Cardiovascular-Kidney-Metabolic healthcare framework: Perspective from Hong Kong

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The term "Cardiovascular-Kidney-Metabolic (CKM) syndrome" has emerged over the past few years to underscore the close and interactive relationship between diabetes mellitus, dyslipidemia, excess adiposity, hypertension, cardiovascular complications, and chronic kidney disease (CKD).[1] It is defined and classified into five stages, ranging from the absence of CKM risk factors (Stage 0) to the establishment of clinical cardiovascular disease (CVD) (Stage 4), which highlights the progressive nature of its pathophysiology and the need for early identification for timely management to prevent the progression of CKM syndrome.[1] These CKM conditions often coexist in the same patient, and each exerts a negative impact on the progression of the other conditions, resulting in worsening of a patient's clinical outcome. The prevalence of patients with CKM abnormalities is rapidly increasing globally, especially in Southeast Asia region, and projected to continue to increase through 2046.[2] In addition to the morbidity, mortality, and suffering imparted on patients and their families, CKM diseases present an escalating healthcare burden to society.

A CKM health framework has therefore been proposed by a presidential advisory of the American Heart Association, which consists of experts in all of the CKM domains, through extensive evidence-based discussions.[1] This framework encompasses not only screening of CKM risk factors and staging, but also clinical management strategies including lifestyle modifications, patient education, as well as the use of cardio- and/or reno-protective medications, including, but not limited to, renin-angiotensin-aldosterone system (RAAS) blockers, sodium glucose co-transporter 2 inhibitors (SGLT2i), glucagon-like peptide 1 receptor agonists (GLP1-RA), non-steroidal mineralocorticoid receptor antagonists (nsMRA), lipid-lowering agents, etc.[1] Central to the framework is the recognition and early identification of CKM risk factors, with the goal of delivering timely interventions that reduce end-organ damage and prevent complications, morbidity, and mortality.[1] The framework also advocates for a global, equitable approach to CKM health by enhancing education and awareness of the syndrome, supporting interdisciplinary CKM care models, improving obesity management, and ensuring equitable access to essential pharmacotherapies. Although a harmonized CKM healthcare model appears ideal, its establishment and implementation can be complex and fraught with challenges and barriers, in view of its cross-specialty nature and involvement of multiple healthcare delivery systems spanning specialist care, primary care, and community healthcare support and education systems. It is unlikely that one model would be able to suit all healthcare systems, given their distinct funding models and other characteristics.

Against this background, the Hong Kong College of Physicians (HKCP) has recently published a *Position Statement on CKM health framework*.[3] HKCP is the professional body overseeing the training and accreditation, and the professional standard, of specialists across all subspecialties and disciplines under Internal Medicine. The HKCP membership includes all physicians at the specialist level, and also physician trainees, in Hong Kong (China). The vast volume of healthcare demand and the wide-ranging scope make Internal Medicine, and the many Medical Subspecialties under its umbrella, an essential anchor and fundamental component in all healthcare systems. Specialty Boards for all internal medicine subspecialties

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are under the purview of the Education & Accreditation Committee of HKCP. Leadership at the College and its committees includes professional leaders in both the public and private sectors. Drafting of the *Position Statement on CKM health framework* involved the Specialty Boards in Cardiology, Nephrology, Endocrinology, Diabetes & Metabolism, and the College leadership. It aims to provide an overarching perspective on the issue of CKM health, and present the College's views on approaches to optimize the CKM healthcare framework that is fit-for-purpose and applicable in Hong Kong. While under the "One country, two systems" constitutional principle, the healthcare system in Hong Kong is very different from that of the Chinese mainland, and the healthcare systems of both areas are constantly evolving in response to changing healthcare needs. Therefore, we feel that sharing the College's views on this important issue, and discussing the challenges faced by healthcare professionals in Hong Kong, would stimulate interest and dialogue from colleagues and stakeholders across the country, which would be conducive toward promoting awareness and advances in CKM healthcare framework at large.

In Hong Kong, where more than a fifth of the population is aged ≥65 years, a recent territory-wide Population Health Survey 2020–2022 reported that approximately 40% of local individuals were unaware of their overweight or obesity status. Moreover, undiagnosed cases of high blood pressure, type 2 diabetes (T2D), and suboptimal lipid profile were identified in 12.1%, 3.1%, and 25.3% of the population, respectively. Diabetes and hypertension are primary causes of end-stage kidney disease in more than 60% of patients undergoing kidney replacement therapy, while CVD and stroke remain the leading causes of their mortality.[3] These findings highlight the inter-connections of CKM conditions that are closely linked to increased morbidity and mortality, and also the knowledge gap in affected individuals in the community, as well as the healthcare service gap in the detection and timely management of patients, which demands collaborative efforts by all stakeholders. Similarly, in Chinese mainland, a recent report from cohort studies showed a high prevalence of CKM syndrome at 80–90%.[4] Excess adiposity, with adipose tissue dysfunction, is considered a root cause of adverse CKM outcomes.[1] While aging is associated with the development of hypertension, dyslipidaemia, T2D, and CKD, a recent study from China found that early adulthood was a crucial period for determining the future risk of developing CVD, highlighting the importance of early weight management in young adults.[5] Obesity in early adulthood, as measured by the body mass index (BMI) at the age of 25, was monotonically associated with increased risks of incident CVD. Importantly, this association was not influenced by subsequent midlife healthy lifestyle factors, highlighting the importance of early weight management in young adults.[5] This appears challenging, as nationwide data from the China Chronic Disease and Risk Factors Surveillance Program demonstrated that the prevalence of obesity in young adults has tripled from 2007 to 2018.[6] Gender gap, regional disparity between urban and rural areas, and insufficient awareness present additional barriers. Notably, half of Chinese men in 2018 were chronic smokers.[7] The awareness of CKD in China is similarly concerning. In a study based on the China Renal Data System, 70% of individuals with stage 3 CKD were unaware of their kidney disease, and many were undiagnosed and without treatment.[8]

