

Arkansas Children's Hospital Pediatric Cardiology Section

Clinical Fellowship / Instructorship in Advanced Pediatric and Congenital Cardiovascular Imaging

Program Goals, Structure, and Expectations

Revised 10/2020

Overview & Philosophy:

This one-year program seeks to train the clinical fellow / instructor in advanced imaging modalities used for the diagnosis of pediatric and congenital heart disease. The goal is to both teach a new skillset to the fellow and support him/her as he/she becomes independently responsible for the general pediatric cardiology practice he/she has just learned in the categorical pediatric cardiology fellowship.

Goals & Objectives:

1. Expand skillset in advanced imaging, including developing at least two of the following:
 - a. Performance and interpretation of transesophageal echocardiography
 - b. Performance and interpretation of fetal echocardiography and consultation
 - c. Performance and interpretation of cardiac magnetic resonance imaging and/or cardiac computed tomography

2. Facilitate continued growth in all facets of general academic pediatric cardiology:
 - a. Independently perform and interpret transthoracic echocardiograms, and teach this skill to learners (fellows)
 - b. Independently staff outpatient cardiology clinics, including the teaching of learners (medical students)
 - c. Independently staff inpatient service teams, including the teaching of learners (residents)
 - d. Coordinate review of cases for presentation in the weekly cardiology case conferences
 - e. Teach categorical fellows in educational conferences throughout the year

Specific requirements for training completion:

The training period lasts 12 months. The minimum number of studies cited in the following sections includes studies performed during the preceding categorical pediatric cardiology fellowship.

General pediatric cardiology

The imaging fellow will continue to solidify his/her skills as a general pediatric cardiologist during the fellowship. To achieve this, he/she will have billing privileges for all general pediatric cardiology services, including outpatient and inpatient consultation, electrocardiogram interpretation, cardiac monitor interpretation, and transthoracic echocardiogram interpretation. Advanced imaging services, such as transesophageal echocardiography, fetal echocardiography and consultation, and cardiac MRI and CT interpretation, will be billed by the attending staff cardiologist or radiologist.

The fellow must be Board-eligible or certified in pediatric cardiology and must have a valid Arkansas medical license. He/she will be assigned the rank of Clinical Instructor. The imaging fellow will maintain a panel of clinic patients at least one half-day per week, during which time he/she will participate in the education of learners (esp. medical students). The imaging fellow will staff the inpatient/consult services for two weeks and two weekends during the year, during which time he/she will also participate in teaching the learners (esp. residents). The imaging fellow will take overnight cardiology call 6-8 times during the year. He/she will otherwise be available for emergent overnight and weekend imaging needs, as able and within reason, for the combined goal of meeting patient care needs and enhancing the fellow's education.

Transthoracic echocardiography (TTE)

The imaging fellow is expected to meet level III reader status by the end of the fellowship, as outlined by the American College of Cardiology and endorsed by the American Society of Echocardiography¹. This includes performance of at least 300 studies and interpretation of at least 750 studies.

TABLE 2 Summary of Training Requirements for Echocardiography

Level	Duration of Training* (Months)	Cumulative Duration* of Training (Months)	Minimal No. of TTE Examinations Performed	Minimal No. of TTE Examinations Interpreted	TEE and Special Procedures
I	3	3	75	150	Yes†
II	3	6	150 (75 Add)	300 (150 Add)	Yes‡
III	3	9	300 (150 Add)	750 (450 Add)	Yes

*Typical duration assuming acceptable progress toward milestones and demonstrated competency. †Exposure to TEE and other special procedures. ‡Completion of Level II and additional special training are needed to achieve full competence in TEE and other special procedures.

Add = additional; TEE = transesophageal echocardiography; TTE = transthoracic echocardiography.

The imaging fellow will staff the echo lab one day per week. If the imaging fellow has not performed 300 studies by the beginning of the 4th year, he/she will begin by performing and interpreting studies. Once 300 studies have been performed, he/she will shift the focus to interpretation of studies performed by sonographers, as critical evaluation of another's images is a skill in its own right.

The imaging fellow will additionally take an active role in teaching TTE to the categorical pediatric cardiology fellows. For example, the imaging fellow will present one or more sessions during Echo Boot Camp.

Throughout the year, the imaging fellow will be available to assist in obtaining challenging images and will coach categorical fellows in echocardiography techniques as needed. Should important anatomy be inadequately demonstrated on an overnight study performed by the categorical fellow/sonographer on a new patient, the imaging fellow will assist the post-call fellow in demonstrating the missing elements of anatomy early the following morning. The imaging fellow may be asked to assist overnight in the rare case that a critical component of anatomy cannot be demonstrated by the categorical fellow and sonographer.

