

Innovative training program for advanced practice providers in electrophysiology



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Cardiac electrophysiology is a highly specialized field focused on the management of cardiac arrhythmias. Therefore, rigorous training is required for advanced practice providers (APPs) to competently practice independently within the specialty. An in-depth, 12-month training curriculum was created for electrophysiology in conjunction with a previously established APP Fellowship Program for the training of other complex subspecialties at an academic medical center. The Stanford Health Care Electrophysiology APP Fellowship Program is the first in the country to provide in-depth education and training for novice APPs to deliver high level care to patients with cardiac arrhythmias. The training program has

proven to be successful in transitioning novice APPs to independent practitioners within the specialty since its inception in 2021.

KEYWORDS Advanced practice; Training; Education; Electrophysiology; Innovation

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Introduction

The Stanford Advanced Practice Provider (APP) Fellowship Program was developed to provide foundational training for newly graduated or new to specialty APPs. In 2016, the APP Fellowship Program was launched with Cancer Care as the primary specialty. After its inception, the Fellowship steadily evolved with the addition of the Cardiothoracic Surgery Fellowship in 2018 followed by the Administration Fellowship in 2019, both of which were the first fellowships in their specialties in the United States at that time. The APP Fellowship Program stemmed from a collaborative effort between the Center for Advanced Practice, the Center for Education and Professional Development, and specialty service lines. Currently, the APP Fellowship Program at Stanford Health Care (SHC) is an accredited transition-to-practice APP Fellowship Program. The program success is attributed to the strong institutional support that has been essential to its development and sustainability.

The Electrophysiology (EP) Service at SHC began using APPs in 2007 with an expectation that they would practice independently at the top of their licensure. The complexity of the specialty needed extensive training of APPs to enable them to meet the expectations for competent, independent

KEY FINDINGS

- The Stanford Healthcare Electrophysiology (EP) Advanced Practice Provider (APP) Fellowship is the first in the country to provide in-depth education and training for novice APPs to deliver high level care to patients with cardiac arrhythmias.
- The EP APP Fellowship training program has proven to be successful in transitioning novice APPs to independent practitioners within the specialty since its inception in 2021.
- The Fellowship Program in EP was found to be a feasible strategy for recruitment and training and with a current retention rate of 100% for those hired after graduating from the EP APP Fellowship.

practice. This created a need for innovative training programs for APPs in EP. With the existing APP Fellowship Program being successfully used for training in the specialties of Cancer Care, Cardiothoracic Surgery, and Administration, it was believed that the APP Fellowship Program would be the best fit for the needs and vision of the EP service. The infrastructure of the Fellowship Program promoted professional growth and development within the institution, yet provided ample opportunity for systematic specialty education. It was a desirable option for EP to use for the training of APPs. In 2020, the EP APP manager submitted a comprehensive

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application requesting EP be considered as a specialty to be added to the existing APP Fellowship Program.

The application to have EP considered as an added specialty to the existing APP Fellowship Program required an EP APP Fellowship Leadership team to be created, a detailed curriculum with clinical rotations to be designed, and preceptors within the existing EP APP team to be identified. After a competitive institutional application process, EP was selected as the specialty to join the Stanford Health Care APP Fellowship Program in 2021 because the EP APPs practice at the top of their licensure, exhibit a high level of professional expertise, and deliver high-quality patient care and the application provided evidence that the EP service had appropriate resources to support the Fellowship Program.

The objective was to determine whether the EP APP Fellowship Program was feasible and effective in recruiting, training, and retaining competent APPs in EP.

Methods
Fellowship structure

The APP Fellowship Program at SHC is led by the APP Fellowship Program Director. The APP Fellowship Program Director reports to the Chief Advanced Practice Officer and is accountable for ensuring that all individuals supporting the program are appropriately oriented and trained. Each clinical specialty has an APP Fellowship Specialty Leader with a programmatic report to the APP Fellowship Program Director (Figure 1). In addition, all the APP Fellows are hired by the APP Fellowship Program Director and report directly to the Director throughout their fellowship training.

Each specialty constructs a team that includes a designated Specialty Leader, a Physician Leader, Primary Preceptors, and a Specialty Advisory Group (Figure 1).

