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Core functions, knowledge bases and essential services: A proposed prescription for the evolution of the preventive medicine specialty

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ABSTRACT

The pandemonium from the 2020 pandemic calls for a greater emphasis on prevention, public health and population health. Yet the role of preventive medicine specialists, ideally qualified to lead this charge, remains difficult to situate within the houses of medicine and public health. To overcome this challenge to its identity and evolve to better tackle novel and on-going public health and population health problems, the authors propose that the specialty of preventive medicine should assert 3 core functions within preventive care; expand and modernize its knowledge base; and enhance its residency training accordingly. The authors also propose 10 essential services, not otherwise systematically provided by other specialties, that the preventive medicine specialty can optimally fulfill as its unique contributions within medicine and public health.

1. Prevention, health and the preventive medicine specialty

It is the authors' view that the pandemonium created by the 2020 pandemic was a call for medicine and public health to prioritize prevention and health over treatment and disease. Medical schools and healthcare institutions aim to improve human health (Ramsey and Miller, 2009), yet medicine is neither health- nor population-centric despite longstanding calls to adapt (Jonas, 1982). Primary, secondary and tertiary prevention are all grounded in the pathogenic viewpoint, i. e. the prevention of risk factors, diseases, disabilities and deaths, respectively (Gordon Jr, 1983). Prevention denotes the avoidance of disease or disability, but only connotes the pursuit of health and well-being. Health still lacks a formal accepted definition that fully excludes the term disease (World Health Organization, 2020) and a clear scientific understanding of its nature; yet it is the mantra of many stakeholders (ex. health coaches, public health practitioners) and socio-professional movements (ex. population health, health and wellness). Existing public health and healthcare system approaches, even in developed nations, fail to mitigate much less contain pandemics or address ongoing population health crises. Although politics, economics and policies have long undervalued and underfunded public health and

population health, this lack of a cohesive approach to health promotion and health protection is rooted in medicine and public health's disease-centric *modus operandi* (Jadotte et al., 2019).

A unified specialty area of Public Health and General Preventive Medicine, herein referred to as Preventive Medicine or PM, ought to lead medicine and public health to adopt more health-centric approaches. Unfortunately, the continued self-segregation of PM specialists based on their designation as public health, population health, or health and wellness physicians (Jadotte et al., 2019) diminishes intuitive recognition of the specialty by other physicians, public health professionals and the public, further perpetuating the specialty's perceived identity problem (Jung and Lushniak, 2017). The specialty's perceived equivalence problem, thought to chiefly reside in the lack of distinctiveness in the structure and content of its residency training relative to other specialties (Jung and Lushniak, 2020), further sows confusion. To overcome these challenges and help PM specialists emerge as recognizable leaders of the science of health in medicine and public health, the authors propose that the specialty should assert 3 core functions within preventive care, expand and modernize its knowledge base, and enhance residency training accordingly. The authors also propose 10 essential services, not systematically provided by other specialties, that

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Specialty Features	Preventive Medicine		All Other Medical Specialties	
Worldview or Paradigm	Salutogenesis as a Theory of Health		Pathogenesis as a Theory of Disease	
Fields of Knowledge	Public Health	General Preventive Medicine	Curative & Restorative Medicine	
Tools	Health Promotion ^a	Health Protection ^b	Disease Prevention	Disease Treatment
Target Levels	Macro (Societal)	Meso (Large & Small Groups)	Micro (Individual)	
Levels of Prevention	Quaternary Prevention ^c	Primary Prevention	Secondary Prevention	Tertiary Prevention
Health System Practice Settings	Public Health Systems	Healthcare Systems ^d	Clinical Care Systems ^e	
Continuum of Care and Core Functions of PM in Preventive Care	Community Medicine ^f	Preventive Care	Primary Care	Secondary & Tertiary (Specialty) Care
Principal Physician Designations	Public Health Physician, Community Medicine Physician, Global Health Physician	Population Health Physician, Healthcare System or Health Services Medical Researcher or Administrator/Manager, Medical or Clinical Epidemiologist	Population Medicine ^g	Clinical Preventive Medicine
			Health & Wellness Physician, Lifestyle Medicine Physician, General Preventive Medicine Physician, Occupational Medicine Physician, Primary Care Physician	Primary Care Physician (Family Medicine Physician, General Internist, General Pediatrician)
			Obstetrician/Gynecologist, Emergency Medicine Physician	General Surgeon, Radiation Oncologist, Dermatologist, Neurologist, Anesthesiologist, Pathologist, Rheumatologist, Cardiologist, Immunologist, Hospitalist, Urologist

