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Commentary

Preventive cardiology as a dedicated clinical service: The past, the present, and the (Magnificent) future



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1. Introduction

That preventive interventions reduce the risk of cardiovascular disease (CVD) is a concept easy to understand but difficult to implement in practice. Pillars of cardiovascular health maintenance include smoking cessation or avoidance, a prudent diet, weight management, regular exercise, stress management, and regular blood sugar, cholesterol, and pressure checks. These deceptively straightforward action items are often disregarded by the average person and not tackled efficiently by their practitioners, and this simple fact largely explains the epidemic of (CVD) that we continue to face. A recent report found that only 5% of patients with a BMI over 30 were defined as obese anywhere in the electronic medical record in a primary care real-world setting [1], and another one showed that Familial Hypercholesterolemia, the most severe and common inherited disease of cholesterol metabolism, is poorly recognized and under-treated [2]. Unless we step up and scale up management strategies for its risk factors and co-morbidities, CVD will continue to be the dominant force controlling our life expectancy [3]. Several concerted efforts are required to significantly improve this forecast, the most important of which is the creation of a dedicated subspecialty aimed at preventing CVD [4]. Once preventive cardiology is developed as a unique specialty of cardiovascular medicine, the medical community and public will need to be made aware of the existence of this service and utilize it regularly for risk assessment. Moreover, hospitals will need to integrate this service and make it as ubiquitous as general cardiology or general endocrinology clinics. Fragments of the medical art that we call preventive cardiology have a long-standing tradition as integrated components of internal medicine, endocrinology, cardiology, nephrology, women's health services, cardiac rehabilitation centers, medical

genetics, and most notably as free-standing lipid clinics. However, a comprehensive and uniform definition and organization of preventive cardiology services remains to be developed, as current efforts are diffuse, fragmented, not standardized, and not certified by a professional board (with the exception of the sub disciplines of Clinical Lipidology and Obesity Medicine). The first generation of formally trained preventive cardiologists should come out of a professional and educational structure similar to what is in place for other subspecialties. If we expect a standard, uniform, and certified set of competencies and skills from an interventional cardiologist, irrespective of where they trained or practice, the same should apply to a preventive cardiologist. And yet, it is likely that the experience of any patient seeking advice for CVD risk assessment and management will vary in significant ways from region to region, hospital to hospital, or even practice to practice in the same town. An important point to keep in mind is that no improvement in healthcare organization and delivery will fully address a problem whose determinants are endemic in society and fostered by economic disparities. Access to clean air, affordability and safety of healthy foods, and living in a wellness-sustaining environment are the substrate for our interventions but well beyond the reach of even the most dedicated provider. We need our policymakers to invest in public health and health system approaches, and to coax health insurance companies to provide full coverage for relatively inexpensive diagnostic procedures and pharmaceutical interventions that have the power to stop the epidemic of heart attacks. This paper discusses the origin of preventive cardiology, the core competencies necessary to excel in this medical art, a proposed structure for teaching and training, and a path to professional recognition and board certification.

2. From risk factors to lipid clinics

Over the past 60 years, our understanding of the drivers of atherosclerosis has become progressively more comprehensive and refined.