The APP Fellowship Specialty Leader is an APP with at least 5 years of clinical experience within the specialty who is familiar with the culture of the institution—SHC—and is experienced with the principles of adult learning. The Specialty Leader is required to complete the SHC Preceptor Course and has effective communication skills. The Specialty Leader clinically supervises the APP Fellows within the specialty area and leads the specialty group meetings. The Specialty Leader serves as the clinical expert in the specialty practice, providing education and oversight to the clinical rotations. The close collaboration between the APP Fellowship Program Director and the Specialty Leader is instrumental in identifying the quality impact of the Fellowship Program. The Specialty Leader has a minimum commitment of 0.4 of a 1.0 clinical full time equivalent (or 16 of 40 hours per week) for 12 months.

The APP Fellowship Physician Champion is an experienced SHC physician within the specialty, often the specialty medical director or department chair, who articulates the value of the APP Fellowship, serves as a clinical expert in the specialty practice, and adds to the interprofessional team of the APP Fellowship Program. The Physician Champion works in close collaboration with the APP Fellowship Program Director and Specialty Leader to assist with the provision of clinical direction and education. The Physician Champion also provides access to interprofessional groups while working on quality improvement projects and introduces varied venues for gaining knowledge.

The APP Fellowship Primary Preceptor is an experienced SHC APP that demonstrates clinical competencies within the designated specialty and has a minimum of 1 year of APP experience. The Primary Preceptor must complete the SHC Preceptor Course to learn concepts and methods for providing peer support, perform clinical evaluations, and

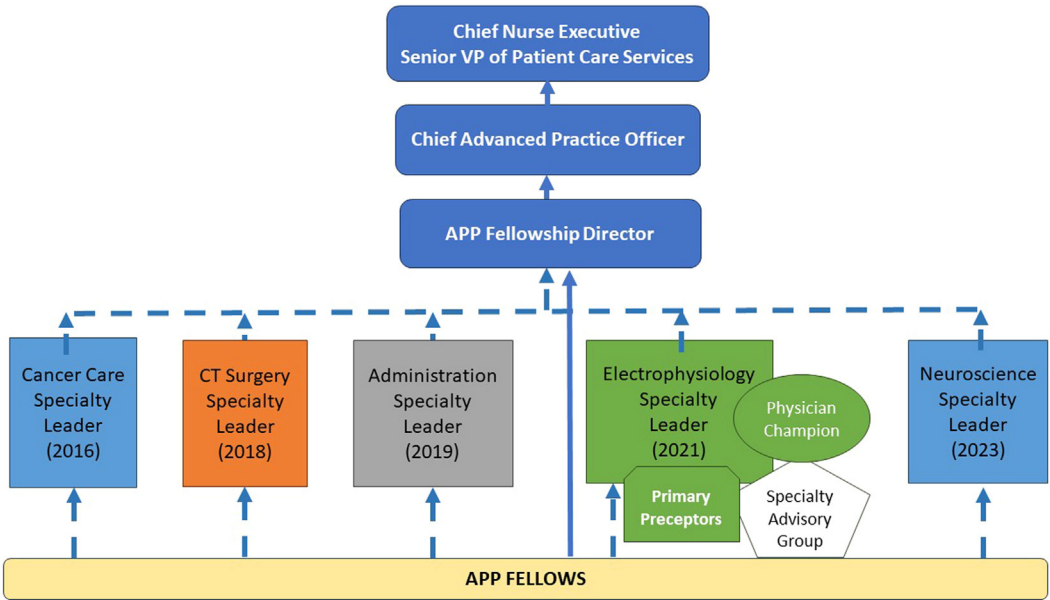


Figure 1 Organizational chart of the Advanced Practice Provider (APP) Fellowship.

role-model organizational enculturation. The Primary Preceptor works in close collaboration with the APP Fellowship Program Director and Specialty Leader to provide clinical direction and education for the APP Fellow. The Primary Preceptors are instrumental in guiding the clinical progression of the APP Fellow by providing the APP Fellows opportunities to develop and enhance clinical reasoning and psychomotor skills that are required for entry into advanced practice roles.

The Program Director and Specialty Leaders make up the APP Fellowship Leadership team. Together, they collaboratively contribute to program planning, decision making, and ongoing program evaluation. They ensure that the program aligns with the goals of the organization and stays responsive to the evolving needs of the health care environment. The Specialty Advisory Group includes the Physician Champion, Primary Preceptors, other selected clinical leaders/managers, Alumni APP, and current APP Fellows. They meet with the Specialty Leader and Program Director every 4 months to provide program evaluation feedback and provide input and guidance on specific aspects related to training APPs within their specialties. Collectively, they serve as a valuable resource for aligning the program to the unique needs of each clinical specialty area.

