Cardiology in the Young

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Advanced fellowship training for cardiology fellows in acute care cardiology

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Abstract

Hospitalised children have become more medically complex and increasingly require specialised teams and units properly equipped to care for them. Within paediatric cardiology, this trend, which is well demonstrated by the expansion of cardiology-specific ICUs, has more recently led to the development of acute care cardiology units to deliver team-based and condition-focused inpatient care. These care teams are now led by paediatric cardiologists with particular investment in the acute care cardiology environment. Herein, we describe the foundation and development of an Acute Care Cardiology Advanced Training Fellowship to meet the clinical, scholarly, and leadership training needs of this emerging care environment.

Acute care cardiology (ACC), defined as the care of hospitalised non-critical care cardiac patients, is increasingly recognised as an important contribution to the advancement of paediatric cardiology-based outcomes. The primary aim of the acute care cardiology unit (ACCU), or the acute care cardiology clinical service, is to facilitate "safe, efficient, and successful discharge of patients to their home environment in the context of monitoring all patients to prevent and treat clinical deterioration".[1] Presently, there is wide variation in the context and staffing of these units, but increasingly many have developed a select group of cardiologists and advanced practice providers to manage the care of these unique patients.[2,3] Analogous to the development of Hospital Medicine within the field of general paediatrics, as well as cardiac critical care within paediatric cardiology, the intentional development of an Acute Care Cardiology Advanced Training Fellowship will foster the expansion of new discovery and limit unnecessary variation within clinical and nonclinical ACC domains.

Children with unique and often complex health care needs are growing in prevalence as a result of improved survival in the face of challenges such as prematurity, congenital anomalies, and chronic health conditions. These children are at higher risk of chronic physical, developmental, behavioural, and mental health conditions beyond those historically described and as a result have increased in-hospital and at home needs which elevates the associated resource utilisation.[4] This well recognised health system need has been successfully addressed by inpatient hospital medicine teams both in terms of addressing the acute and chronic clinical issues, as well as the multiple transitions of care between the hospital and home environment.[5] Hospital Medicine fellowships were developed over 15 years ago to address these patient needs and have since established core competencies within clinical care, core skill development, and system improvement across a 2-year curricular framework.[6] These training programmes include core clinical rotations, health systems exposure, scholarship (including improvement science, clinical and translational research, medical education, leadership, and advocacy), and individualised curriculum with the clinical and nonclinical activities guided by the learning needs and career plans of the individual trainee.

Within paediatric cardiology, evolving patient-related medical complexity is a result of a great number of innovations and discoveries such as vasodilator therapies (systemic and pulmonary), advanced heart failure management including ventricular assist devices, cross-sectional imaging advances for improved diagnosis and interventional planning, greater monitoring capacity, expanded respiratory support options, and most critically, enhanced surgical and catheter-based interventions.[7] These developments have occurred within an environment defined by greater external pressures and focus on CHD hospitalisation outcomes – including hospital length of stay, readmission, complications such as central line associated blood stream infection, and cost – as well as more transparent public reporting.[8,9] As a result, previous systems responsible for these patients and care domains no longer meet the pressures of this evolving clinical environment adequately.

Pediatric cardiology has already responded to these challenges by developing cardiac critical care training programmes in response to the evolving sophistication of the intensive care environment.[10,11] These fellowships include core curricular competencies necessary to evaluate and treat patients with critical cardiac and non-cardiac primary care, function as a professional

member of a multidisciplinary team with excellent communication skills, and develop quality improvement and patient safety-focused skills.[11] While the ACCU does not require all of the procedural skills and intensive management required in a critical care environment, many of the medical knowledge and non-clinical core competencies are immediately relevant within the ACC environment. In addition, the evolving definition of what constitutes a cardiac critical care versus an acute care patient deserves representation from both clinical spheres, and requires a greater depth of experience and investment.

Properly trained with the aid of specific core competencies, appropriate skill development, scholarly maturation, and leadership exposure, the ACC advanced fellow meets the needs of the field. Herein, we describe the first ACC Advanced Training Fellowship.

