

Chapter 17

Education and Training



Hemant S. Murthy, Rami Manochakian, and Mohamed A. Kharfan-Dabaja

Introduction

One of the main missions of any comprehensive cancer center is to provide opportunities for training and education to improve prevention and treatment outcomes of cancer patients. Management of cancer in today's era is multidisciplinary, with patient care teams comprised of multispecialty physicians, advanced practice providers (APPs), nurses, therapists, and other health-care staff across different fields. Each team member holds a specific role in cancer care and has a different approach to the management of patients ultimately leading to more comprehensive care.

Given the many components and specialties that comprise a comprehensive cancer center, the educational programs are often specialized and tailored to multiple disciplines. The ultimate goal of establishing education and training programs within a comprehensive cancer center is not only to have them available to their staff, but rather to garner the ability to disseminate education to health-care providers, cancer patients, and the public at large.

Training of Health-Care Professionals

Within a cancer center, there is a variety of specialties which provide expertise in oncology. These specialties possess their own individual training programs that help train and develop future physicians, scientists, APPs, and nurses specialized within

H. S. Murthy · M. A. Kharfan-Dabaja (✉)
Division of Hematology-Oncology, Mayo Clinic, Jacksonville, FL, USA

Blood and Marrow Transplantation Program, Mayo Clinic, Jacksonville, FL, USA
e-mail: KharfanDabaja.Mohamed@mayo.edu

R. Manochakian
Division of Hematology-Oncology, Mayo Clinic, Jacksonville, FL, USA

oncology. Training programs may include but are not limited to biomedical and basic science research, postdoctoral programs, clinical residency and/or fellowship programs, all geared towards research and treatment of cancer.

Hematology/Medical Oncology

Hematologists and medical oncologists comprise the largest block of cancer specialists in a comprehensive cancer center. Their standard training is called “Hematology/Oncology fellowship”, which in the USA follows completion of 3 years of internal medicine residency, but that is not always the case in other countries. A hematology/oncology fellowship typically requires 3 years, although some programs offer the opportunity for a 2-year fellowship in either hematology or medical oncology. The goal of fellowship training programs is to enable trainees to gain a broad knowledge of clinical and research cancer sciences, and to develop the needed clinical skills and expertise to become competent and proficient hematologists and/or oncologists. At least half of the fellowship curriculum is spent in clinical training with a combination of inpatient and outpatient experiences, focusing on different malignancies including solid tumors, benign hematology, malignant hematology, and hematopoietic cell transplantation (HCT) or other cellular therapies. Many programs offer dedicated research time that can be spent in basic science or in clinical/observational investigation, depending on the trainees’ interest and it is usually under the guidance and tutelage of a research mentor. Trainees present their research projects at national scientific meetings and ultimately publish the findings in peer-reviewed journals.

Apart from clinical training and research, another major component of a fellowship program is the didactic and experiential learning lectures and activities, which are embedded within the context of health-care delivery system. It also provides trainees with access to comprehensive education resources provided by major national hematology and oncology societies, namely, the American Society of Clinical Oncology (ASCO), the American Society of Hematology (ASH), and others. Some centers offer an additional 1 year of subspecialty cancer training after completion of the 3 years fellowship, like fellowships in leukemia, blood and marrow transplantation, thoracic malignancies and others, or in drug development and early cancer therapeutics trials.

Pediatric Hematology/Medical Oncology

A pediatric hematology/oncology fellowship curriculum also requires 3 years and mirrors that of the medical oncology/hematology fellowship.

Radiation Oncology

One field that differs slightly in this training model is radiation oncology. In the USA, radiation oncology is a 5 year residency program for which candidates may apply for and join directly out of medical school. The first year is generally a transitional year of a medical internship followed by 4 years of radiation oncology training. Radiation oncology residency training prepares for treatment of both adult and pediatric populations and most of the training occurs in the outpatient setting. Time for research is also embedded in many radiation oncology programs.

Other Oncology Specialties

Oncology specialty training also includes surgical oncology and gynecology oncology. Similar to medical and pediatric oncology programs, eligible trainees must have completed residencies in their respective fields before pursuing oncology specialty training. The length of residency and fellowship training may vary. We refer the reader to the Accreditation Council of Graduate Medical Education oncology specialty training programs for additional details (<https://www.acgme.org>).

Pharmacy

Pharmacists with specific expertise in oncology often go through additional training, including attaining board certification in oncology pharmacy (BCOP) [1]. BCOP is a credential for pharmacists whose practice involve understanding the complexity of drug therapies use for preventing and treating cancer, manage cancer-related and drug-related adverse events, or clinical situations not encountered in other diseases. To obtain BCOP, they are required to graduate from an accredited pharmacy program, followed by completion of a 2 year pharmacy residency program, which includes 1 year dedicated to oncology pharmacy training followed by passing score on standardized board certification examination.