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Thanks to the NIH, a prospective community cohort observational program known as the Framingham Heart Study (FHS) was funded in an effort to determine the factors that associate with development of atherosclerotic CVD (ASCVD) [5]. From this work, we established the current view of ASCVD, a complex, multi-factorial, slow progressing deterioration of the artery wall leading to occlusion either by obstruction or by superimposed thrombosis. The Framingham investigators coined the very term “risk factor” for coronary heart disease [6], a concept that is central to evaluation, prevention, and treatment of ASCVD. The understanding that dyslipidemia, hypertension, diabetes, smoking, inheritance, and stress are linked to ASCVD marked an inflection point in the interest to study risk factor management and to provide preventive services to mitigate the burden of ASCVD, as FHS clearly demonstrated that multiple factors coexist and cooperate to accelerate the path to disease development [7]. The main findings from the FHS have been recapitulated in numerous cohorts from around the world, suggesting that the factors controlling susceptibility to atherosclerosis are not based on ethnicity, race, or gender [8–10]. Many of these factors are common, acquired, and modifiable, and thus can be used in risk assessment algorithms for proper patient stratification and to monitor efficacy of treatment [11]. As a result of these findings, a network of lipid clinics developed in the United States (US) and around the world. These programs were mostly research centers for clinical trials of lipid-lowering agents, for investigations of lipid metabolism, and for treatment of patients with inherited conditions like Familial Hypercholesterolemia [12]. Lipid clinics created the starting element of what grew to become the modern approach to preventive cardiology, but in many cases, they were limited to lipid management, and though heart protection was the ultimate goal it was disconnected from the scope of care both logistically and in terms of clinical competencies, as lipid clinics in the US were traditionally based in endocrine operations, with limited knowledge of coronary disease evaluation and management. However, lipid-lowering trials gave us one of the most important healthcare advances of the twentieth century: the discovery that statins reduce the risk of heart attack. Starting with the 4S study (Scandinavian Simvastatin Survival Study) in 1994, our understanding of ASCVD risk management was turned upside down, and what used to be a very controversial topic (should you worry about your cholesterol?) suddenly became the low-hanging fruit of preventive cardiology (lowering cholesterol protects you from a heart attack). A stream of cardiovascular clinical trials corroborated the finding that statins reduce CVD rates in all high-risk groups [12]. When placebo-controlled statin trials were no longer ethical, study design involved comparisons of high vs. low-dose, or high vs. low-potency statin, and the results across these trials were remarkably consistent: more LDL-C reduction provided more CVD benefit. Because improvement in cardiovascular outcomes were observed in individuals with average or even low LDL-C levels, statin utilization in practice changed from only treating those with clearly elevated LDL-C to treating all individuals according to CVD risk thresholds. Today, the majority of those taking statins do not have severe hypercholesterolemia, and many have no LDL-C abnormalities at all. An average American today has an LDL of about 110 mg/dl [13]. However, if s/he falls in one of the high CVD risk categories, then lowering LDL-C by 10, 40, or as much as 55 points is needed to achieve optimal levels [14,15]. Since guidelines have harped so much on aggressive LDL management, one could surmise that the primary role of a preventive cardiologist is to prescribe statins, but we know well that there are interventions with CVD risk reduction power that do not affect lipids (eg, GLP-1 RA), others that reduce risk of CAD but not because they affect lipids (eg, icosapent ethyl), and others that reduce risk of heart failure more than they affect the risk of CAD (eg, SGLT-2i).

3. What is a preventive cardiology service and where should it be housed?

The practice of preventive cardiology requires specialized knowledge of metabolism, cardiovascular physiology, anatomy, and imaging,

functional stress testing, cardiac rehabilitation, pharmacology, natural therapies, and lifestyle management. Since many patients seeking preventive cardiology services are at clear and present danger of developing a first or recurrent ASCVD event, we argue that the most appropriate setting for a preventive cardiology practice is in cardiovascular medicine to facilitate coordination of additional care (ie, diagnostic testing, curbside consultations, referrals to and from general cardiology, heart failure, electrophysiology, interventional, etc.). However, cardiologists should not be the exclusive members of a preventive cardiology team. In contrast to other subspecialties of cardiovascular medicine, preventive cardiology should be open to other disciplines, and indeed it offers the best management when a dedicated team is available to provide longitudinal care. The preventive cardiology team should aim at including internists, endocrinologists, family physicians, pediatricians, obstetrician/gynecologists, clinical pharmacists, clinical psychologists, clinical geneticists, dietitians, nurses, and advanced practice providers. The integration of a clinical pharmacist in the care team is endorsed by several large national societies including the National Lipid Association, the American College of Cardiology, and the Heart Failure Society of America. The work of the clinical pharmacist improves health care measures in patients with hypertension, dyslipidemia, coronary artery disease, heart failure, and diabetes [16]. The clinical pharmacist helps improve safety and efficacy of therapeutic interventions [17], medication adherence [18], insurance coverage, and cost control of branded medications [19], and should oversee pharmacologic management protocols (PCSK9 inhibitors, hypertension, anticoagulation, diabetes, etc.; [20,21]). Similarly, an expert practice needs to provide professional and efficient lifestyle counseling services for ASCVD risk management. Every doctor should advise a patient to eat well, manage stress, lose weight, and quit smoking, but very few practices are set up to provide specialized services that go beyond ineffective verbal recommendations. ASCVD is often the consequence of decades of poor lifestyle choices. Providing generic and rapid advice on therapeutic lifestyle changes is not only ineffective but also sends a dangerous message to patients, i.e. that pharmacologic therapy is more important than are changes in behavior. Preventive cardiology programs must invest in the services of registered dietitians, ad-hoc trained nurses, and lifestyle coaches for weight management, exercise prescription, smoking cessation, stress reduction, and psychological support [22]. Finally, even though ASCVD is the centerpiece and commonest target of preventive cardiology, our discipline encompasses a lot more, as it is now well established that atrial fibrillation and heart failure are eminently amenable to prevention strategies, and that drugs affecting metabolic conditions can have beneficial repercussions not only on coronary status but also on rhythm and pump. An expert provider needs to manage risk for cardiovascular outcomes beside coronary events, and appropriately use novel drugs for metabolic control that influence risk of any cardiac outcome (i.e., SGLT-2i, GLP1-RA, Icosapent ethyl, Factor Xai, colchicine, etc.).