Definitions of Key Terms

a. **Health promotion:** the process of enabling people to increase control over their health and improve it, involving the population as a whole in the context of their everyday lives rather than focusing on people at risk for specific diseases and is directed toward action on the determinants or causes of health.⁹

b. **Health protection:** the interventions that are needed when health-promoting changes in the environment, workplaces, and health-related behaviors are not fully effective, thus necessitating methods of specific protection against a disease or type of injury.¹⁵

c. **Quaternary prevention:** the actions taken to identify patients or populations at risk of over-medicalization, protect them from invasive medical interventions, and provide ethically acceptable care procedures, thought to be equivalent to health promotion.⁵

d. **Healthcare systems:** the meso-level interventions that fall outside of traditional medical practice (e.g., quality improvement and patient safety initiatives, team-based care)⁵ and may be thought of as indirect patient care.

e. **Clinical care systems:** the clinician-driven micro-level interventions (e.g., medications, surgeries, screenings)⁵ that are also known as direct patient care.

f. **Community medicine:** an interdisciplinary field that aims at dealing integrally with the preservation and restitution of health, as well to prevent disease, not only at an individual level but also in groups of defined communities, taking into consideration health and social determinants; a main goal is to identify health problems and needs, and to evaluate the extent to which clinical and public health services meet such needs.⁹

g. **Population medicine:** the epidemiologic approach to the management of clinical services.¹⁰

Fig. 1. Conceptual map of the continuum of care, core functions, levels of prevention, and proposed fields of knowledge and worldviews of PM, compared with other medical specialties. The proposed expansions and enhancements for the PM specialty's evolution are highlighted.

the PM specialty, thus evolved, would optimally fulfill in medicine, public health and society.

2. Three proposed core functions for preventive medicine within preventive care

Core functions serve as an articulation or operationalization of the mission of a profession or specialty, particularly when this mission is unclear to the general public, relevant organizations or members of the profession or specialty itself (Public Health National Center for Innovations, 2020). Preventive Medicine still needs to clearly situate itself within the houses of medicine and public health to facilitate simple recognition of who PM specialists are and what they do. The 2020 pandemic provides an opportunity and mandate to address this need. Preventive medicine physicians are experts in preventive care, as compared to primary, secondary and tertiary care. Using this known continuum of care, PM should highlight its unique qualifications to perform 3 proposed core functions that the authors believe cover the spectrum of practice of PM specialists: community medicine (Porta, 2014), population medicine (Gray and Ricciardi, 2010), and clinical preventive medicine (CPM) (Jadotte et al., 2019).

Community medicine, which entails the preservation and restitution of health for persons and social groups within geo-politically designated communities (Porta, 2014), could convey the core function of PM specialists within public health systems (i.e. macro-level preventive care such as health policies, laws and regulations). Population medicine, a term for the epidemiologic approach to the management of clinical services (Gray and Ricciardi, 2010), could designate the indirect patient care core function of PM specialists within healthcare systems (i.e. meso-level preventive care such as quality improvement and patient safety interventions). Clinical preventive medicine, which consists of direct patient care, could denote the core function of PM specialists in clinical care (i.e. micro-level preventive care such as clinical preventive services and lifestyle medicine interventions), and may be provided both within

and outside the bounds of a given public health or healthcare system or practice setting.

