How to Develop a Cardio-oncology Fellowship

Michelle N. Johnson, MD, MPH[a,*], Richard Steingart, MD[a], Joseph Carver, MD[b]

KEYWORDS

• Cardio-oncology • Fellowship • Cardiovascular disease • Cancer therapeutics

KEY POINTS

- The areas of knowledge required to manage cardiovascular disease in patients with cancer and cancer survivors include specific cardiovascular complications directly related to oncologic therapies and the impact of cancer and its therapies on existing or potential cardiovascular comorbidities, including atherosclerosis, valvular disease, and myocardial disease.
- The cardio-oncology training milieu, the selection process for cardio-oncology trainees, and the cardio-oncology training curriculum must emphasize consultation, education, and research skills.
- Robust fellowship programs are best supported by high-volume centers that can provide a critical mass of patient clinician exposures.
- To date, cardio-oncology fellowships have been pursued and completed by cardiologists and internists but future training models would also include programs designed for oncologists, family medicine specialists, and physician extenders.
- The curriculum for cardio-oncology should be structured with core competency-based goals in a manner that is in keeping with the Accreditation Council for Graduate Medical Education and American College of Cardiology's Core Cardiovascular Training Statements directives. These milestones/goals can best be accomplished through a 1-year immersion fellowship with a combination of inpatient and outpatient exposure.

Management of cardiovascular disease in patients with cancer and cancer survivors requires particular clinical expertise; skills that are central to cardio-oncology.[1] The areas of knowledge required include (1) specific cardiovascular complications directly related to oncologic therapies (eg, hypertension associated with vascular endothelial growth factor (VEGF) signaling pathway inhibitors, left ventricular dysfunction caused by anthracyclines, radiation-related vascular disease) and (2) the impact of cancer and its therapies on existing or potential cardiovascular comorbidities, including atherosclerosis, valvular disease, and myocardial disease.[2] The past decade has seen rapid expansion of cancer therapeutics, many of which have potential cardiotoxicity. In addition, the conversion of many cancers to chronic conditions, rather than uniformly fatal diseases, has produced an ever-expanding population of patients with cancer at high risk for cardiovascular diseases that require specialized knowledge of treating physicians. Thus, there is a compelling need for enhanced cardio-oncology training.

Historically, oncologists were the predominant long-term providers for patients with cardiovascular comorbidities during active cancer treatment, as well as for survivors. With advances in cardiovascular medicine (drugs, devices, interventions) leading to greatly improved survival in recent years, it is unrealistic to expect that practicing oncologists could provide state-of-the-art care of their patients' cardiovascular disease. In 2014

[a] Department of Medicine, Memorial Sloan-Kettering Cancer Center, 1275 York Avenue, New York, NY 10021, USA; [b] Department of Medicine, Abramson Cancer Center, University of Pennsylvania, 3400 Civic Center Boulevard, Philadelphia, PA 19104, USA
* Corresponding author.
E-mail address: johnsom1@mskcc.org

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there were 14 million cancer patients in the United States and estimates are that there will be more than a 20% increase in cancer rates by 2020 caused by the aging of the population.[3] The number of cancer survivors is also increasing, with predictions forecasting approximately 21 million cancer survivors by 2024.[4–6] Significant comorbidities in cancer survivors include heart failure and diabetes and, as they age, there is increased incidence of comorbidities such as atrial fibrillation and hypertension.[4,7,8] Medical management in survivors will require increasing skills in these areas. Thus it becomes imperative that there is the development of the discipline of cardio-oncology.[9,10]

There is a severe staffing shortage anticipated in oncology services, with decreasing numbers of practicing oncologists in the setting of increased rates of cancer.[11,12] This dynamic will require that more of the cardiovascular conditions related to cancer and its treatments be treated by advanced practice practitioners, internists, family medicine physicians, geriatricians, and cardiologists. Patients with particularly complex cardiovascular problems related to cancer and its treatments will require care by cardio-oncology experts.

In a recent survey of adult and pediatric cardiology division chiefs and fellowship directors, 52% agreed that a cardio-oncology service or dedicated clinician would improve the care of patients with cancer.[10] Cardio-oncology fellowship training develops this coterie of clinicians. Such fellowships are designed to offer a tertiary level of training beyond cardiovascular diseases fellowships.[13] This additional training is necessary because at present more than 40% of cardiovascular training programs report having no formal training in cardio-oncology, and only 11% included lectures on cardio-oncology as part of the core curriculum.[10] The authors support the proposal put forth by the International Cardioncology Society and Canadian Cardiac Oncology Network whereby cardio-oncology fellowship graduates will serve as a small group of experts who provide a resource for all the providers in the community involved in the management of patients with cancer.[13] Community providers will continue to provide almost all of the cardiovascular care for patients with cancer. The cardio-oncologist will be a consultant, educator, and researcher. In addition, cardio-oncology subspecialists will facilitate collaboration between cardiologists and oncologists in the clinical and research arenas. Therefore, the cardio-oncology training milieu, the selection process for cardio-oncology trainees, and the cardio-oncology training curriculum must emphasize consultation, education, and research skills.

Since the 1990s, the number of cardio-oncology training programs in the United States has grown. Successful training programs share several characteristics. Robust fellowship programs are best supported by high-volume centers that can provide a critical mass of patient clinician exposures. This exposure should occur with both inpatients and outpatients to include those issues unique to outpatient cardio-oncology. Note that cardio-oncology clinics are found only in approximately half of the international comprehensive cancer centers despite data suggesting that the presence of these clinics is related to more intensive monitoring for cardiotoxicity as well as long-term monitoring for complications related to radiotherapy.[9] Cardiology and oncology trainees should have an opportunity to rotate through an established cardio-oncology clinic to ensure the broadest exposure as well as to allow them to go on to establish new clinics in centers of need.

To date cardio-oncology fellowships have been pursued and completed by cardiologists and internists but future training models would also include programs designed for oncologists, family medicine specialists, and physician extenders. The authors have considered offering cardio-oncology fellowship positions to board-eligible or board-certified oncologists, but have found that our emphasis on cardiovascular testing, such as electrocardiograms, stress testing, echocardiography, has so far been a challenge. Although we continue to consider the value of tailoring the curriculum to physicians with oncology backgrounds, this article assumes that cardio-oncology fellowship trainees are usually board-certified cardiologists or internists aspiring to become cardiologists.

CURRICULUM

The curriculum for cardio-oncology should be structured with core competency-based goals in a manner that is in keeping with the Accreditation Council for Graduate Medical Education and American College of Cardiology's Core Cardiovascular Training Statements directives.[14] These milestones/goals can best be accomplished through a 1-year immersion fellowship with a combination of inpatient and outpatient exposure. As a guide for the recommended number of patient-fellow interactions, a proposal of a minimum of 100 unique patient visits has been put forth as a requirement for sufficient exposure.[13] The competencies should also be weighted based on the clinical background of the trainee.