As pointed out earlier, while the healthcare system in Chinese mainland is different from that of Hong Kong, both are constantly evolving in response to the changes in healthcare needs. Chinese mainland has established a medical insurance system that provides near-universal coverage of the population, whereas Hong Kong uses a dual-track model with complementary public and private sectors. The Hospital Authority of Hong Kong serves as the principal statutory body that provides heavily subsidized public healthcare services, through its 43 public hospitals and institutions, 49 specialist outpatient clinics (SOPC), and 74 general outpatient clinics (GOPC). It is responsible for approximately 60% of primary care and over 90% of secondary and tertiary care in Hong Kong, with an established referral system between primary and secondary/tertiary care. In other words, while most patients with advanced CKM syndrome stages 3–4 are managed by specialists at healthcare institutes in the public sector, those with early CKM syndrome stages 1–2, including individuals with obesity, prediabetes, hypertension, dyslipidaemia, T2D, and mild-to-moderate CKD may go undiagnosed in the community, or managed in the absence of a structured or protocolised care system in the private or public sector. In Hong Kong and Chinese mainland, it was not until recently that both healthcare systems started to shift more focus from a treatment-oriented institution-centric secondary/tertiary healthcare to prevention-oriented primary healthcare. The Healthy China 2030 Initiative, released by the Chinese State Council in 2019, is a significant step toward better CKM health in the country.[9] The Initiative highlights the importance of prevention, and includes 15 major goals with some specifically targeting components in the CKM syndrome, such as diet and obesity, preventing diabetes mellitus, anti-smoking, and the prevention of cardiovascular and cerebrovascular diseases.[9] In this regard, continuous and additive efforts, which might need to be channelled through legislative or public health frameworks, may be required to achieve targets in healthcare improvement programs.

In the *HKCP Position Statement on CKM health framework*, we highlighted the importance of primary care doctors, who can play the roles of screening, monitoring with timely investigations, and longitudinal care of stable patients with CKM syndrome. In Hong Kong, for example, primary care doctors of GOPC have been providing T2D patients with regular diabetic complications screening under the Risk Assessment and Management Programme for Diabetes (RAMP-DM) since 2009, which has been shown to effectively reduce the risks of developing macrovascular and microvascular complications, as well as all-cause mortality.[10] In a healthcare system, collaboration is key to avoiding duplication of efforts and to maximizing the efficient utilization of limited healthcare resources. In this regard, Hong Kong is beginning

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to build a structured territory-wide primary healthcare system, with the establishment of the Primary Healthcare Commission in July 2024. Standardization of practice and clinical care protocols are fundamental to ensure smooth integration of specialist and primary care in a collaborative care model.[3] In Hong Kong, primary care doctors include both family medicine specialists in the public or private sector, and also general practitioners in the private sector. The former undergoes structured specialist training under the Hong Kong College of Family Physicians, while the latter, the Health Bureau of Hong Kong, issues and regularly updates Reference Frameworks for common CKM conditions such as T2D and hypertension to standardize management protocols. In Chinese mainland, we have noted significant steps in improving the detection and management of CKD and obesity. In 2022, the National Health Commission of the People's Republic of China provided a technical guidance on CKD screening, diagnosis, and management, outlining the roles of healthcare providers at different levels, from village to county and city, to establish a hierarchical framework for CKD management. In 2024, the Commission issued the first guidelines for the standardization of diagnosis and management of obesity in China.

With the increasingly frequent interactions between Hong Kong and the mainland cities of the Guangdong-Hong Kong-Macau Greater Bay Area (GBA), there has been a rising demand for cross-border healthcare services among Hong Kong residents. According to the Shenzhen Municipal Public Hygiene and Health Commission, more than 600,000 residents from Hong Kong and Macau sought medical care in Shenzhen in 2023. This presents a challenge to the healthcare system and also an opportunity for collaborative actions for better CKM care. With the increasing coverage of medical insurance system on the Chinese mainland, and also the concerns about the sustainability of the heavily subsidized public medical services in Hong Kong, there are distinct challenges faced by different regions, not only in China but also in other parts of the world.

In summary, CKM syndrome is an interactive conglomeration of non-communicable diseases with rapidly escalating prevalence. CKM syndrome presents a public health threat with astounding societal impact. Through the *Position Statement on CKM health framework*, the HKCP wishes to raise awareness and stimulate collaborative efforts to tackle the challenges that CKM syndrome presents, with the ultimate aim of enhancing CKM health for all.

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