Fig. 1 maps and defines these 3 proposed core functions of PM relative to the full continuum of care, the levels of prevention, and the known fields of knowledge in medicine and public health. It also situates PM physicians and the various names they are known by relative to physicians in other specialties and their general positions along the continuum of care. Residency training in health promotion, health protection and disease prevention provides mastery of both public health and general preventive medicine as foundational fields of knowledge, and practical expertise implementing multilevel interventions across most levels of prevention. PM specialists are therefore uniquely prepared to perform the 3 proposed core functions within preventive care. Although primary care specialties clearly do some preventive care, PM possesses a multi-systems perspective that is otherwise woefully lacking in preventive care and is ideally suited to the task of integrating primary care and public health (Institute of Medicine, 2012). Emergency preparedness failures in healthcare and public health systems during the COVID-19 pandemic confirm this lack of integration.

3. Proposed modernization of preventive medicine’s knowledge base

Aside from mastery of actionable core functions, the possession of a unique knowledge base also distinguishes a specialty. In addition to general preventive medicine and public health as foundational fields of knowledge shared with other specialties and professions, PM should achieve expertise in salutogenesis (Mittelmark et al., 2017), evolutionary sciences (Stearns, 2012), human ecology (Bubolz and Sontag, 2009), lifestyle medicine, integrative medicine (Katz and Ali, 2009), and advanced research methodologies. This would build upon the PM specialist’s knowledge of biostatistics, epidemiology, social and behavioral sciences, health services administration and environmental health sciences, to further distinguish PM from other medical specialties. Table 1

Table 1
Proposed fields of knowledge to adopt for the evolution of the PM specialty.

Primary area of contribution	Expanded fields of knowledge	Key components relevant to the PM specialty	Examples of practical applications for the PM specialty
Theory	Salutogenesis	Principles; theories; models; variables & interventions	Improved definitions of health & health promotion; reinterpretation of health data in light of salutogenic approach; collection of novel data to inform health & salutary approaches vs. disease & risk-based approaches; generation of new testable hypotheses
	Evolutionary sciences	Evolutionary psychology, sociology, anthropology, pharmacology, pathology & physiology	Improved understanding of facilitators, barriers and resistance to health behavior change, & genetic inheritance & epigenetic manifestation of diseases; explanatory framework for the emergence of chronic & infectious diseases
	Human ecology	Social & environmental factors (i.e. upstream or root causes) impacting human health and society	Combined impact of social & environmental determinants on population health, migration, urbanization, gentrification, residential segregation, economic mobility, & wealth creation; explanatory framework for the distribution of chronic and infectious diseases; “one health” & ecosystems interventions
Practice	Lifestyle medicine	Nutrition; physical activity; sleep; emotional wellness (ex. positive psychology); risk factor avoidance (ex. smoking cessation & substance use reduction) & social connectedness	Health & wellness clinical guidance in the absence or presence of disease; motivational interviewing, brief action planning & other behavior change approaches for health & wellness; physician modeling of & advocacy for health promoting & health protective approaches for patients, the public & communities
	Integrative medicine	Drug/herb interactions; interprofessional collaboration; evidence-based integrative medicine therapies (EBIM)	Applications of herbs & other EBIM therapies for health & disease; coordination of integrative medicine teams; assessment of the effectiveness of integrative medicine interventions; medical oversight of EBIM therapies
	Advanced research methodologies	Social network analysis; hot-spotting; systematic review & meta-analysis; digital health & “big data”; multi-level/complex research designs and analytic methods	Infectious disease “real-time” tracking using digital health data; geospatial analysis of non-communicable & communicable disease clusters; synthesis of data across multiple studies for a variety of types of evidence (ex. quantitative, qualitative, & economic); precision-based individual & population interventions; cluster-randomized trials and stepped-wedge designs (ex. to evaluate interventions applied to communities, hospitals, and medical practices)

details the essence of these proposed knowledge expansions and their relevance to PM's capacity to perform the 3 proposed core functions, including their primary area of contribution to the specialty (i.e. theory or practice), their core components and topical examples of their applications in PM.

