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GUEST EDITORS' PAGE

Bridge to Transplantation

Advanced Heart Failure and Transplant Cardiology Training for Cardiovascular Disease Fellows

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Approximately 6.5 million Americans experience heart failure (HF), which contributes to 1 in 8 deaths each year (1). Current therapies improve survival for HF with reduced ejection fraction, but a result has been to increase the number of HF patients who progress to advanced disease (2). Accordingly, there is an increasing need for well-trained cardiologists to manage these complex patients.

As HF prevalence increases, there are significant gaps in care of the HF patient, including the underuse of guideline-directed medical therapies (3,4). For example, in the IMPROVE-HF (Registry to Improve the Use of Evidence-Based Heart Failure Therapies in the Outpatient Setting) trial, only 59.9%, 44.2%, and 89.2% of patients were on target doses of ACE inhibitors, beta-blockers, and aldosterone antagonists, respectively (5). In addition, the concomitant use of multiple medications and titration of these medications in individual patients is challenging, especially in the setting of renal dysfunction and/or hypotension (6,7). Newer medications, such as sacubitril/valsartan and ivabradine, also appear to be underutilized (8,9). Finally, >1 of 5 HF patients is readmitted to the hospital within 30 days of hospital discharge, which is often related to inadequate HF medication management (10).

With respect to advanced therapies, left ventricular assist devices are now approved as a bridge to transplantation or as stand-alone (destination) therapy (11,12). Although there has been a modest increase in yearly heart transplantations from 2,199 to 3,191 between 2000 and 2016 (13), the continued discrepancy between organ supply and demand has resulted in a steady increase in the implantation rate for mechanical circulatory support devices (MCSDs)/left ventricular assist devices. A total of 3,041 approved durable devices were implanted in 2015 in the United States, compared with 240 approved devices in 2007 (14,15).

The amount of specialized knowledge and skill required to care for the growing number of patients with HF, including those who require MCSD and/or cardiac transplantation, resulted in the establishment of the cardiology subspecialty of advanced heart failure and cardiac transplantation (AHFTC). However, with only 992 board-certified AHFTC cardiologists in the United States (16), it is not possible for the majority of patients with advanced HF to be managed by AHFTC specialists. The most recent COCATS (Core Cardiology Training Symposium) statement (COCATS 4) lists the knowledge and skills recommended to meet level II training in the management of HF patients (17). Currently, 48% of general cardiology fellows train in programs without AHFTC fellowships and may have difficulty attaining some COCATS 4 level II competencies (**Figure 1**). Given the lack of a structured experience in this field of growing importance, there is an ongoing need for partnerships between cardiovascular disease (CVD) training programs that offer AHFTC care and those that do not.

IMPORTANCE OF AHFTC TRAINING

The important knowledge and skills that can be acquired by a CVD fellow during structured AHFTC

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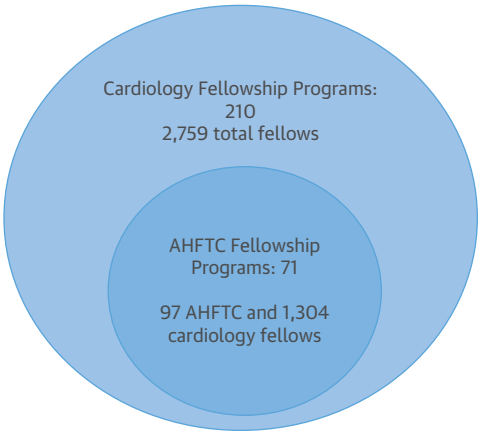
FIGURE 1 Distribution of AHFTC and Cardiovascular Disease Fellowship Programs and Trained Fellows



AHFTC = advanced heart failure and cardiac transplantation.

training, taken from the larger COCATS document, are listed in Table 1. Formalized HF education, hands-on training, and bedside experience in the application of these skills is emphasized. A rotation in AHFTC should include clinical care of patients in both outpatient and inpatient settings. Training should include evaluation of patients' candidacy for advanced HF therapies and perioperative care, and should allow for observation of cardiac transplantation and MCSD placement.

The best long-term outcomes with both acute and chronic therapy with MCSD and transplantation are often in those patients who are referred early (18). A lack of adequate training in advanced HF therapies may be 1 reason that referral to an AHFTC cardiologist is delayed until the patient's clinical course has significantly progressed (19). Also, frequent visits with HF clinicians can facilitate earlier achievement of target doses for HF medications (20). Better understanding about MCSDs and cardiac transplantation would help general cardiologists to more effectively guide patients and their families in their decision-making about the risks and benefits of such therapy.

The current Accreditation Council for Graduate Medical Education (ACGME) requires CVD fellows to have knowledge of cardiomyopathy and HF, but does not explicitly require training in AHFTC (21). Advanced HF can occur in any part of the country, but AHFTC care is only present in localized pockets, necessitating the appropriate dissemination of training and knowledge. It is likely that hub-and-spoke partnerships between AHFTC cardiologists and general cardiologists will enhance the HF care of thousands of patients with HF in the United States.

STEPS OF ESTABLISHING A RELATIONSHIP

For training programs that do not have sufficient opportunities for AHFTC training, establishing a relationship with a partnering institution with AHFTC programs can provide an opportunity for rotations in AHFTC. Several steps are involved in setting up an effective relationship (Table 2)—some of which can be facilitated by the graduate medical education offices of the 2 institutions. An AHFTC program can reasonably be expected to train up to 1 to 2 visiting general cardiology fellows at a time, such that 50 to 100 fellows/year might receive training.

Under the current system, the Centers for Medicare & Medicaid Services (CMS) does not fund training at institutions outside of the primary institution. Therefore, if a CVD fellow is to receive a stipend during the time of training at the AHFTC program, a source of funding is necessary. Funding also may be required for liability insurance, accommodation, travel, and so on. The visiting fellows' training programs, affiliated hospitals, and local scholarships could serve as potential sources of funding.

A TENNESSEE CASE

A 2-week rotation was established for senior CVD fellows from East Tennessee State University in Johnson City, Tennessee, to rotate in the AHFTC program at Vanderbilt University Medical Center in Nashville, Tennessee. After appropriate funding sources were realized and the preliminary processing was complete, East Tennessee State University CVD fellows rotated at Vanderbilt between January and February of 2017. The total cost including salary, housing, and insurance funding was $11,444 for 3 fellows. The rotation included training in MCSD and cardiac transplantation in both the inpatient and outpatient settings. Feedback from the visiting fellows was exceedingly positive, and they believed that the rotation significantly helped improve clinical skills and knowledge related to AHFTC.

BENEFIT OF AN AHFTC ROTATION

There are numerous benefits of an AHFTC rotation to CVD fellows at all training programs. When general cardiologists are adequately exposed to AHFTC, it improves patient care in geographic areas that are not historically able to clinically handle care for these patients. In this view, there has been an evolving concept of collaborative care of AHFTC patients