

Title of Program

Medical Simulation Fellowship at the Center for Simulation and Research, Cincinnati Children's Hospital Medical Center

Program Director

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Identified need for specified training

Providing high-quality simulation-based training (SBT) in a healthcare setting requires skilled educators¹⁻⁷, and the increasing demands for SBT in healthcare have driven the development of simulation fellowship programs.⁸ These programs offer an opportunity for fellows to acquire a high-level of knowledge and skill in SBT development, delivery and evaluation.⁹

Prior to simulation fellowships, most simulation programs were started by faculty physicians or other healthcare providers without formal training who developed expertise through practice. SBT programs emphasize different topic areas and have differing fields of expertise. For example, medical directors of simulation centers come from anesthesia, critical care, neonatology, emergency medicine, and internal medicine, among others, and some centers started off specializing in non-technical team training (e.g., teamwork, communication), whereas others specialized in procedural training (e.g., airway management). While likely somewhat effective, this process is probably less reliable and efficient than a formal fellowship training program, leading to unwanted variation in quality of SBT in healthcare.

A recent publication in *Academic Medicine* described English-based SBT fellowship programs internationally.¹⁰ This cross-sectional survey identified 49 programs who offered simulation fellowships, 32 (65%) of which responded to the survey. Twenty-one were U.S.-based programs. The first fellowship program was started in 1998, but 56% started after 2010; 59% were hospital affiliated and 38% were medical school affiliated. Fellow backgrounds including residency graduates, and to a lesser extent medical school graduates, nurses, and non-clinical educators. In two-thirds of programs, fellows were "full time" employees, with most requiring 12-20 hours weekly of clinical duty. Funding for fellowships usually came from their clinical departments (59%), with salaries ranging from \$50,000-80,000 and often additional funding to attend national conferences and/or development workshops/courses. Fellowship programs employed a wide variety of educational methods, including conference attendance, experiential learning, research, mentorship, participation in instructor training courses, and informal contributions to simulation lab teaching. Forty-eight percent provided 10-19 hours weekly of training, with a range of 10-49 simulations per month. The top five areas of time spent were simulation training as an instructor (24%), doing research in and/or with simulation (14%), developing simulation educational curricula (13%), independent studying or reading (11%) and learning in classes or courses (8%). Over 90% of programs covered four core objectives: (a) professional values and capabilities, (b)

educational principles, practice and methodology in simulation, (c) implementation, assessment and management of simulation-based activities, and (d) scholarship.

Complete program outline, including competency-based goals, objectives, clinical and research curriculum

We have established a medical simulation fellowship through the Center for Simulation and Research at Cincinnati Children's Hospital medical Center (CCHMC). The fellowship's curricular goals and training specifics will be tailored to each fellow based on their desired focus, long-term career goals, and clinical background. The educational components and principles described below are relevant to all potential fellows.

Educational Components of Fellowship Program:

General Educational Principles:

- Adult learning theory
- Curriculum and educational session design, implementation and assessment
- Learner assessment, feedback, and evaluation
- Program development, implementation and evaluation
- Educational research methodology

Simulation Specific Principles:

- Human patient simulator and task training concepts
- Scenario design and delivery, including incorporation of technical and non-technical knowledge and skills into scenario development
- Simulation facilitation and debriefing theory and techniques
- Development of assessment tools and programs for procedural skills training and assessment, with a focus on deliberate practice to mastery learning
- Use of audiovisual recording and other technologies to enhance simulation-based research and educational programs
- Training and evaluation of instructors in simulation
- Simulation course intake and evaluation processes
- Simulation center administration
- Promotion of simulation within your institution
- Simulation center accreditation process and requirements
- Research in simulation in healthcare, emphasizing the unique positives of simulation for research, including lack of risk of patient harm, greater control of confounders, and increasing the denominator of infrequent clinical events.

Fellow Responsibilities:

- Clinical: hours per week (or shifts per month) will depend on area of subspecialty
- