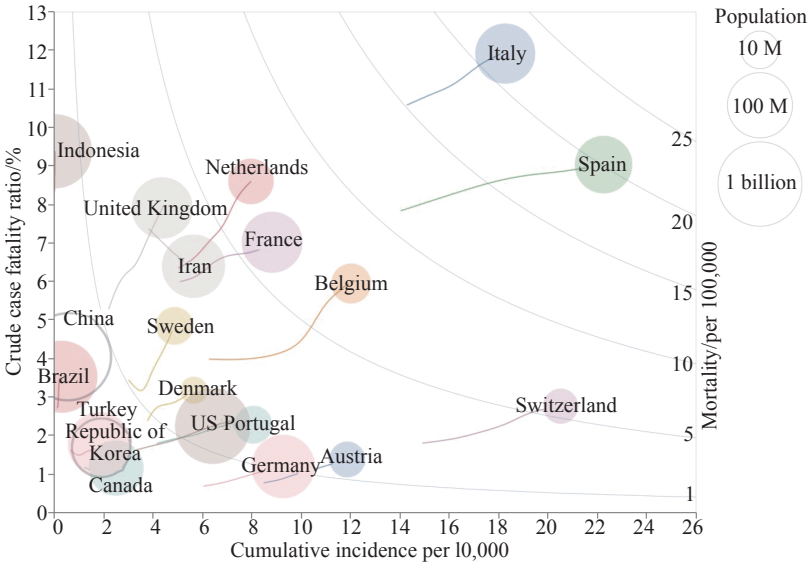

FIGURE 1. Comparison of the COVID-19 crude case fatality ratio (Y axis = total deaths/total cases), cumulative incidence (X axis = total cases/total population), and mortality (the isoline = total deaths/total population) of 19 countries with more than 100 fatal cases by April 1, 2020. The size of balloon was proportional to the country's population size. The small rope of the balloon traced the history of changes related to CI and CFR in the past 7 days. M=million.

