HEART FAILURE CURRICULUM

I. Outpatient Management Objectives

a. Diagnosis, assessment and prognosis
   i. Ability to obtain complete medical histories, including review of patient medical records, and perform accurate examinations with an emphasis on cardiac findings
   ii. To be able to interpret the results of laboratory testing, heart catheterizations, hemodynamics, cardiopulmonary stress testing, echocardiography, nuclear stress-testing, cardiac CT/MR and endomyocardial biopsies
   iii. To be able to risk stratify patients with HF and identify patients with advanced disease

b. Management of HF
   i. To be able to institute an effective plan for the diagnostic evaluation of patients with new onset HF
   ii. Understand the role of non-pharmacologic interventions including diet and education
   iii. To have a full understanding of the multiple pharmacologic treatment options now available, and to recognize the appropriate indications for each therapy
   iv. Understand the treatment options for the management of arrhythmias in HF
   v. Be aware of treatment options for the management of specific cardiomyopathies including cardiac amyloidosis, sarcoidosis, Fabry’s disease etc.
   vi. Understand the indications for device therapy including implantable cardiac defibrillators and biventricular pacing devices
   vii. To understand the indications for heart transplant consideration
   viii. Understand the concepts of disease management and health care delivery

II. Inpatient Management Objectives

a. Diagnosis, assessment and prognosis
   i. Ability to obtain complete medical histories, including review of patient medical records, and perform accurate examinations with an emphasis on cardiac findings
   ii. To be able to interpret the results of laboratory testing, heart catheterizations, hemodynamics, cardiopulmonary stress testing, echocardiography, nuclear stress-testing, cardiac CT/MR and endomyocardial biopsies
   iii. To be able to risk stratify patients with HF and identify patients with advanced disease

b. Management of decompensated patients
   i. To recognize the role of hemodynamic monitoring including pulmonary arterial catheters
ii. To understand the role of inotropes, vasopressors and vasodilators

iii. To be able to manage volume overload using standard therapies including diuretics, and the role of ultrafiltration and hemodialysis in appropriate patients

iv. To be able to recognize the need for mechanical circulatory support in patients with advanced or refractory disease, and to understand the various options now available including percutaneous support devices, temporary and permanent implantable assist devices

v. Be able to contribute to discharge planning, longitudinal care and prevention of readmission

III. End-Stage Heart Failure/Palliative Care

a. To understand the role of palliative care in end-stage HF, and to be able to participate in discussions on end-of-life issues with patients, family members and other providers

HEART TRANSPLANTATION CURRICULUM

I. Overview

To be aware of the scope, trends and outcomes of heart transplantation in the United States. To understand the role of the United Network for Organ Sharing (UNOS) and local organ procurement organizations (OPOs).

II. Indications for Transplantation

To be aware of the indications for heart transplantation.

III. Selection of patients: evaluation of the transplant recipient and selection criteria

Understand the pre-transplant work-up process, psychological and social considerations, exclusion criteria, listing procedure and status, individual issues, HLA sensitization and techniques for desensitization, the place of retransplantation, use of inotropes and assisted circulation as a bridge to transplant.

IV. Transplant listing and organ donor system

To understand transplant listing criteria and the prioritization of recipients for donor offers.

V. Indications for inotropes, hemodynamic monitoring, and mechanical support

To understand the indications for using inotropes and vasodilators, the place of hemodynamic monitoring using pulmonary arterial catheters and the indications for short and long term mechanical circulatory support.

VI. Surgical aspect of heart transplantation and early post operative care
Understand the management of donor candidates, evaluation of donor offers and the procurement of organs (‘donor runs’). Be familiar with donor and recipient surgical procedures including organ preservation, biatrial technique vs bicaval. Be aware of early and medium term complications of heart transplantation.

VII. Rejection

a. To understand and differentiate the pathophysiology of acute antibody mediated and cellular rejection as well as chronic rejection (see below). Be aware of typical clinical and pathological findings, the classification system for grading rejection and appropriate treatment strategies for each grade of rejection. To be familiar with surveillance strategies including endomyocardial biopsies, drug level monitoring, gene expression profiling and genomic markers of rejection, echocardiography and cardiac MR, immune function assays and antibody monitoring.

b. Immunesuppression: have a firm grasp of strategies for induction therapy, drugs used for chronic immunesuppression and their side effects, and therapies used for treatment of acute rejection.

