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Cardiovascular disease prevention career pathways: The status quo and future directions



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ABSTRACT

Cardiovascular disease prevention is a complicated field requiring similar resource allocation and training as any other subspecialty in cardiology. To highlight the increasing need for primordial, primary and secondary cardiovascular disease prevention at a population level, it is necessary to have a clear vision for not only adequate training in the field but also sample career trajectories that today's fellows-in-training (FIT) and early career (EC) physicians can use as a reference. However due to less centralized training, reduced exposure to the discipline and no clear institutional champions, direct access to "role model" careers in cardiovascular disease prevention may be lacking for today's generation of trainees. These trends may change with more formalized recognition and more visibility of career trajectories in the field. In the current short report, we propose career pathways in cardiovascular disease prevention that can serve as a board resource roadmap for today's FIT/EC physicians to design their careers in cardiovascular disease prevention. We explore three types of preventive cardiologists prototypes including; "the researcher", "the clinician" and "the academic" preventive cardiologist models. These models are based on experiences gained in separate preventive cardiology training fellowships in addition to general cardiology training. Further, with advances in the scientific technologies, we highlight the future trajectory in the field. Preventive cardiology, although currently not the most desired path for FIT/EC physicians to pursue today, has the potential to be seen as the lucrative and essential training field in the future.

1. Introduction

Epidemiological trends over the past three decades have shown a decline in overall cardiovascular disease (CVD) mortality. Factors for this shift include reduction in smoking, better lifestyle choices, discovery of new medications for treatment of dyslipidemia as well as technological advances in the field leading to early life saving interventions [1,2]. However, primary prevention of atherosclerotic CVD has not kept up with the promising reductions in mortality. The rise in leading CVD risk factors, like obesity and diabetes, has highlighted an ever-growing need for primary and *primordial* CVD prevention. The prevalence, health consequences, and resource burden of CVD remain a constant threat at a population level. In fact, prevention is likely the single most effective entity at reducing the burden of CVD, and should be a main focus in devoting healthcare resources [3].

Many individuals with CVD, and those at high risk for developing

CVD, remain sub-optimally identified and inadequately treated [4]. Today's clinicians play a central role in CVD prevention by identifying high-risk individuals as well as implementing lifestyle and therapeutic interventions. However, CVD prevention training during cardiology fellowship remains deficient in addressing societal needs [5].

Preventive cardiology is a subspecialty that currently lacks standardization in education and training, clinical practice and trajectory in careers. For fellows-in-training (FIT) considering a CVD prevention career, there are limited training resources and no central board certifying body in the field [6]. This not only limits exposure to CVD prevention education but also obscures the ability to navigate various career options suited for cardiology fellows-in-training (FIT) considering this field. Formalized structures of a CVD prevention fellowship have been proposed before [3,6].

In this manuscript, we describe the status quo and a future outlook for the broad trajectory of careers in CVD prevention possible for FIT in

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clinical training programs.

2. Current CVD prevention training pathways

The exposure deficiency in preventive cardiology during general cardiology fellowship training may be attributed to some key issues i.e. lack of a well-defined program within the training institute, less centralized availability of resources nationally or the more lucrative appeal of several procedural subspecialties within cardiology.

There are currently only 11 reported clinical training programs in CVD prevention. After the publication of the first document enlisting the clinical training fellowships in prevention in 2012 [7], only two other documents have updated these lists; first in 2018 [6] and recently, by the American College of Cardiology (ACC) [8]. The scope of clinical fellowships in CVD prevention currently encompass one or two entities in prevention but not all. Typical models in training are geared towards primary and secondary prevention strategies by clinical training in lipids, hypertension or cardiac rehabilitation with or without focus on clinical