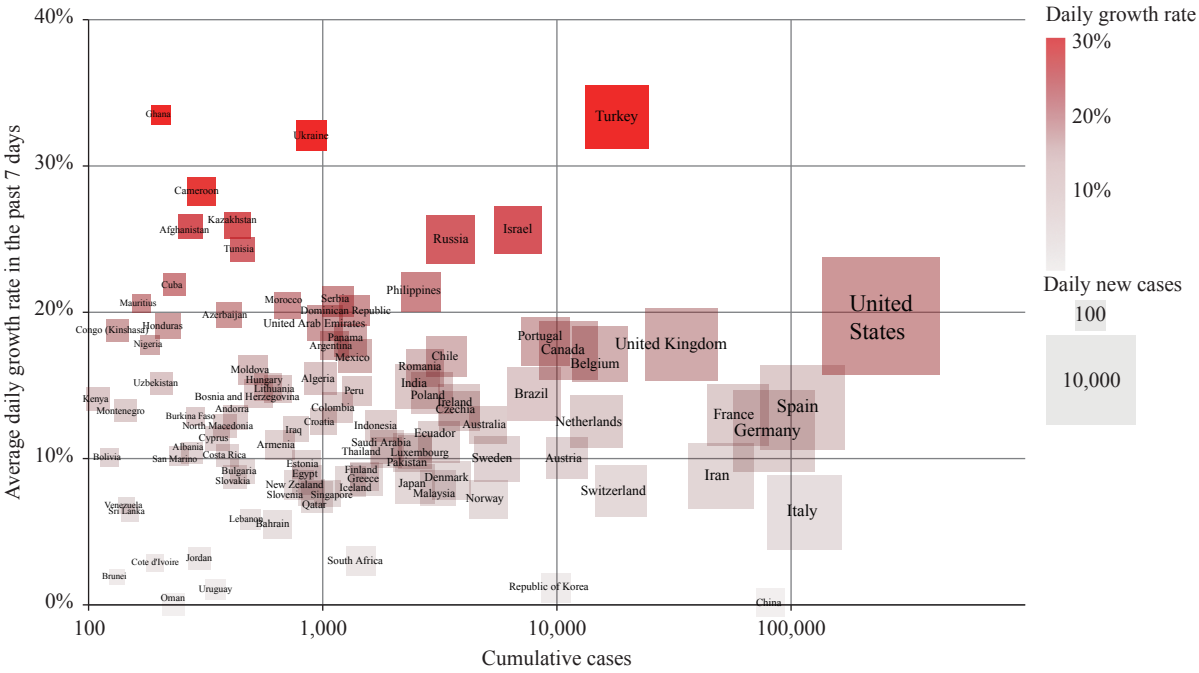

FIGURE 2. The average daily growth rate of the reported cumulative cases in the past 7 days for each affected country with more than 100 total confirmed cases by April 1. The color transparency represented the growth rate. The size of the square was proportional to the number of new cases on April 1.

rate of increase. Besides Israel, the rest of the countries had relatively small numbers of confirmed cases. The USA had not only the largest number of cumulative cases but also a relatively high rate of increase of 20%, showing fast spread of COVID-19. Many European counties showed moderate rates of increase between 10%–20% but had large amounts of cumulative cases, such as the UK, Germany, France, Belgium, the Netherlands, Portugal, etc. Many other countries in Eastern Europe, South America, Southeast Asia, and South Asia were also in this region of 10%–20% rate of increase, including highly populous countries like India, Indonesia and Brazil. It is notable that the rates of increase of Italy and Iran, whose surges of COVID-19 cases emerged relatively earlier (at the beginning of March), were below 10% in the past 7 days, possibly indicating a stage of plateau. Many countries were located at the region of the graph below 10% increasing rate, among which China was at the lowest position with the Republic of Korea. Japan, Malaysia, as well as several European countries were also in this region of the graph. It is worth mentioning that the rate of increase of South Africa, having the largest number of confirmed cases in Africa, noticeably slowed down in the past 7 days.

Transmission Rate Prediction

Transmission rates in the global climatic zones. Using data collected from websites of WHO and governments, we continually calculated the effective reproduction numbers (Rt) in the context of climatic zones globally (excluding China) using SEIR mathematic modeling of infectious diseases. In general, the obtained Rt curves were gradually declining in the past two weeks (Figure 3A). The Rt values for each region on March 30 were 2.35 (subfrigid), 1.96 (temperate), 1.58 (tropical) and 1.30 (subtropical), respectively.

Transmission rates in the northern and southern hemispheres. The Rt values of COVID-19 globally and in the Northern and Southern Hemispheres (excluding China) were evaluated. Based on the issued data of the confirmed cases, the morbidity and the CFR in the Northern and Southern Hemispheres until March 31 were estimated as 14.38/100,000 and 5.08% and 1.99/100,000 and 2.27%, respectively. Rt curves showed a declining trend globally and in the Northern and Southern Hemispheres, and those of global and Northern Hemisphere almost overlapped (Figure 3B). The Rt values on March 30 were 1.74 (Northern Hemisphere), 1.72 (global), and 1.27 (Southern Hemisphere).

Laboratory Testing for 2019-nCoV in Various Countries

As described in our report last week (*2*), the numbers of reported confirmed cases in countries would be greatly influenced by their national testing criteria. The laboratory capacity and the supply of virus testing kits also determined the national scale of testing. Using data from Wikipedia by April 3 (*3*), the total testing numbers, the number of positive test results, and the tests per million population of the affected countries with over 1,000 tests were collected separately and calculated. In Figure 4, the positive rate was showed on the Y-axis and the testing number per million population was indicated in log scale on the X-axis with labeling by different continent by color and national population by size. From the perspective of continents, most countries in Europe (light blue), North America (green), and Oceania (pink) revealed relatively high testing coverage, followed by South America (yellow), while South Asia (purple) seemed to have low overall coverage. The testing data of the most

