

Chinese pharmacists' rapid response to the COVID-19 outbreak

While the outbreak of coronavirus disease 2019 (COVID-19) has been well controlled in China,^{1,2} cases are being identified in a growing number of other locations internationally. It has been proved in China that the spread of the virus can be remarkably slowed and reversed through the implementation of social distancing policies, isolation and quarantine measures, and early detection and medical care of patients with confirmed infection with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).¹ Besides physicians and nurses, Chinese pharmacists have played an important role in fighting the epidemic. The responses and actions of Chinese pharmacists to control and prevent COVID-19 may be instructive for other countries.

In an epidemic it is crucial to protect the security of healthcare professionals and to ensure that medications are not contaminated in the pharmaceutical distribution and supply chain. From late January to early February 2020, pharmacists in Wuhan (the capital of Hubei province, where COVID-19 was first reported), Second Xiangya Hospital in Hunan province, and the Chinese Pharmaceutical Association published articles recommending COVID-19 prevention and control strategies for use by pharmacists and personnel of drug distribution companies. Under the guidance, pharmacists across China were well trained and quickly mastered the techniques of using personal protective equipment (PPE) and sterilizing work environments. Relieving mental stress was also an important part of training. To date, no pharmacist has been reported to have acquired a nosocomial infection with SARS-CoV-2.

In an epidemic, ensuring the supply of medications is probably the main work of pharmacists across the world. Chinese pharmacists quickly developed emergency plans, established drug formularies, and prepared antiviral drugs and sanitizing agents before the epidemic spread to their cities. While patients with confirmed COVID-19 were treated in designated hospitals, in nondesignated hospitals a tem-

porary outpatient pharmacy was set up to supply medications to patients with fever or suspected COVID-19 in order to reduce risks of cross infection. Multiple hospitals had already launched online pharmacy services for prescription handling and mailing, which particularly benefited patients with chronic diseases, and these services were crucial at the height of the COVID-19 epidemic in China. The hundreds of thousands of community pharmacies located across the country served as frontline healthcare facilities to provide the public with medications, masks, and hygiene products.³

When the outbreak had just begun, China's pharmacists rapidly compiled documents to introduce detailed information on therapeutic drugs for COVID-19 so that physicians could better master the characteristics and instructions for usage of the medications. The use of "Fangcang shelter hospitals"—a novel public health concept for quarantining and treating infected patients with mild symptoms—was first implemented in China and has now been adopted globally to tackle COVID-19.⁴ Chinese pharmacists in Fangcang hospitals developed novel approaches to introducing drug information, answering patients' questions, and relieving patients' anxiety through broadcast and telephone services and mobile phone apps. For critically ill patients with COVID-19, who often had comorbidities, renal and hepatic dysfunction, and/or bacterial infections, pharmacists actively participated in multidisciplinary teams and made drug therapy plans together with physicians. They carefully monitored adverse effects and drug-drug interactions. Evaluation of drug treatments for COVID-19 is also being conducted by many pharmacist experts.

In China there are approximately 400 million patients with chronic diseases who require long-term drug therapy and medical support. During the epidemic, pharmacists conducted online clinics or used Internet tools to support these patients. For instance, we managed 500 patients on warfarin therapy via a mobile phone app, including pro-

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viding recommendations on warfarin dose adjustment. Through writing articles and making videos, pharmacists also actively disseminated accurate information about the epidemic and related drug therapy and educated the public about personal and environmental hygiene and the importance of wearing a surgical mask; these activities were very helpful in alleviating public panic and stopping the spread of rumors.

The major work of most pharmacists at the peak of the epidemic was distributing and maintaining drug supplies. If pharmacists had participated in the development of guidelines for treating COVID-19, detailed information about drug-drug interactions and adverse drug reactions would have been addressed. In addition, therapeutic drug monitoring (TDM) methods were very useful in managing critically ill patients receiving drugs with narrow therapeutic windows.⁵ Only a few biosafety level 2 laboratories conducted TDM for patients with COVID-19, as most TDM laboratories in China are biosafety level 1 facilities.

During the epidemic Chinese pharmacists have made great contributions to the control and prevention of COVID-19. They have played a key role in maintaining a stable supply of medications and disinfection products, pharmacotherapy management of patients, and disseminating medical knowledge to the public.

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1. Chen S, Yang J, Yang W, et al. COVID-19 control in China during mass population movements at New Year. *Lancet*. 2020;395(10226):764-766.
 2. Kraemer MUG, Yang CH, Gutierrez B, et al. The effect of human mobility and control measures on the COVID-19 epidemic in

China [published online ahead of print March 25, 2020]. *Science*. 2020;pii:eabb4218.

3. Ung COL. Community pharmacist in public health emergencies: quick to action against the coronavirus 2019-nCoV outbreak. *Res Soc Adm Pharm*. 2020;16(4):583-586.
4. Chen S, Zhang Z, Yang J et al. Fangcang shelter hospitals: a novel concept for responding to public health emergencies [published online April 2, 2020]. *Lancet*. 2020;pii:S0140-6736(20)30744-3. doi.10.1016/S0140-6736(20)30744-3.
5. Seger C, Tentschert K, Stoggl W et al. A rapid HPLC-MS/MS method for the simultaneous quantification of cyclosporine A, tacrolimus, sirolimus and everolimus in human blood samples. *Nat Protoc*. 2009;4(4):526-534.

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