Salutogenesis, a health-centric worldview complementary to pathogenesis and foundational for health promotion and protection, continues to inform novel population and public health approaches (Mittelmark et al., 2017). The rapid increase in the annual rate and number of citations in PubMed indexed under the MESH term "salutogenesis", from January 1, 1975 to December 31, 2019 ($n = 2868$), suggests an increasingly wide appeal of this paradigm in medicine and public health. Yet salutogenesis remains absent from the knowledge base of PM, its natural home in medicine and public health. Similarly, the evolutionary sciences (Stearns, 2012) and human ecology (Bubolz and Sontag, 2009) explain, respectively, the emergence and population distribution of nearly all health and disease phenomena (Boaz, 2002), and therefore should inform PM's knowledge base. Expertise in lifestyle medicine and its natural complement of evidence-based integrative medicine, previously recommended for PM (Katz and Ali, 2009), could further distinguish PM from other specialties, yet lifestyle medicine is not systematically taught in all PM residency programs. The authors recommend an expansion of the specialty's research agenda to further develop the evidence base and support training in these fields. This would require a renewed covenant between the specialty, medical schools, universities, national and other funding agencies that is cognizant of the need to fund health-centric research that best aligns with health-centric aims (National Institutes of Health, 2020).

4. Proposed enhancements to preventive medicine residency training

Training should be geared towards building expertise in the application of this expanded, modernized knowledge base to the 3 proposed core functions of PM. This would require enhancing the competency of faculty in those fields of knowledge, optimizing rotations for residents to hone their skills in those 3 core functions, and establishing a resident and faculty "community of practice". The latter may be achieved within each residency program or as shared learning spaces across programs. The CDC as the parent public health agency in the United States, and other public health departments, should assist PM residency programs in building stronger public health expertise among their residents, particularly considering the dire need for public health-trained physicians during times of pandemics and other ongoing population health crises. Residency programs should implement population health rounds, akin to medical rounds in other specialties, where residents would regularly demonstrate their expertise in applying population health tools to practical problems within their affiliated healthcare systems, which may incite the creation of recognizable and valued population health consult services run by PM specialists. The American College of Preventive Medicine and CDC Zika rotation, and the United States Preventive Services Task Force (USPSTF) rotation sponsored by the Association for Prevention Teaching and Research and the Agency for Healthcare Research and Quality are prototypical opportunities that should be available annually to all PM residents nationally to facilitate advanced-level training in the expanded knowledge areas. Pre-planned projects implemented through distance learning would increase the feasibility of such expansions.

For example, systematic review and meta-analysis methodologies are taught at the USPSTF rotation. Advanced-level public health rotations, such as those available at the CDC, could allow PM residents to apply knowledge of infectious or chronic disease emergence (drawing from evolutionary science) and distribution (drawing from human ecology) to explain and address disparate patterns of population disease spread. The COVID-19 pandemic's skewed population impact could largely have been predicted by the joint application of evolutionary science (i.e. the

origins of the SARS coronaviruses and other pandemic viruses) and human ecology (i.e. the social and environmental factors that perpetuate observed prevalence and mortality disparities). Similarly, robust quality improvement, clinical epidemiology, communicable disease control and surveillance, and public health field deployment opportunities should be developed and expanded locally, regionally and nationally, and supported by residency funding agencies and healthcare systems. This would sustain a pipeline of highly qualified PM specialists to further increase national capacity to meet local or regional needs, providing adequate coverage to systematically tackle population and public health issues everywhere. In the realm of direct patient care, many PM residency programs have implemented lifestyle medicine clinics or consult services, while others have trained residents to deliver clinical preventive services via telehealth. To achieve widespread expertise in this realm, such rotations should be replicated, scaled up and adopted by all PM programs nationally.