VIII. Long term post-transplant care

a. Complications: to be familiar with early and late complications of transplantation.

Transplant vasculopathy: Late graft failure, immune and non-immune causes/factors, histopathological and clinical difference compared to atherosclerosis, treatment

Chronic kidney disease: role of calcineurin inhibitors, induction therapy in preserving renal function

Infections: Early vs. late infection, opportunistic infections and activation of latent infections, prophylaxis

Malignancy: leading cause of late death equaling vasculopathy, post-transplant lymphoproliferative disorders and skin cancers, role of viral factors (EBV etc.)

CONFERENCES

- **Heart transplant evaluation meeting**: The multi-disciplinary transplant team meets weekly at 7 am Monday mornings in Room 901 Oxford House to discuss the evaluation, status and listing of patients for transplant and device therapy. The CHF Fellow on the rotation and HF/Txp fellows are expected to attend.

- **Heart Failure Clinical meeting**: every Monday at 12 pm, Room 5181 MCE North Tower. This will be a clinical case presentation incorporating review of clinical, laboratory, imaging and hemodynamic data on selected cases. The CHF Fellow on the rotation and HF/Txp fellows are expected to attend these meetings.
• **Heart Failure Research meeting:** Second Tuesday of every month at 12.00 pm in Room 4212 MCE South Tower. Discussion of new and active research protocols.

• **Heart transplant outpatient discussion meeting:** 10 am Wednesday mornings in Room 901 Oxford House. This will be attended by the transplant team including attending, transplant coordinators and fellow.

**REQUIREMENTS FOR HEART FAILURE TRAINING CERTIFICATION (COCATS 3)**

**Level 1:**
1 month of training. Experience in the evaluation, management and prevention of heart failure (taken as part of 9 months of required non-laboratory clinical practice rotation).

**Level 2:**
6 months of training. In addition to satisfying all Level 1 curriculum requirements outlined, trainees will be required to have additional experiences in the interpretation of advanced heart failure patient hemodynamic data during both acute and chronic interventions and during the assessment of prognosis. One example of an additional curriculum at the Level 2 stage would be trainee rotations through outpatient electrophysiology clinics to focus on the interrogation, evaluation, and programming of implantable electrophysiologic devices used to treat and manage heart failure patients.

**Level 3:**
Additional 12 months of training. Demonstration of proficiency in the management of additional more challenging cohorts of heart failure patients (with the specified levels of exposure listed in parentheses if meeting UNOS criteria as a “heart transplant physician” is desired).
1. Patients requiring end-of-life hospice-based care
2. Patients with hemodynamic compromise severe enough to warrant chronic inotropic drug infusion support
3. Patients with heart failure and noncardiac organ transplants
4. Patients who are being evaluated for cardiac transplant or mechanical assist devices (at least 30)
5. Patients who have undergone cardiac transplant (at least 30, of whom at least 5 are seen during initial transplant hospitalization)
6. Patients with heart failure on mechanical circulatory assist devices (at least 5, of whom at least 2 are being managed during perioperative hospitalization)
7. Patients with heart failure being evaluated for implantable cardioverter-defibrillators (ICDs) (at least 50) and patients with heart failure being evaluated for cardiac resynchronization therapy (CRT) (at least 50)
8. Device interrogation and interpretation in patients with implanted ICD or ICD-CRT devices (at least 100)

**ABIM SUBSPECIALTY CERTIFICATION IN HEART FAILURE AND TRANSPLANTATION**
The training pathway involves satisfactory completion of four years of training – 36 months of accredited cardiovascular disease fellowship including 24 months of full-time clinical training, plus 12 months of advanced heart failure and transplant cardiology fellowship training (total 48 months) that meets the following criteria:

- Advanced heart failure and transplant cardiology fellowship training must be undertaken in programs accredited by the Accreditation Council for Graduate Medical Education (ACGME) when accreditation has been established (currently estimated to be July 1, 2012). Until that time, advanced heart failure and transplant cardiology fellowship training must be conducted within an institution that has an accredited cardiovascular disease fellowship program.

**RECOMMENDED READING**

**HEART FAILURE**


**HEART TRANSPLANTATION**


Susan Bell, Quinn Wells, Henry Ooi, June 2010.