Program description

The SHC APP Fellowship Program offers 12-month paid and fully benefited positions that includes didactic and practice-based learning. The APP Fellowship Program hires 1–3 new graduate APPs per year for each clinical specialty: Cancer Care, Cardiothoracic Surgery, EP, and, most recently, Neurosciences. There is also a Fellowship in Administration for APPs with more than 5 years of clinical experience who want to transition to a leadership role. The SHC APP Fellowship Program is accredited with distinction by the American Nurses Credentialing Center in all specialties except EP. Because the EP APP Fellowship Program commenced in 2021, there are plans to apply for EP accreditation in 2024.

The SHC APP Fellowship Program focuses on 3 learning approaches:

1. Practice-based learning with a minimum of 1250 hours of active and observed learning experiences;
2. Weekly didactic learning with a minimum of 500 hours dedicated to specialty-specific presentations, self-learning modules, journal club, simulated learning for high-fidelity/low-frequency clinical scenarios, case studies, project trainings, presentation guidance, and specialty certification; and
3. Professional development with the APP Fellows practicing communication skills during a tailor-made communication series, attending APP Grand Rounds, participating in APP Shared Leadership Council, completing a research study or process improvement project in their specialty area, submitting an abstract for presentation at a specialty conference, and attending/presenting at a regional and/or national APP or specialty conference.

It is essential for the APP to learn how to develop and conduct a process improvement/quality improvement project. APPs within the APP Fellowship Program are trained to identify a gap in the health care system process and then formulate methods to solve a problem or initiate a change within that system process. The APP Fellows lead these projects by learning a standard approach to continuous improvement and problem solving that is applicable across all levels of interdisciplinary teams. The goal of the project is to complete a comprehensive literature review and identify a practice change that will provide safe, reliable, high-quality patient care that is sustainable.

In addition to the SHC APP Fellowship Program, there is a structured institutional mentorship program for all APPs hired at SHC who have less than 3 years of advanced practice experience. The mentorship program includes facilitated sessions to discuss/develop strategies to overcome barriers and successfully meet challenges that they may encounter while establishing their APP practice. The APP Fellows also attend the mentorship program.

Curriculum

The EP APP Fellowship Program curriculum was designed using the SHC APP Fellowship Program curriculum blueprint that includes methods to deliver content related to the clinical competencies for each specialty and evaluates the information received. The EP APP Fellowship Program curriculum was based on the 2020 ACC Clinical Competencies for Nurse Practitioners and Physician Assistants in Adult Cardiovascular Medicine,¹ the Allied Professional Educational Competencies Developed by the Council of Allied Professionals of the Heart Rhythm Society,² and the 2021 HRS Educational Framework for Clinical Cardiac Electrophysiology.³ The EP APP Fellows are expected to receive certification related to their clinical specialty by the completion of the Fellowship Program. The electrocardiogram (ECG) interpretation is an essential skill for the EP APP. The ability to accurately interpret a cardiac rhythm enables them to correctly diagnose and develop a treatment plan for patients with arrhythmias. For developing their arrhythmia interpretation skills, the ECG Academy course accredited by the American Association of Nurse Practitioners and approved for both nurse practitioners and physician assistants is used.⁴

The ability to manage cardiac implantable electronic devices (CIEDs) is a unique, complex skill that must be mastered to independently practice in EP. This training has the steepest learning curve, and it takes an EP APP close to a year to become proficient and independent in CIED management. The EP APP Fellows are enrolled in a structured training that includes the Medtronic Academy self-study modules,⁵ attendance at classes provided by device manufacturers, and hands-on sessions in the outpatient device clinic and on the inpatient patient care units.

The EP APP Fellowship focuses on core competency training on the diagnosis and medical management of arrhythmias, inpatient/outpatient procedural management,

and management of patients with CIEDs. The program includes 6-week clinical rotations focused on inpatient arrhythmia management, outpatient arrhythmia management, performing cardioversions, CIED management, and

observing/assisting in the EP laboratory (Figure 2). In addition, multiple 1-week mini clinical rotations with selected cardiology subspecialties are interspersed throughout the foundational EP clinical rotations to expose them to the