Curriculum

The ACC Advanced Training Fellowship at Cincinnati Children's Hospital Medical Center was developed in partnership between the leadership of the categorical cardiology fellowship and the ACCU. The curriculum was informed and advised by the 3-year ACGME accredited Pediatric Hospital Medicine Fellowship at the institution. The ACC fellowship was approved by CCHMC's Office of Graduate Medical Education in January, 2019. Successful applicants for this 12-month institutionally supported training programme are required to have completed a paediatric cardiology categorical fellowship.

ACC Advanced Fellowship teaching staff include the ACC faculty and select members of the cardiac ICU and advanced heart failure (ventricular assist device) faculty. In turn, the ACC Advanced Fellow provides context-specific education for members of the CCHMC ACC team, which includes rotating first year categorical cardiology fellows, unit-specific advanced practice providers, and first year paediatrics residents. Additional ACC team members include a unit-dedicated pharmacist, social worker, care manager, and nutritionist. Additionally, the Advanced Fellow is expected to collaborate regularly with both ACCU nursing leadership and bedside nursing staff to cultivate staff education and partnership. The majority of the training occurs within the CCHMC main campus, with external time at the Heart Institute partner location at the University of Kentucky, as well as an additional ACC programme, as able. ACC clinical service responsibilities and the non-clinical expectations are outlined below and shown in Table 1:

Table 1. ACC Advanced Training Fellowship curriculum schedule

Rotation	Weeks
ACCU service (includes overnight home call)	
Weekend + weekday	12
Weekday only	8
CICU service	4
External ACCU – Kentucky Children's Hospital	2
External ACCU – PAC^3 partner center	2
Elective	2
Non-clinical – research/scholarly	18

Clinical training

1. ACCU service, 20 weeks (including one weekend a month): These weeks include home call during evenings and, as appropriate, weekends. The advanced fellow leads the entire multidisciplinary team through family-centered rounds and drives the clinical decision-making under the supervision of the ACC faculty.
2. CICU service, 4 weeks: The advanced fellow provides clinical support to front-line advanced nurse practitioners and categorical cardiology fellows. In addition to the patient care experience, the ACC fellow develops an understanding of institution-specific patient flow and levels of care delivery as appropriate between the ACCU and the CICU.
3. External ACCU, 2 sets of 2 weeks: External ACCU time is facilitated and supported by the institution in order to experience an alternative ACCU care model. Specifically, two weeks of time are spent at Kentucky Children's Hospital through the Joint Heart Programme between CCHMC and the University of Kentucky and two weeks are spent at a Pediatric Acute Care Cardiology Collaborative (PAC^3)[1] partner centre of the fellow's choosing.
4. Elective, 2 weeks: In alignment with the fellow's clinical interests, two weeks of elective time allows for exposure to ACC-relevant fields. For example, fellows can rotate with the hospital adult medicine consult team or the complex care inpatient team, or with an adult cardiology team at a neighbouring adult academic hospital.

Non-clinical training

A number of scholarly and research requirements compose the fellowship expectations for the remaining 18 weeks. Under the guidance of the Program Director and a faculty research mentor, the fellow is expected to generate an academic product within one of four scholarly domains: clinical research, quality improvement science, education, or advocacy. The fellow has the opportunity to participate in advanced QI programmes, lead QI projects on the ACCU, and obtain additional Master's-level education. At CCHMC, this includes institutional courses through the Anderson Center for Healthcare Improvement and education through the University of Cincinnati. The fellow leads ACCU-focused educational sessions for the ACC advanced practice providers and categorical fellows. In addition, the fellow is invited to participate in operations and administrative meetings to develop leadership and administrative experience. These sessions include weekly meetings with the ACCU nursing leadership, as well as monthly patient outcome review panels (readmissions, transfers back to the ICU). Lastly, the trainee is also expected to attend all PAC^3 meetings and participate in a PAC^3 committee and an ongoing multicenter PAC^3 project. Involvement in PAC^3 develops experiential learning in multicenter collaboration, understanding of variation between ACCU contexts and clinical practices, and networking with ACCU physician, nursing, and parent leaders.