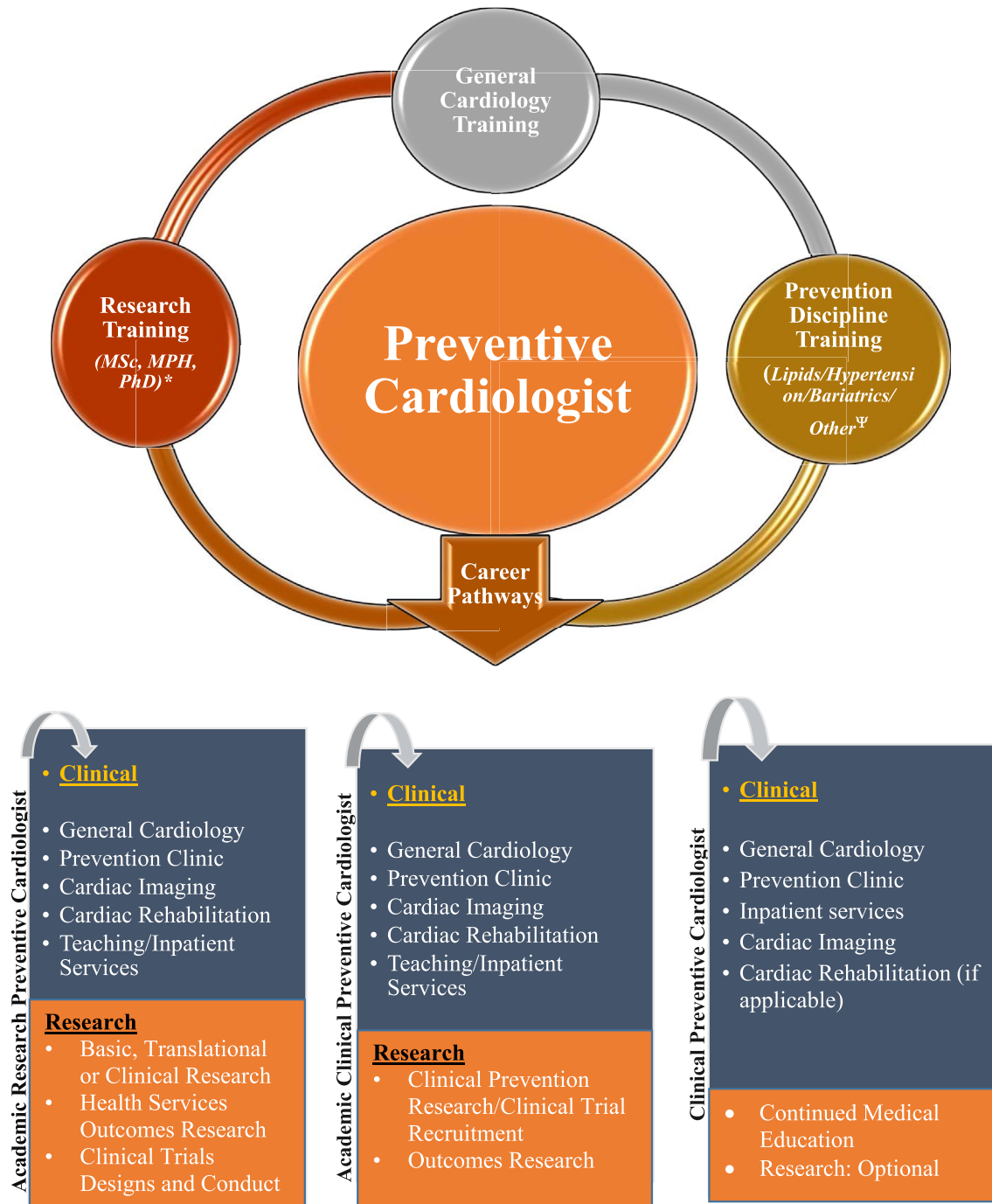


Fig. 1. Central Illustration: The status quo in Cardiovascular Disease Prevention Career Pathways Preventive Cardiology Practice Models including a) Academic Research Preventive Cardiologist; b) Academic Clinical Preventive Cardiologist; c) Clinical Preventive Cardiologist prototypes.

*Research training includes Masters in Science (MSc), Masters in Public Health (MPH), Doctor of Philosophy (PhD) and others including Masters in Clinical Investigation.

ΨOther Prevention specific training includes diabetes/cardiomatabolic health management to genetic testing and precise risk profiling.

trial or biostatistical training constituted as research training.

In addition to these independently-funded opportunities in CVD prevention training, a comprehensive list of the National Heart, Lung and Blood Institute funded Epidemiology and Statistical training programs for MDs and PhDs is available online [9]. These programs are primarily research-oriented and are not open to visa holders.

3. CVD prevention: calls for standardized training

Recently, a number of crucial steps have been taken to promote the CVD prevention agenda, laying the groundwork for the rise of this critically needed subspecialty. The ACC Prevention Council has published a perspective examining the need for preventive cardiology as a separate subspecialty for clinical practice given several advances in diagnostic and therapeutic as well as risk assessment tools. This document, in addition to others, suggests a framework for fellowship training in CVD prevention [3,10]. Shapiro et al., have outlined the clinical competencies that a 'preventive cardiologist of the future' will need to be proficient in such as "... *metabolic management and cardiovascular disease management through expert use of diagnostic and therapeutic interventions inclusive of nonpharmacological tools ...*". The ACC's Prevention Council now also has an updated list of prevention fellowships with the ultimate goal of maintaining a regularly updated catalogue for trainees to access [8].

4. Trajectory in CVD prevention: clinician vs researcher

An organized role for a preventive cardiologist remains ambiguous in current academic settings. A preventive cardiologist's overall reimbursement is different than most other subspecialties within cardiology which are dominated by procedures and multimodality imaging utilization. Most hiring institutions likely oscillate around the questions; 'what is the ability of the "preventive cardiologist" to generate revenue and in which capacity?'