	APP 1	APP 2
Week 1	Bootcamp	Bootcamp
Week 2	Bootcamp	Bootcamp
Week 3	Clinical Bootcamp	Clinical Bootcamp
Week 4	Clinical Bootcamp	Clinical Bootcamp
Week 5	Inpatient/device	Inpatient/device
Week 6	Inpatient/device	Inpatient/device
Week 7	Inpatient/device	Inpatient/device
Week 8	Inpatient/device	Inpatient/device
Week 9	Inpatient/device	Inpatient/device
Week 10	Inpatient/device	Inpatient/device
Week 11	Inpatient HF	Inpatient HF
Week 12	Inpatient HF	Inpatient HF
Week 13	Inpatient HF	Inpatient HF
Week 14	Inpatient HF	Inpatient HF
Week 15	Inpatient HF	Inpatient HF
Week 16	Inpatient HF	Inpatient HF
Week 17	Mini Rotation	Mini Rotation
Week 18	Cardioversion/device	Cardioversion/device
Week 19	Cardioversion/device	Cardioversion/device
Week 20	Cardioversion/device	Cardioversion/device
Week 21	Cardioversion/device	Cardioversion/device
Week 22	Cardioversion/device	Cardioversion/device
Week 23	Cardioversion/device	Cardioversion/device
Week 24	Mini Rotation	Mini Rotation
Week 25	Outpatient/device	Outpatient/device
Week 26	Outpatient/device	Outpatient/device
Week 27	Outpatient/device	Outpatient/device
Week 28	Outpatient/device	Outpatient/device
Week 29	Outpatient/device	Outpatient/device
Week 30	Outpatient/device	Outpatient/device
Week 31	Mini Rotation	Mini Rotation
Week 32	Inpatient Consult	Inpatient Consult
Week 33	Inpatient Consult	Inpatient Consult
Week 34	Inpatient/device	Device
Week 35	Inpatient/device	Device
Week 36	Inpatient/device	Device
Week 37	Inpatient/device	Device
Week 38	Inpatient/device	Device
Week 39	Inpatient/device	Device
Week 40	Mini Rotation	Mini Rotation
Week 41	Device	Inpatient/device
Week 42	Device	Inpatient/device
Week 43	Device	Inpatient/device
Week 44	Device	Inpatient/device
Week 45	Device	Inpatient/device
Week 46	Device	Inpatient/device
Week 47	EP Lab	EP Lab
Week 48	EP Lab	EP Lab
Week 49	EP Lab	EP Lab
Week 50	EP Lab	EP Lab
Week 51	Elective	Elective
Week 52	Elective	Elective

Figure 2 Clinical rotation schedule for the Electrophysiology (EP) Advanced Practice Provider (APP) Fellowship Program.

Table 1 Evaluation schedule for APP Fellows and the Fellowship Program

Evaluation	Start of the Fellowship Program (0 mo)	End of each clinical rotation	End of each quarter (3, 6, and 9 mo)	Every 4 mo (4, 8, and 12 mo)	End of the Fellowship Program (12 mo)	Every 3–4 y
APP Fellow Self-Competency Assessment	X				X	
APP Fellow Clinical Competency Assessment Completed by the Preceptor		X				
Preceptor Evaluation/Feedback Completed by the APP Fellow		X				
APP Fellow Observation and Competency Evaluation by the Specialty Leader			X		X	
Specialty Leader Evaluation/Feedback Completed by the APP Fellow					X	
APP Fellow Annual Employee Evaluation by the Program Director					X	
Program Evaluation by the Specialty Advisory Group				X	X	
Program Accreditation by the American Nurses Credentialing Center						X

APP = advanced practice provider.

diversity of teams and provide an opportunity to create relationships with other APPs within the cardiovascular service line (Figure 2).

During the clinical rotations, the EP APP Fellows are expected to observe new skills and engage in hands-on learning. They are provided relevant reading assignments and asked to attend related lectures and weekly case discussions with the EP medical fellows. In addition, The EP APP Fellows are asked to review and become familiar with the most recent clinical guidelines: “Evaluation and management of premature ventricular complexes,”⁶ “2023 ACC/AHA/ACCP/HRS guideline for the diagnosis and management of atrial fibrillation,”⁷ “2019 ESC guidelines for the management of patients with supraventricular tachycardia,”⁸ and “2022 ESC guidelines for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death.”⁹ These guidelines provide a foundation for patient presentations during interdisciplinary care rounds and active engagement in discussions related to clinical decision making during each clinical rotation (Figure 2).