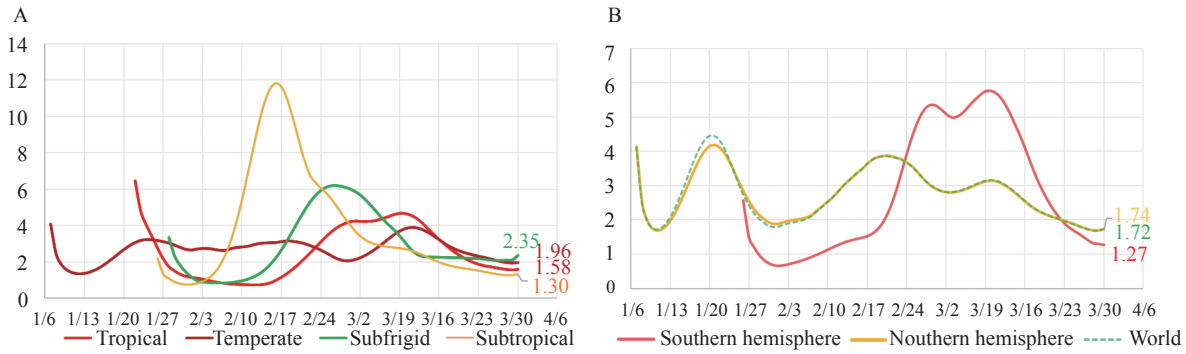

FIGURE 3. Rt trends and values. (A) Rt trend of COVID-19 by hemisphere (excluding China) by Mar 31, 2020. (B) Rt trend of COVID-19 in four climatic zones (excluding China) by Mar 31, 2020.