This backtracks to a very important aspect of FIT's career planning. For an aspiring preventive cardiologist, what is the standard training and career to envision?

Is it as a general cardiologist with a focus on prevention? Or is it a lipidologist also relying on additional imaging to have adequate reimbursements? Or should preventive cardiologists always need to have research funding as the primary income?

Based on our experience with mentoring faculty as well as various institutional models, we describe the current prototypes that today's FIT may pursue as Preventive Cardiologists after fellowship completion (Fig. 1).

4.1. Clinical preventive cardiologist

The "Clinical Preventive Cardiologist" prototype is functional in both academic and private arenas, with the majority of time spent in clinical practice. The prerequisites include training in general cardiology and additional certification in at least one discipline of available CVD prevention including lipidology, hypertensive disorders, cardiac rehabilitation, and obesity. This model is less dependent on extensive research training. Research productivity typically stems from quality improvement initiatives and/or scholarly activity by clinical outcomes. Physicians pursuing this track may supplement revenue and clinical acumen by general cardiology inpatient and/or outpatient practice and cardiac imaging (including echo, coronary computed tomography or cardiac MRI) in addition to practicing aforementioned CVD prevention specific components.

4.2. Academic Research Preventive Cardiologist

A dedicated year or two of prevention focused research training is required for this pathway with a preferred additional degree (including

but not limited to Master's degree in Clinical Science or Public Health, or PhD), to equip the physician with quantitative skills.

CVD prevention field remains a ripe research field. With advancement of technology and use of metabolomics [11] and proteomics, in addition to genomics, uncovering further molecular pathways and new potential therapeutic targets is more within grasp than before. Several areas in this realm are relatively understudied ranging from the '-omics' influences in CVD to optimal clinical risk assessment tools development. Further, there are niche spaces for bench and translational researchers aspiring to undertake investigations in lipoprotein metabolism, vascular biology/thrombosis, nutrition, obesity and hypertension all of which directly pertain to primordial CVD development.

This pathway physician should consider a grant-funded research career in one or combination of basic, translational, clinical or health outcomes research in the "big data" era or train to be a clinical trialist. Typically, \cong 25–30% time may be spent on clinical responsibilities (general cardiology/lipid/hypertension clinic and/or subclinical imaging focus).

4.3. Academic Clinical Preventive Cardiologist

FIT aspiring to include equivalent scholarly and clinical responsibilities are best suited for this model which entails a balanced division between both areas. As in any field within cardiology this model is likely the hardest to negotiate particularly since CVD prevention is relatively an uncharted territory without a clear institutional champion.

Nevertheless, we have found several examples of the 'Academic Preventive Cardiologists' who are effective leaders in research, through their institutional funding mechanisms or recruitment of clinical trials to their centres, and also well-rounded clinicians. This prototype spends nearly half of the time devoted to clinical responsibilities in the general cardiology arena. Furthermore, developing a clinician-educator and teaching role may also be an alluring opportunity for FIT pursuing this pathway in the appropriate academic settings. Another area for academic exposure and involvement for Preventive Cardiologists remains the organizations like ACC and American Heart Association for involvement to implement CVD prevention strategies at a population level.

5. The future of CVD prevention for FIT

To assist the pipeline of future preventive cardiologists, there have been efforts by national cardiovascular organizations [12]. The inclusion of FIT into the leadership of the ACC prevention council and in the Scientific Sessions have served as an invaluable opportunity to network with leaders in CVD prevention, gain their mentorship and insights into various pathways to practice after completing fellowship [12]. Moreover, several other prevention focused societies including the American Society for Preventive Cardiology, National Lipid Association, and the American Heart Association (Epidemiology and Prevention Council) are excellent avenues where FIT can gain supplemental mentorship and experiences in the field.

In the future if preventive cardiology is given its independent subspecialty recognition, a clinical preventive cardiologist would have to be trained in the entire breadth of the field ranging from the complex lipid and metabolic disorders management to genetic testing and precise risk profiling. Furthermore, we envision that this field will also encompass the traditional use of diagnostic and therapeutic interventions used within cardiology.

6. Conclusions

Cardiovascular disease prevention is a complicated field requiring similar attention, resource allocation and training as other CVD subspecialties. Promoting the CVD prevention agenda not only calls to design a comprehensive prevention program under a centralized body

but also to fill the increasing need to train physicians focused in prevention aiming to utilize novel risk profiling techniques and therapeutic agents.

Historically, CVD prevention has not been the most sought-after career for cardiology FIT. These trends may change with more formalized recognition of the field. Information as provided in this paper highlights career possibilities in CVD prevention at present. Our hope is these proposed career pathways will be a useful roadmap for today's FIT to design their careers in CVD prevention. Whether from a health or financial burden perspective the time for prevention is here and it is now after all, "prevention is better than cure" (Fig. 1).

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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