

## Strengthening population medicine to promote public health

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As we enter 2022, we are faced with the fact that coronavirus disease 2019 (COVID-19) has been devastating the world for more than 2 full years. Since the original outbreak of COVID-19 in December 2019, the disease has proved to be a major threat to global health and, perhaps more importantly, one that is not likely to be resolved soon. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus that causes COVID-19, is easily transmissible and highly contagious.<sup>[1,2]</sup> When the virus first entered the human body and subsequently spread among people, an important biological phenomenon occurred—adaptation to a new host. SARS-CoV-2 has undergone frequent mutations, producing multiple variants of consequence to human health.<sup>[3]</sup> Rapidly emerging variants such as Omicron have shown strong immune evasiveness. Coupled with the substantial amount of global travel nowadays, ongoing variant emergence makes COVID-19 extremely difficult to contain and even more difficult to eliminate or eradicate. Furthermore, COVID-19 poses a major threat to the global economy.<sup>[4]</sup> Needless to say, there is a high degree of uncertainty associated with COVID-19 and the future.<sup>[5,6]</sup>

Despite these ongoing risks and uncertainties, measures can be taken to keep COVID-19 in check. Curbing the pandemic requires not only biomedical interventions, but also strategies that involve all aspects of society and span a variety of policy arenas, including public health, economics, and social support services. Studies have found non-pharmaceutical interventions that may substantially reduce the virus's transmission rate and avert millions

of deaths across China, the USA, and Europe.<sup>[7-9]</sup> For example, social distancing measures, such as “outbreak-control holidays,” can prevent new infections.<sup>[10,11]</sup> Innovative public health concepts such as Fangcang shelter hospitals (large, temporary hospitals built by converting public venues into healthcare facilities to isolate patients with mild to moderate symptoms of an infectious disease from their families and communities, while providing medical care, disease monitoring, food, shelter, and social activities) can also make a major contribution to bringing COVID-19 under control.<sup>[12]</sup> Successful implementation of Fangcang shelter hospitals requires many supportive social and economic strategies, such as strong communication and public engagement, an efficient governance structure, and financial support. Health workers must closely collaborate with other sectors to ensure that all these components converge.<sup>[12]</sup>

Notwithstanding these examples of successful public health interventions during the pandemic, for decades the medical community has paid insufficient attention to population health and social and economic strategies.<sup>[13,14]</sup> These insufficiencies can be demonstrated by the privileging of curative measures over other elements of the care continuum; overreliance on biomedical measures relative to biomedical, psychological, social, and environmental measures; and lack of coordination and collaboration with relevant individuals in other sectors.<sup>[15,16]</sup> Insufficiencies exist not only in infectious disease control, but also in chronic disease management. For instance, while rates of chronic diseases have skyrocketed in recent decades, clinicians have paid little attention to effective population-based interventions that address large unmet need for healthcare and could yield significant improve-

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ments in chronic disease outcomes.<sup>[17,18]</sup> These shortcomings with respect to the management of both infectious and chronic diseases have impeded efforts to maximize long-run population health and promote health equity. To better prepare for future global health challenges, the medical community should embrace and practice a new discipline that addresses all of these insufficiencies—population medicine.

Population medicine is an evolving concept that presently can be defined as a progressive medical discipline that aims to maximize long-term population health and advance health equity by mobilizing accessible resources. Population medicine can achieve these aims by providing comprehensive care that encompasses health promotion, disease prevention, diagnosis, control, treatment, and rehabilitation; by integrating and applying knowledge, academic principles, and technologies of modern medicine and related disciplines; by coordinating individual health behaviors and collective health actions; and by serving as the medical foundation of public health practices. Population medicine shifts the conventional focus of clinical medicine away from individual health and toward population health, and it is characterized by multidisciplinary efforts to address the biomedical, psychological, social and environmental determinants of health and, hence, achieve long-term population health.

The core values of population medicine can be summarized by five ongoing transitions from traditional medical practice to population medical practice. The first transition is from individual health to population health. Population medicine encourages medical workers to shift their practices from focusing on the health of the individual patients who enter their examination rooms to the health of the whole communities which they serve. The second transition is from treatment to comprehensive care. In traditional medical practice, clinicians are expected to focus only on diagnosing and treating the conditions already afflicting their patients, leaving public health professionals to focus on health promotion, disease prevention and control. In contrast, population medicine emphasizes the comprehensive coordination of health promotion, disease prevention, diagnosis, control, treatment, and rehabilitation across all health workers and throughout the entire care cascade. The third transition is from the biomedical model of medical practice to a biopsychosocial-environmental model of medical practice. Population medicine facilitates collaboration between the health sector and other sectors—such as government agencies, public institutions, and private businesses—in the design and implementation of interventions that comprehensively account for relevant biomedical, psychological, social, and environmental factors. The fourth transition is from providing short-term cures to improving long-term health. Population medicine encourages clinicians to reflect on whether their practices are beneficial for the long-term health of humankind and thus avoid short-sighted interventions that may cause long-term harm (e.g., overprescribing antibiotics). Note that long-term health refers to both the progression of individual health throughout the lifecycle and the progression of population health over multiple generations. The fifth transition is

from maintaining medicine's disciplinary silo within the field of natural science to creating linkages across the natural sciences, social sciences, and humanities. Population medicine integrates multiple disciplines to achieve innovative solutions addressing a wide range of factors that may affect health. Disciplines relevant to the field of population medicine include economics, politics, sociology, anthropology, and engineering, among others.

In the past, traditional medical practices have been restricted and narrowly focused. However, as global health challenges grow exponentially, it is time to integrate population medicine into the existing health system. While it is tragic that a rampaging pandemic was required to shed light on the importance of population medicine and public health, the reality of this tragedy provides even more reasons why we cannot continue neglecting these fields. The impact of population medicine and public health is invisible until it is not. We must now do our best to prevent the present visibility of these fields from once again receding, leaving us blind to their importance until it is too late.

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### Conflicts of interest

None.

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