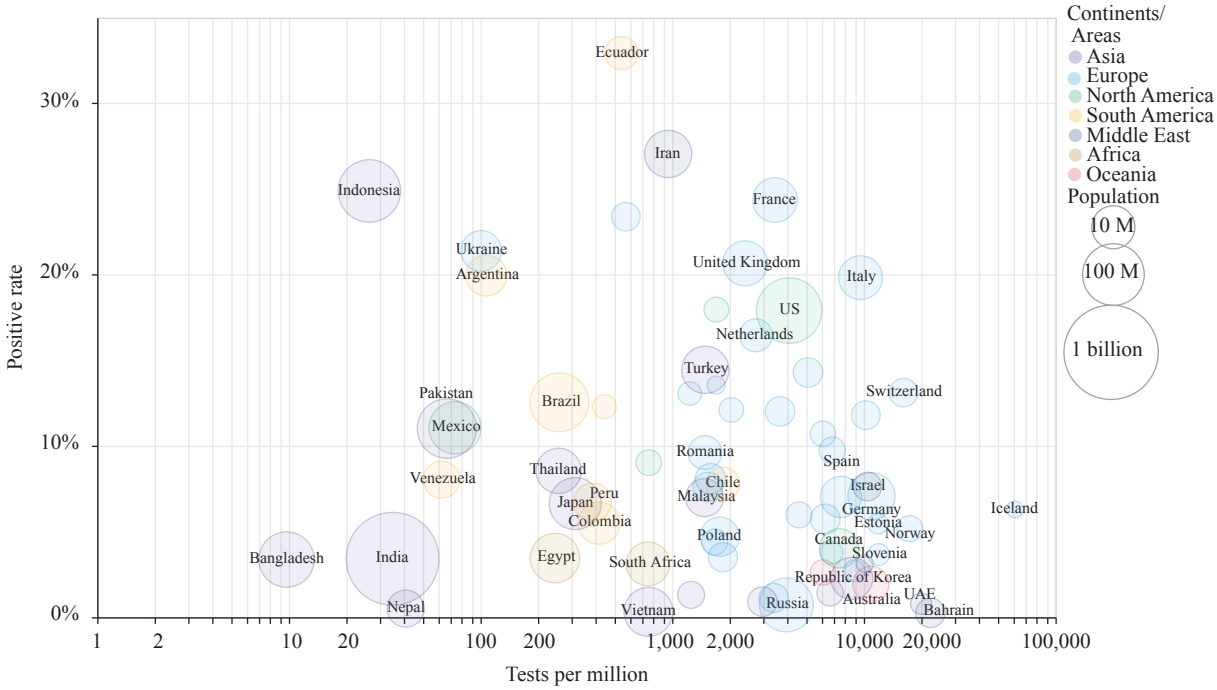

FIGURE 4. 2019-nCoV laboratory testing coverage and positive rate by country up to April 3, 2020. Coverage was measured by the number of tests per million population. The size of the circle was proportional to population size, and the color represented the continent. M=million.

African countries were either inaccessible or less than 1,000.

Regarding individual countries, Iceland had the highest testing coverage (57,459 per million), followed by the UAE and Bahrain (both over 21,500 per million), and Norway and Switzerland (both over 16,000 per million). On the contrary, the testing coverage of Bangladesh, Indonesia, India, and Nepal were markedly lower. Ecuador had the highest positive test result rate at 33% and a testing coverage rate of 562 per million. The positive test result rate of Iran was also high (27%) and a testing coverage rate of 962 per million. Indonesia had a high (25%) positive test result rate, but its testing coverage rate was low at 27 per million.

The Ratio of Serious and Critical cases *vs.* Critical Care Beds

The number of the critical care (ICU and IMCU) beds in a country is one of the indices reflecting the national medical service capacity. Considering that critical care beds are not only for COVID-19 cases but also for patients with other diseases, we assumed that a shortage in critical medical service may occur, especially when the COVID-19 occupancy of critical care beds in a special region, e.g., a city or a country, exceeds 50% (*4*). The numbers of critical care beds in 67 countries were obtained from literature (31 in Europe, 24 in Asia, 11 in Africa and the USA) (*5*–*7*), as well as the numbers of serious and critical COVID-19 cases on April 1 in the corresponding countries (*8*). After calculating the ratio of the numbers of serious/critical cases to critical care beds in the individual countries, 9 countries currently had ratios over 50% (Figure 5). Spain (131%), Iran (102%), Andorra (100%), and the Netherlands (99%) seemed to be beyond or very close to complete occupation. France (74%) and Sweden (71%) were probably facing severe shortages of critical care resources. Belgium (62%), Italy (53%), and Portugal (51%) are close behind. It should be noted that circumstances in some severely affected areas inside a country were likely even worse, such as the Lombardy region in Italy. Quickly expanding the available number of critical care beds and qualified medical staff in those countries will help solve such problem.

We also compared the numbers of critical care beds per 100,000 people in 67 countries. The capacities of Africa and Asia were noticeably less complete, with an average value of 0.2 (maximum value 1.2) and 6.3 (maximum value 21.6), which were much lower than that of Europe (average 11.3, maximum 28.8 in Germany) and the USA (34.7). On the other hand, a