Discussion

Care of increasingly complex, hospitalised paediatric cardiac patients benefit from a dedicated faculty and directed team structure. As a result, the ACC environment provides a unique opportunity for advanced fellowship training in order to optimise

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clinical and non-clinical programmatic and scholarly discovery. Informed by the core competencies and curricular framework of paediatric Hospital Medicine and cardiac critical care fellowships, the ACC Advanced Fellowship aims to deliver the GME-approved foundation necessary to develop tomorrow's leaders.

While a three-year categorical cardiology fellowship provides clinical experience sufficient to be familiar with the fundamentals of the ACCU, an additional ACC fellowship year affords unique clinical leadership exposure to both common and uncommon patient types, as well as the scholarly and operational skill development to advance the field. Furthermore, general categorical cardiology fellowship only requires a minimum of four months of inpatient time, and aims for all fellows to "acquire the knowledge and skills necessary to become a competent consulting paediatric cardiologist".[12] The aim of the ACC advanced fellow is to become a leading paediatric cardiologist within the hospital domain of care. As a source of comparison, when surveyed, graduates of paediatric Hospital Medicine fellowships reported higher levels of perceived competency in core and specialised clinical skills such as pain management, nutrition, newborn care, and management of technology-dependent patients when compared to non-fellowship trained early career paediatric hospitalists.[13] It can thus be expected that the graduate of an ACC advanced fellowship would feel more competent on the ACCU than a general cardiologist.

There is significant variation in ACCU environments, such as staffing, resources, and care capabilities.[2,3] Categorical paediatric cardiology fellowship typically allows for observation of a single inpatient environment. In order to generalise care practices to other hospital systems, exposure to three different ACCU environments through an advanced ACC fellowship allows the trainee to consider appropriate application of different care models in their future practice. Additionally, a deeper understanding of the unit's operational structure and established partnership with nursing and hospital leadership builds the insight needed to lead an ACCU across different environments. Fellowship-trained paediatric hospitalists report higher perceived non-clinical competency in healthcare areas such as business practice, quality improvement, safety, cost-effective care, medical education, evidence-based medicine, and research than their non-fellowship trained peers.[13] Pediatric Hospital Medicine fellowship training has led to early productive careers in academic hospitals with leadership roles and published research in areas such as quality improvement and education.[14] Given the similarities, advanced ACC fellowship training should generate the same improved competency in non-clinical areas, as well as greater academic productivity.

Finally, as the field of paediatric cardiology is becoming increasingly collaborative, with a greater focus on learning from shared de-identified patient outcomes and joint quality improvement efforts, early participation within the PAC^3 learning network provides the foundation and relationship for successful future collaboration.[1] PAC^3 aims to improve outcomes within the acute care environment and has previously demonstrated the capacity to reduce post-operative length of stay, and the opportunity to participate fully in this learning framework is critical to the accelerated maturation of the advanced fellow. Early access to opportunities to establish roles within the next generation of PAC^3 leaders through national presentations, development of and participation in multicentre projects, and committee leadership access provides the advanced fellow an immediate spring board to their academic journey.

With continued growth and development of training programmes for ACC advanced fellowships, establishment of a curricular framework will likely be needed to achieve consensus on the competencies necessary for ACC training. Similar to the consensus-based frameworks developed within Pediatric Hospital Medicine[6] and cardiac critical care,[11] this curriculum can be anticipated to include the six established Accreditation Council for Graduate Medical Education core competencies assessed by the American Board of Pediatrics: medical knowledge, patient care, systems-based practice, practice-based learning and improvement, professionalism, and interpersonal and communication skills. Standardization of ACC advanced fellowship curriculum and training programmes can be expected to follow.

Conclusion

The ACC field continues to develop in response to the challenges posed by paediatric cardiac patients with increasing medical complexity. Following similar training pathways developed within paediatric hospital medicine and cardiac critical care, an ACC Advanced Training Fellowship can provide the clinical and non-clinical training to establish the next generation of leaders within the field.

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