4. Core competencies

So, what do we expect from an excellent preventive cardiology service? We expect expert management of severe hypercholesterolemia, diabetes, hypertension, obesity, stress, tobacco abuse, and genetic susceptibility to CVD, to name a few. We expect the service to tackle intelligently and efficiently the spectrum of diagnostic and therapeutic options, which so often range from militant nihilism to over-zealous and baseless interventionism. There is too much for a general cardiologist, endocrinologist, or primary care provider to know and do regarding ASCVD risk assessment and mitigation, and too much demand of expert management from the patient side to have a satisfying experience in a non-dedicated practice, such as general endocrine or cardiology clinic, or even a focused lipid clinic or a cardio-metabolic center. Core competencies of a modern preventive cardiology practice should include three major compartments: 1. Cardiovascular risk assessment (use of risk calculators, biochemistries, genetic analyses, non-invasive imaging, and

functional testing); 2. Co-morbidity management (diabetes, obesity, hypertension, dyslipidemia, gout, systemic inflammatory conditions, and more); 3. Lifestyle management (exercise, diet, use of natural supplements for chronic conditions, counseling on integrative medicine options, weight management, stress reduction, smoking cessation, and targeted addiction interventions). Many more competencies, of course, may be added to this list to take a preventive cardiology service from “standard” to “excellent” (terms we hope will soon have specific and quantifiable definitions), including providing LDL apheresis, running an internal, CDC-standardized clinical laboratory for lipids and biomarkers, creating a registry and bio-repository for discovery work on unique phenotypes or on structured management protocols (PCSK9i, SGLT-2i, GLP-1RA, IPE, etc.), and actively participating in clinical trials for pipeline medications or new devices for cardio-metabolic conditions.

Given the fact that ASCVD is so pervasive, should everyone be evaluated by a preventive cardiologist? Even though the exposure to cardiovascular risk factors is ever present, not everyone needs to be evaluated by a preventive cardiologist. In general, young individuals (<45 years of age) from low-risk families and without co-morbidities and past or current CVD risk exposures only need to keep following the mandates of a healthy lifestyle. However, we envision a future when everyone above the age of 45–50 has at least one visit with a specialized center for cardiovascular risk assessment. Examples of patient types whose management in a preventive cardiology setting is most efficient include: 1. A healthy appearing woman with no family or personal history of CAD or risk exposures but with recent hospitalization for NSTEMI; 2. A young healthy man with LDL 270 mg/dl identified at screening and skeptical about this being a problem; 3. A middle-aged woman with poorly controlled hypertension, well-controlled diabetes, untreated combined dyslipidemia, and unwilling to try a statin; 4. A healthy 48 year-old man whose father died at age 48 of sudden cardiac cause; 5. A 60 year-old woman with no comorbidities, asymptomatic CAD with calcium in the LAD, Agatston score of 440, and an HDL of 150 mg/dl; 6. A 71 year-old man with hypertension, obesity, and low HDL, and a coronary calcium Agatston score of zero; 7. A middle-aged man with extremely elevated lipoprotein (a) requesting both genetic testing and therapy with a PCSK9 inhibitor; 8. A healthy 59 year-old man, marathon runner, vegetarian, non-smoker, with no co-morbidities and on no medications who comes to clinic just to make sure his heart is as healthy as he thinks. These cases are meant to highlight the value of “personalization” of management in CVD prevention, the critical importance of patient’s perception and expectations, and the knowledge that a shared decision-making protocol should inform all diagnostic and therapeutic steps. In addition, we must keep in mind the common presence of social determinants of CVD, including poor quality of housing, domestic stress and abuse, local crime rates, quality of air and water, access to food, and social support systems. While interventions on these aspects are the prerogative of government and citizen groups, a preventive cardiology service should consider adding a “polysocial” risk score to inform evaluation and intervention strategies [23], and should have an outreach component to provide education and clinical services to the public and particularly to underprivileged sectors.

5. The most important issue: training and certification

A preventive cardiologist today is often a family practitioner, internist, cardiologist, or endocrinologist with some additional a-la-carte exposures to the nuances of lipid metabolism as offered by organizations such as the National Lipid Association (NLA), the American College of Cardiology (ACC), or the American Society of Preventive Cardiology (ASPC). However, when it comes to certification, the only diploma today comes from the American Board of Clinical Lipidology (ABCL), which is not recognized by the American Board of Internal Medicine (ABIM) and does not require demonstration of specialized and supervised clinical training. Interestingly, the ABCL board has only awarded less than 800 diplomas in its 15 years of existence. Preventive cardiology cannot