5. Ten proposed essential services for the preventive medicine specialty

Essential services are practical functions performed by a specialty/profession in response to societal needs (Harrell and Baker, 1994). Achievement of an essential service reflects complex interactions between training competencies and contextual factors (ex. technology, organizational culture, and community characteristics) (Mayer, 2003). Although the PM specialty's residency training competencies are partly informed by the essential public health services (Jung and Lushniak, 2017), the authors recommend the development of essential services specific to PM. With expanded expertise in the elements proposed in this paper, the authors believe that PM specialists would optimally perform 10 proposed essential services within the 3 identified core functions, as illustrated in Fig. 2.

Within public health systems, where the PM specialist would perform the community medicine core function, PM specialists would evolve into the new "John Snows" of medicine and public health (Johnson, 2006), ready to deploy to and innovate in disaster or high disparity locales and areas with outbreaks of diseases related to infectious pathogens or environmental factors. The specialty would help public health agencies optimize their mission of health promotion and health protection (Centers for Disease Control and Prevention, 2020; The 10 Essential Public Health Services), the two central elements of salutogenesis. Public health and healthcare systems might then finally move beyond just risk factors to also systematically address salutary factors (ex. understanding, measuring and adapting natural environments to promote and protect social, mental and physical well-being; community health assessment and improvement initiatives). In addition, PM specialists would assure the primacy of a health-in-all-policies approach (Porta, 2014) while providing the physician perspective for and oversight over all public health interventions. They would also (continue to) provide clinical preventive services, when needed, in the public health context (ex. directly observed therapy for TB).

Within healthcare systems, where the PM specialist would perform the population medicine core function, PM specialists would be credentialed and privileged to provide clinical epidemiology and medical quality improvement services, including expert guidance on patient panel management, thereby freeing up other physicians to do additional direct patient care. They would develop, implement and innovate in the healthcare system's emergency preparedness plans to assure that business and financial decisions are counterbalanced by medical and public health evidence as guidelines and best practices change. They would also provide direct patient care, when desired, as a specialty service for lifestyle medicine, clinical preventive services, and evidence-based integrative medicine (ex. acute and chronic inpatient or outpatient care) in certain employment settings to be able to sustain their clinical practice productivity and meet their expected relative value units and volume-driven reimbursements (Kentros and Barbato, 2013). This