Transesophageal echocardiography (TEE)

The imaging fellow must include TEE as one of the two skills to master over the course of the year. A minimum of 25 esophageal intubations and 50 TEEs (performed and interpreted) will be required of all imaging fellows^{1,2}. These should include both intraoperative studies and studies for guidance during interventional procedures, as well as competency in 3D echocardiography. The imaging fellow will understand the indications and contraindications to TEE. He/she will be facile in reporting relevant findings to the surgeon or interventionalist in real time. This competency will be achieved predominantly on the day of the week that the imaging fellow staffs the echo lab.

Fetal echocardiography and consultation

The imaging fellow may elect to master fetal echocardiography and consultation during his/her fellowship. A minimum of 50 fetal echocardiograms (performed and interpreted) will be required as a core competency of all imaging fellows². Involvement in at least 100 total cases will be required for those who choose fetal cardiology as one of their emphasis areas.

The imaging fellow will master the fundamental skills of determining fetal position, situs, cardiac anatomy, and cardiac rhythm. He/she will also observe and participate in the discussion of the findings with the parents, alongside faculty. Finally, the imaging fellow will understand common associations of fetal heart disease with extracardiac structural abnormalities, syndromes, and chromosomal abnormalities.

Cardiac magnetic resonance (CMR) imaging and cardiac computed tomography (CCT)

The imaging fellow may elect to master CMR and/or CCT imaging during his/her fellowship. A minimum of 3-6 months of dedicated CMR training is necessary to achieve competency in this area, though this time may be non-contiguous². Participation in a minimum of 20 CMR examinations will be required as a core competency of all imaging fellows. For those who choose CMR imaging as one of their emphasis areas, the complete interpretation of at least 100 CMR examinations will be required². Of these, the imaging fellow will be directly involved in the acquisition and post-processing of at least 50 studies². Furthermore, the imaging fellow will develop an understanding of MRI physics, instrumentation, nomenclature, and safety.

A minimum of 3 months of dedicated CCT training is necessary to achieve competency in this area, though this may also be non-contiguous. Participation in a minimum of 10 CCT examinations will be required as a core competency of all imaging fellows. For those who choose CCT imaging as one of their emphasis areas, the complete interpretation of at least 50 CCT examinations will be required. Of these, the imaging fellow will be directly involved in the acquisition and post-processing of at least 30 studies. Furthermore, the imaging fellow will develop an understanding of CT physics, instrumentation, nomenclature, and safety.

Cardiology case conferences

The imaging fellow will be responsible for coordinating the presentation of imaging data during the weekly cardiology case conferences. This includes ensuring completeness of the available data to answer the referring cardiologist's question, as well as coaching the categorical fellows to give well-organized, complete, yet succinct presentations. A greater degree of involvement in the presentations may be required when the assigned categorical fellow is a junior fellow, particularly when advanced imaging is part of the data review.

Academic productivity and research

The imaging fellow will give 4 didactic lectures to the categorical pediatric cardiology fellows throughout the academic year.

In addition to the teaching responsibilities outlined above, the imaging fellow will be expected to remain active in research during his/her fellowship. A scholarly activity project will be defined at the onset of advanced training and should ultimately culminate in a presentation at a national meeting and submission of a manuscript for publication in a peer-reviewed journal. This work product is in addition to that required in the categorical fellowship, though the projects may be closely related.

Sample work week:

The imaging fellow's time will be allocated according to the professional goals and priorities of the fellow, within the framework and expectations outlined above. The following work week illustrates an example of a possible distribution of the imaging fellow's time.

Day of the week	Activity
Monday	7:30am – 10am: Week in preview conference
	10am – 5:30pm: Outpatient clinic
Tuesday	7:30am – 5:30pm: Echo lab, incl. TEE
Wednesday	7:30am – 5:30pm: Fetal clinic <i>-or-</i> cardiac MRI/CT, per preference
	Finalize preparations for surgical conference
Thursday	7:30am – 3pm: Fetal clinic
	3pm – 5:30pm: Cardiac case conference
Friday	7:30am – 5:30pm: Fetal clinic <i>-or-</i> cardiac MRI/CT, per preference

References:

- ¹Ryan et al. "COCATS 4 Task Force 5: Training in Echocardiography." JACC. 2015. 65(17): 1786-99.
- ²Srivastava et al. "Task Force 2: Pediatric Cardiology Fellowship Training in Noninvasive Cardiac Imaging." Circulation. 2015. 132:e57-e67.