Evaluations

The APP Fellowship Program is regularly evaluated using competency-based evaluation tools. The APP Fellows, Primary Preceptors, and Specialty Leaders participate in the program evaluation. The APP Fellows have daily direct contact with their Primary Preceptors and meet weekly with the EP Specialty Leader and monthly with the APP Fellowship Program Director (see Table 1). All Specialty Leaders within the Fellowship meet weekly to discuss and coordinate the APP Fellowship. The Advisory Group within each specialty meets every 4 months to review the curriculum rotations and specialty content and to evaluate whether the program is meeting the projected outcomes. Modifications are made each year to the program curriculum/structure on the basis of feedback from fellows, preceptors, and the Advisory Group.

Results

Using the Fellowship Program in EP was found to be a feasible strategy for recruitment, training, and retention for EP APPs. This novel training approach was acceptable to the EP APP Fellows and to the entire EP team. With the infrastructure of the existing SHC APP Fellowship Program, the EP specialty curriculum was easily implemented and was provided adequate resources. The Primary Preceptors verbalized a sense of professional fulfillment and satisfaction by being able to contribute to the creation, implementation, and evaluation of a comprehensive onboarding program to prepare them to be the next generation of EP APPs.

Recruitment has been enhanced by the initiation of the EP APP Fellowship. Before the Fellowship Program, the EP APP manager received an average of 1–2 applications per open EP APP position. Because the SHC APP Fellowship Program launches a national recruitment search each year, the EP APP Fellowship positions are advantaged by being included in the annual national recruitment strategy. The first year, this recruitment approach resulted in 13 applications for the inaugural cohort, 19 applicants for the second year, and 21 for the third cohort. Two applicants were selected to participate in the program for the first and subsequent years after a rigorous selection process.

The program prioritizes candidates who clearly articulate their relevant experience and knowledge of the specialty, their understanding of the Fellowship, and an alignment with the values of SHC. Final selection criteria include demonstration of a passion to work in EP, high emotional intelligence, and flexibility. SHC is an equal opportunity employer, committed to recruiting a diverse pool of applicants. We value a variety of backgrounds and life experiences to enrich the program and provide comprehensive care to patients in our community.

Currently, the EP APP Fellowship limits the training to 2 fellows per year. The Fellowship is resource intensive but provides a reliable pipeline to expand the program and replace APPs who are leaving the service in a timely manner

with competent employees. In the rare event that our institution does not have open positions within our service after program completion, the Fellows would have the competence to practice at any institution.

To date, 4 EP APP Fellows have graduated from the program and are fully trained, competent, and easily enculturated into the organization after being hired as full-time permanent APPs. The third cohort is underway. The EP APP Fellows were able to interpret ECGs, manage patients with complex arrhythmias, perform cardioversion procedures, and manage patients with CIEDs with minimal supervision within the first week of employment and independently after completing 4 weeks of new employee orientation. Before the initiation of the EP APP Fellowship Program, newly hired APPs required 6–12 months of orientation and 12–18 months of device training. Although the total training time of 13 months for the EP APP Fellowship is not greatly different from those hired before the Fellowship, the structured Fellowship Program provides a comprehensive, in-depth training experience with consistent preceptors. Prior orientation efforts had been unsuccessful at maintaining consistent preceptors for an extended orientation, which is especially beneficial for APPs entering highly specialized fields or complex practice areas, such as cardiac electrophysiology.

Thus far, retention of the EP APP Fellows is 100%. All 4 EP APP Fellows hired after the completion of the APP Fellowship Program continue to be active members of the EP team⁷ and currently function as advisors/alumni for the EP APP Fellowship Program at Stanford. The entire SHC APP Fellowship Program has trained 43 APPs since its inception in 2016. Of the 43 completing the Fellowship, 94% work in the specialty in which they were trained and 72% accepted permanent employment at SHC.

Conclusion

The EP APP Fellowship is a structured program providing a novel and feasible training program for APPs in the highly specialized practice of EP. There is a scarcity of formalized training programs for EP APPs in the United States. In our experience, this training approach has been an effective strategy for incrementally hiring,

training, and retaining 4 competent, confident APPs over 2 years who significantly contribute to the EP team. The APP Fellows have also established a connection to the Stanford Center for Advanced Practice and developed a commitment for continued professional growth. We acknowledge that the success of the program largely depends on the organizational support of the program. However, the commitment from the EP team is critical for the APP Fellows to successfully transition to being an advanced provider in the specialty practice of EP. The entire EP team feels they have been rewarded by the EP APP Fellowship. As far as we know, the EP APP Fellowship is the first of its kind in the country and provides a training model that could be implemented in other institutions with appropriate resources.

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