Basic Science/Laboratory Researcher

The Cancer Biology Training Consortium (CABTRAC) was created in 2005 in order to help develop and facilitate training recommendations for future cancer researchers, especially graduate and postgraduate researchers [2]. The goal of CABTRAC was to establish guidelines for trainees focused on education in the experimental science of cancer biology, research training in the experimental science of cancer biology, and

career development of trainees towards independent cancer biologists [3]. Trainees are expected to be exposed to topics including basic science of cancer biology: dysregulation of signal transduction pathways, oncogenes and tumor suppressor genes, control of cell proliferation, cell cycle, and cell death, carcinogenesis, DNA damage, and repair, tumor angiogenesis, invasion, and metastases, tumor microenvironment, cancer genetics and epigenetics, cancer immunology, translational science (molecular diagnosis and prognosis, molecular imaging, systems biology and bioinformatics, therapeutic strategies including targeted and cytotoxic therapies, immunotherapy, hormone therapy, small molecules), and chemoprevention. Educational exposure to biostatistics, informatics, data interpretation, cancer disparities, and basic experimental design is also deemed essential to the training of cancer biology scientists.

Continued Medical Education (CME)

Training and education in a comprehensive cancer center are not restricted to trainees within a structured training program. Continued education of all cancer care team members is essential, given the always changing understanding of cancer biology and emergence of new therapies, technologies, and innovations. The goals of CME as it pertains to members of a cancer center are twofold: to enhance their knowledge and skills pertaining to their own individual practices and specialties and acquiring knowledge from other specialties (also known as cross-training). Some examples of cross-training include incorporating novel concepts that can be investigated across multiple diseases, or awareness of clinical scenarios that may allow lab or translational researchers to gain better insight into the cancer.

Grand Rounds

Cancer center grand rounds are regularly scheduled seminar series through which invited speakers present insights and expertise on cancer treatment and/or new innovations in cancer research. Speakers typically include cancer center members or outside invited speakers. Grand rounds can serve multiple purposes within a cancer center. It can provide members with updates in patient care and management and could be a CME source. Additionally, grand rounds, through presentation of new innovations and research findings, can also spawn collaboration and promote cross-training among specialists from different disciplines within oncology, potentially stimulating new research.

Board Certification

Many oncology specialties have board certification requirements as dictated by their respective specialty organizations. In addition, certification is often contingent on passing specialty board examinations. Maintaining board certification also

requires maintaining standards including participation in educational programs, continued professional development, and satisfactorily passing board examinations. Maintenance of such standards by cancer center members is important to ensure continued training and education, remaining current with advances in oncology, and ultimately improving delivery of care to cancer patients.

Development of New Cancer-Specific Programs

Continued advancement in oncology therapeutics can sometimes be limited by expansion of these therapies to centers with limited resources. New programs are developed in order to provide education on emerging or complex therapies such as phase 1 clinical research units, HCT, and other cellular therapies.

Building specialized cancer-specific programs may be burdensome, particularly in low- to middle-income countries. Accordingly, partnering with more established cancer institutions with requisite expertise can prove beneficial. One successful example of this was the partnership of the Global BMT program of the University of Illinois at Chicago (UIC) [4] and its partnership with developing a bone marrow transplant program in Kathmandu, Nepal [5]. The steps involved included training relevant staff in Nepal and allowing for Nepalese providers to receive training at UIC, exchange of standard operating procedures, overseeing construction of HCT unit in a Nepalese hospital, and continued teleconferences between UIC and Nepal. Another example includes enhancing cancer care in low-income limited resource countries such as Guatemala, Vietnam, and Rwanda [6]. Through partnership with established cancer centers and with significant investment, improvements, and development of infrastructure, training of relevant professionals, implementing new cancer screening programs, and developing cancer-specific health policy have improved cancer care in these regions. These serve as examples of the benefits of partnering with established cancer centers with requisite experience to facilitate the development of new cancer-specific programs.

Discussion

Cancer is a major public health problem worldwide. Recent advances in the understanding of the biologic and molecular aspect of cancer, and emergence of new and more effective targeted therapies highlight the importance of continuous education of health-care providers and supporting staff. The ultimate goal is to deliver effective treatment in a safe manner. Unfortunately, there is a gap in the ability to make these therapies and new technologies available to all cancer patients worldwide. Education and training addresses one major aspect of this problem by developing partnerships between cancer centers in the developing world and established centers in developing countries to facilitate exchange of knowledge. Regrettably, the high

cost of these therapies and technologies is a serious limitation to deliver these treatments to cancer patients in the developing world.

Conflicts of Interests HSM: no conflicts of interest to disclose

RM: Discloses advisory board/consultancy for AstraZeneca, Guardant Health, Novocure and Takeda

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