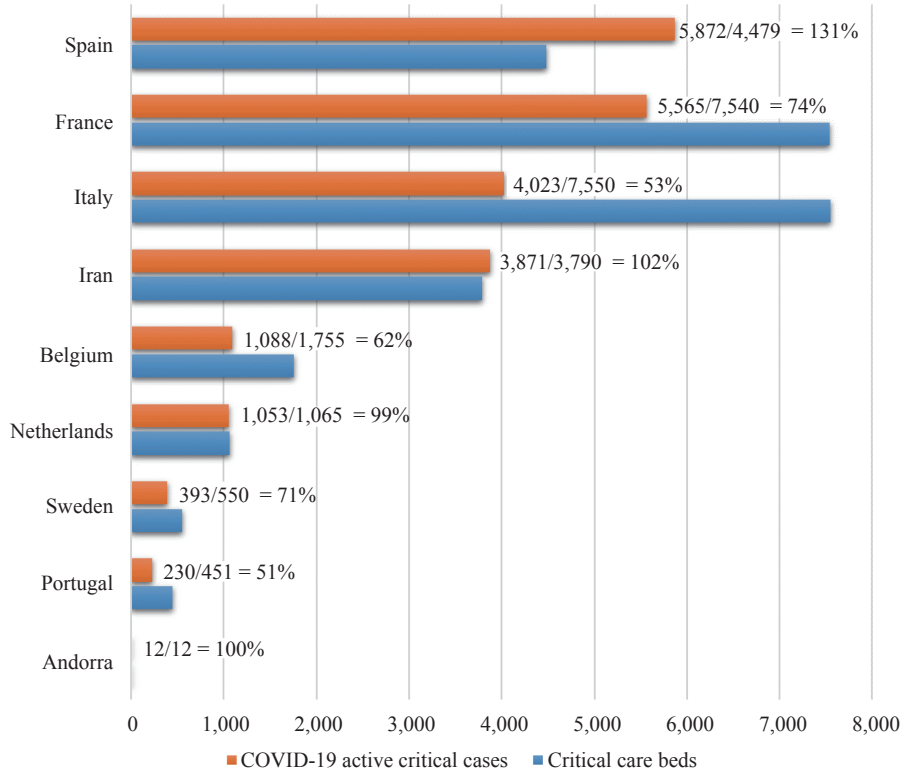

FIGURE 5. Countries in shortage of critical care resources. The ratio of the number of COVID-19 active serious and critical cases (April 1) to the total number of critical care beds was labeled besides the bars.

shortage of qualified medical workers in most African and Asian countries is much more critical than the shortage of ICU beds and equipment such as ventilators.

COIVD-19 Imported Cases into China

According to data issued by the National Health Commission, 300 confirmed COVID-19 cases were identified in the past 7 days in Mainland China as imported cases. March 26 and 27 were the days with the most imported cases last week with 54 new cases each day. The numbers of newly imported cases in the last 5 days of past week displayed a fluctuating but declining trend. Cumulatively until now, the top 5 source countries were the UK, USA, Spain, France, and Italy, and the top 5 destinations were Shanghai, Beijing, Guangdong, Fujian, and Gansu.

Since February 29, there have been continuously imported cases reported in Mainland China. A series of measures have been implemented, such as reducing the number of flights, quarantining at designed places for passengers from high-risk country for 14 days, and medical observation at home for the passengers from moderate- and low-risk countries for 14 days. At the end of March, stricter strategies and measures were implemented to further reduce the impact of imported cases from abroad, including suspending the entry of foreigners with valid visas, further reducing flight operations, testing all entry personnel, quarantine at designed place for all passengers from all foreign countries after entering for 14 days, etc. As illustrated in Figure 6, the peak day with largest increase in the imported cases was March 23. Afterwards, the daily number of imported cases declined, while in the same period the global (excluding China) daily number of confirmed cases dramatically increased. Such a scenario may somehow reflect significance on preventing imported cases and protecting further local transmission, although the exact impact of the comprehensive control measures is still under investigation.

DISCUSSION

In the past week (March 26 to April 1), the rapid increases of COVID-19 in most European countries and the USA did not show any slowdown, making Europe and the USA as the two major epicenters. The daily new confirmed cases in the USA were close to 20,000 in the first two days and over 20,000 in the last