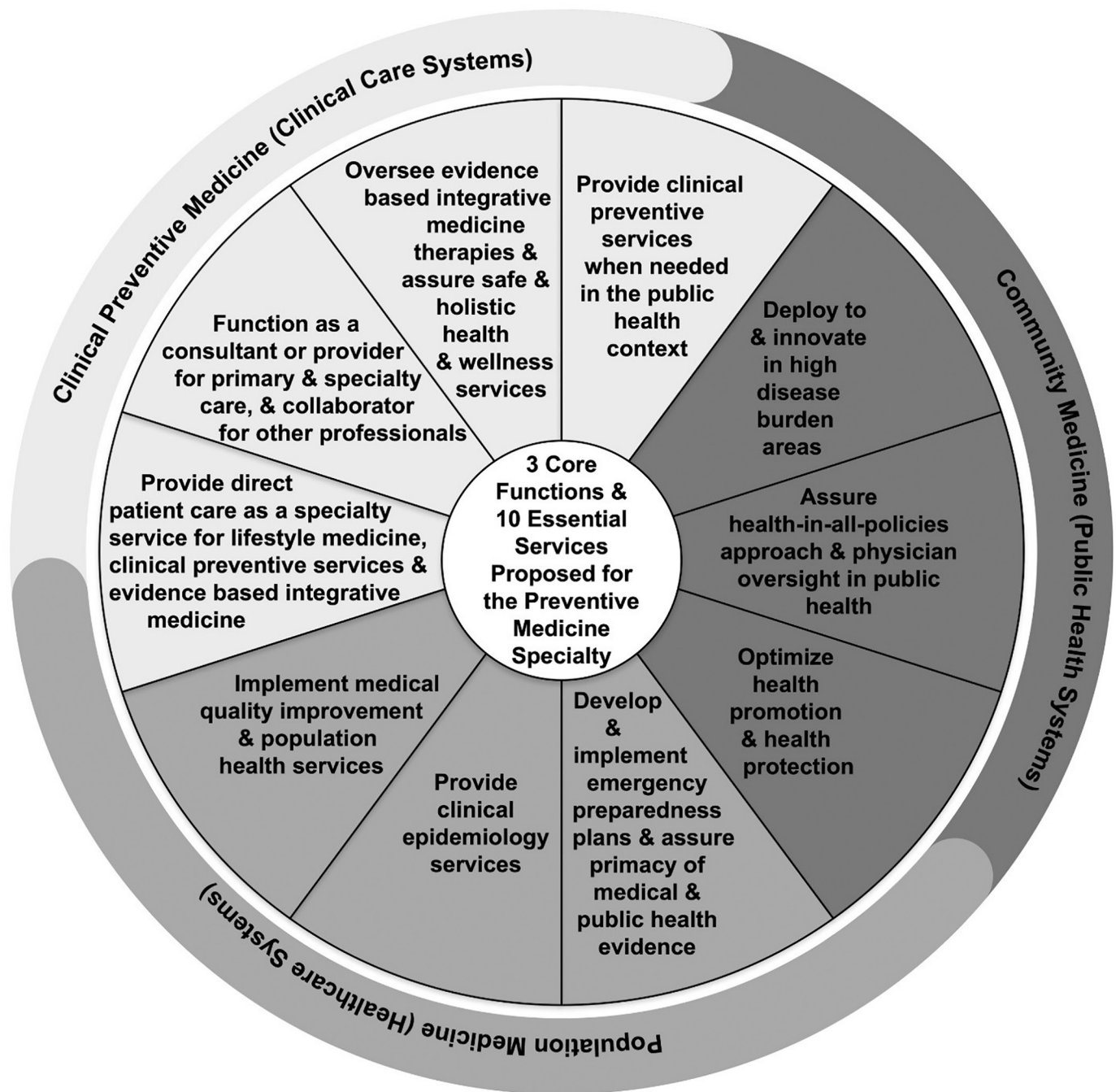


Fig. 2. The 3 core functions and 10 essential services proposed for the PM specialty.

would help eliminate common misconceptions about PM doctors and practicing medicine (Jung and Lushniak, 2018).

Among PM specialists with clinical practices, the essential services tied to the clinical preventive medicine core function would take place via lifestyle medicine, clinical preventive services, and evidence-based integrative medicine. In addition to the preventive patient care services already mentioned, PM specialists would become sought-after consultants to primary and specialty care providers, and collaborators for integrative medicine (Katz and Ali, 2009) and other health professionals. They would oversee evidence-based integrative medicine therapies to facilitate safe and holistic health and wellness services, a critical role in the context of novel, painful, incurable or terminal illnesses, when people eagerly seek integrative medicine therapies without a definitive source of sound medical guidance. They would also serve as

consultants for clinical preventive services and lifestyle medicine within primary care or multi-specialty practices where such expertise is desired. This is crucial to patient safety as other physicians without population or public health training increasingly try to address the social determinants of health, a service that PM specialists are optimally trained to perform.

6. Conclusion

By taking these proposed prescriptions, PM should no longer be searching for a cure to its perennial purported identity and equivalence problems. Although many of the proposed ideas are new to the specialty and need to be further evaluated and validated prior to their adoption by the specialty, the authors believe that PM should evolve as prescribed to

become a more distinct and recognizable specialty, if it is to lead population health and public health efforts. The authors propose that PM specialists boldly expand their fields of knowledge, embrace their 3 core functions in preventive care, and be prepared to optimally deliver 10 essential services as their unique contributions to medicine, public health and society.

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Declaration of Competing Interest

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