survive on this fragile trajectory. In addition, the COCATS4 (standards of training for cardiology fellows in American hospitals) only require minimal exposure to preventive services, as little as a 1-month rotation in cardiac rehabilitation or a lipid clinic, to satisfy criteria for taking the board exam [24]. The many “preventive cardiology fellowships” currently available are not equipped to provide the set of clinical competencies necessary to produce trained experts, but rather represent a mélange of locally structured and mostly philanthropically funded programs, with a focus on clinical or basic research for foreign medical graduates [25]. What is needed is structure and uniformity of teaching, training, monitoring, and evaluating performance in preparation for a validated, comprehensive, and eminently clinical standardized examination. The fellowship program should involve at least one year of dedicated work in an accredited center of proven excellence and with repeated exposure to outpatient management of cardiovascular risk. The training should go well beyond knowledge and management of lipids and the certification exam should capture the spectrum of competencies expected from a modern preventive cardiologist. It is too early to envision a uniform training structure that can be developed as national model, but the an obvious start is with existing centers of preventive cardiology working together to define what makes their operations separate from other services and define the elements of knowledge and competence that a trainee should acquire to tackle expertly, professionally, and efficiently the diverse types of patients coming to our practice. In our experience at OHSU it is feasible to insert a non-expert provider into monitored practice after 3 months of practical and theoretical onboarding, but it takes a full year for the trainee to achieve a fully competent and independent poise on all aspects of care required. An additional point of contention is the pre-requisite for entering the fellowship. We envision a clinical training program that is housed in cardiology departments but open to fellows of related disciplines and to other providers as well. A final consideration on training is about requirements for clinical or bench research exposure. While research experience is not necessary to achieve clinical competency, preventive cardiology fellows should achieve the level of knowledge of research methods and ability to interpret new scientific data as currently required by COCATS4. However, it should be clear that the ABIM does not consider research as one of the six testable components of competency (medical knowledge, patient care and procedural skills, practice based learning and improvement, interpersonal and communication skills, and professionalism). All of this is being discussed, developed, and spearheaded by organizations such as the ASPC and the ACC [22]. The path to certification is not yet clear, but it cannot be credibly entertained without first creating a validated structure of training and a clinical competency testing system, and this must be done in collaboration with organizations, such as ACC and ASPC, that have the political and professional gravitas to ensure an uninterrupted trajectory toward the issuing of a diploma that a preventive cardiologist should want to hang on the office wall.

This article is part of the inaugural issue of the *American Journal of Preventive Cardiology*, official organ of the ASPC and a peer-reviewed publication devoted to the definition, expansion, and standardization of the medical art through editorial, opinion papers, teaching articles, and original investigations with clear translational value. This new journal aims at bringing pragmatic discoveries and care delivery improvements to an audience of practitioners that should then contribute to the implementation phase of any evidence-based advance.

6. Preventive cardiology in the post-COVID19 world

This article is written when the whole world is adjusting to the COVID19 epidemic. We are currently not able to see non-urgent patients or to meet in person even with our nurses. We are worried about our own health and about our future as experts in chronic, non-infectious diseases. Is this the time when Preventive Cardiology is relegated to the role of minor and dispensable medical subspecialty? Quite the opposite, this is the time for us to show the indispensable value of our expertise, our

interventions, and our outcomes. The challenges are clear: “ubi maior minor cessat” is what the epidemic of coronavirus may seem to tell us – “move aside, chronic disease managers, because all we need is ventilators!” However, the value of expert CVD prevention is clear: 1. We mollify the co-morbidities that make the epidemic so much more dangerous; 2. We are on the frontline to combat the increased CVD risk caused by the incredible financial, societal, and psychological stress of this crisis [26]; 3. We tackle issues like the current discussion on whether ACE-I or ARB should be discontinued if they are truly affecting the entry point of the COVID19 virus within cells [27]; 4. We move forward with telemedicine and pave the way for a more modern set up of outpatient visit and truly move preventive cardiology to a scalable, sustainable, and efficient platform [28]. As we will eventually put this pandemic in the rearview mirror, what will remain is that people need to be as healthy as possible when disaster strikes, and preventive cardiology is the discipline that aims at accomplishing just that: to help you face life struggles with a strong heart.

7. Conclusions

The medical art of preventive cardiology has yet to get proper recognition as a dedicated subspecialty of cardiovascular medicine due to its apparent simplicity, intuitive applications, and common sense interventions. Just like other medical subspecialties before it, preventive cardiology must intelligently plan for a non-disruptive separation from the current main outlets of its components of care (cardiology, endocrinology, lipid clinics, etc.) and plan to connect with all other services used by the patient in need of CVD prevention (diabetes, hypertension, interventional, EP, etc.). Until now, this has been done with fragmented and non-uniform approaches. In the future, the individual provider that wants to have the full set of competencies in preventive cardiology should undergo proper training and certification and the center that specializes in preventive cardiology must have the care team abilities to address the spectrum of needs of this ever-expanding category of patients.

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