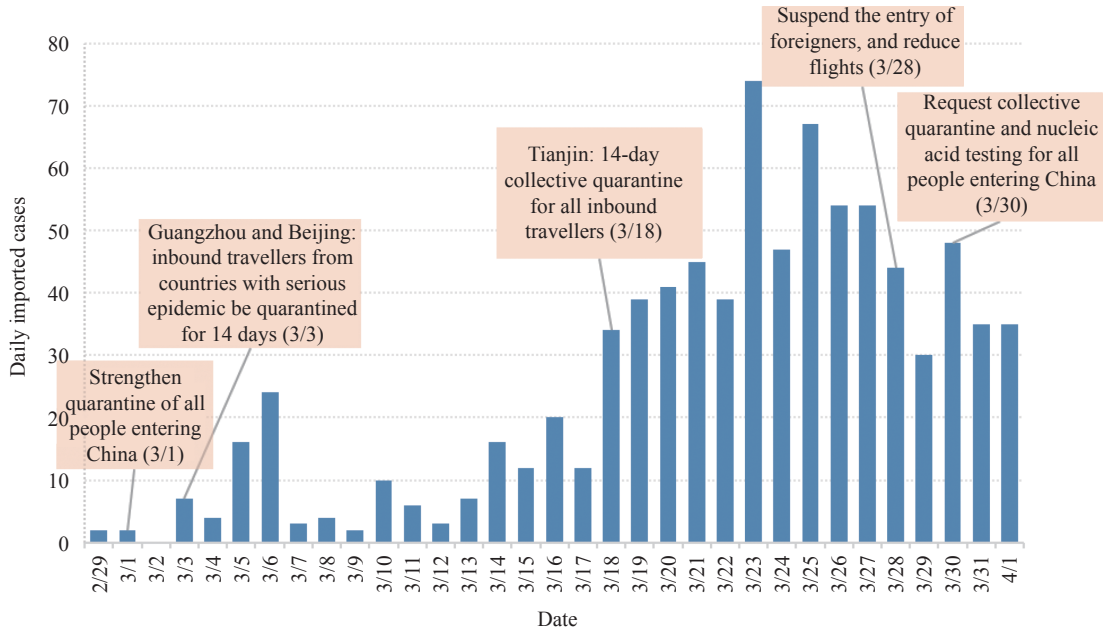

FIGURE 6. Trend of COVID-19 imported cases and related control measures of China, February 29 to April 1.

5 days. The situations in Europe showed slight variation, in which the UK and Turkey seem to maintain continually increasing trend, while many countries with large populations, such as Spain, Italy, Germany, the Netherlands, Belgium, and Norway appeared to reach a plateau. Italy even began revealing declines. Such situations may persist in next week.

This week, the Rt curves and values of the four climatic zones and the two hemispheres seem to slightly decline when compared with those of the previous week, but they still remained higher than one. This indicates that the transmissibility of COVID-19 regarding large continents or regions worldwide is still high. Although the case numbers in Africa rose significantly and more countries were affected in last few weeks, large portions of African countries are still at the stage of importing case. It is notable that three countries with large populations in the tropical zone, i.e., Brazil, India, and Indonesia reveal rapid increases in the past week, despite the absolute case numbers in India and Indonesia remaining small. Much more attention should be paid to the changes in those three countries as these may provide useful information for containment of COIVD-19 in Africa.

In this report, we have analyzed data of national laboratory testing and critical care beds, which are two important factors for control of COVID-19 pandemic, together with other epi-statistics. The total testing numbers worldwide increased remarkably in the last week, particularly in the developed countries, which is beneficial for timely identification of infected cases and implementation of control measures. However, the laboratory testing capacities in many developing counties are still insufficient and requires joint efforts from different international communities. Although the shortage of critical care beds in some severely affected European countries seems to be critical, the strong economic and technical capacities and human medical resources in European countries may rapidly expand their medical service capacities in order to fulfill this gap. We have also noticed that the most critical shortage of critical care beds seems not to involve the developing countries yet in this study. We believe that this is largely due to the lack of updated information. Review of the publications has already proposed a weakness in critical care beds in most African and Asian countries. Such a gap is almost impossible to be improved in a short time due to economic constraints and lack of human resources. Therefore, enhancing implementation of non-pharmaceutical containment interventions is more important in developing countries.

Our data here indicates that air travel restrictions and other corresponding comprehensive control measures started to show positive effects in the decline of imported cases in the past few days. However, we have to notice, on the other hand, that the transmission of COVID-19 abroad rapidly increased last week and will probably remain increasing in the next few weeks. As virus circulation and possibility of

infection increases, more and more overseas Chinese people, particularly those in European countries and the USA, might develop a strong desire to come back to China. Despite of the decreasing number of flights in next few weeks, the possibility of infected overseas passengers might still increase. Travel restrictions and related control measures still need to be held for a while.

Similar to our last report, the relevant data here was collected from the websites of governments, mainstream media, relevant professional websites, and published literature, which may affect the accuracy and real-time performance. The deviation of the prediction from the reality is probably inevitable.

Acknowledgements: The authors would like to thank Fu Gao, Zunyou Wu, Jiaqi Ma, Jingjing Xi, Jie Li, Xiang Ren, Qiulan Chen, and Wei Chen from China CDC and Yidu Cloud (Beijing) Technology Co. Ltd. for their contributions to the article.

[#] Corresponding authors: Xiaopeng Qi, qixp@chinacdc.cn; Xinhua Li, lixinhua@chinacdc.cn; Xiaoping Dong, dongxp@chinacdc.cn.

[1] Chinese Center for Disease Control and Prevention, Beijing, China.
[&] Joint first authors.

Submitted: April 05, 2020; Accepted: April 05, 2020

REFERENCES

1. WHO. COVID-19 Situation Report-72. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200401-sitrep-72-covid-19.pdf?sfvrsn=3dd8971b_2. [2020-04-1].
2. Pang MF, Liang ZR, Cheng ZD, Zhang J, Huang N, Guo L, et al. Weekly assessment of the COVID-19 pandemic and risk of importation - China, March 25, 2020. China CDC Weekly 2020; 2(14): 230-6. http://weekly.chinacdc.cn/en/article/ccdcw/2020/14/230.
3. Wikipedia. COVID-19 testing. https://en.wikipedia.org/wiki/COVID-19_testing?wprov=srpw1_0. [2020-04-03].
4. Remuzzi A, Remuzzi G. COVID-19 and Italy: what next? Lancet 2020. http://dx.doi.org/10.1016/S0140-6736(20)30627-9. [2020-03-13].
5. Murthy S, Leligdowicz A, Adhikari NKJ. Intensive care unit capacity in low-income countries: a systematic review. PLoS One 2015;10:e0116949. http://dx.doi.org/10.1371/journal.pone.0116949.
6. Phua J, Faruq MO, Kulkarni AP, Redjeki IS, Detleuxay K, Mendsaikhan N, et al. Critical care bed capacity in Asian countries and regions. Crit Care Med 2020. http://dx.doi.org/10.1097/CCM.0000000000004222. [2020-01-9].
7. Rhodes A, Ferdinande P, Flaatten H, Guidet B, Metnitz PG, Moreno RP. The variability of critical care bed numbers in Europe. Intensive Care Med 2012;38(10):1647 – 53. http://dx.doi.org/10.1007/s00134-012-2627-8.
8. Worldometers. COVID-19 coronavirus pandemic. https://www.worldometers.info/coronavirus/#countries. [2020-04-1].

The inauguration of *China CDC Weekly* is in part supported by Project for Enhancing International Impact of China STM Journals Category D (PIIJ2-D-04-(2018)) of China Association for Science and Technology (CAST).

CCDC weekly

Vol. 2 No. 15 Apr. 10, 2020

Responsible Authority
National Health Commission of the People's Republic of China

Sponsor
Chinese Center for Disease Control and Prevention

Editing and Publishing
China CDC Weekly Editorial Office
No.155 Changbai Road, Changping District, Beijing, China
Tel: 86-10-63150501, 63150701
Email: ccdcwjournal@163.com

CSSN
ISSN 2096-7071
CN 10-1629/R1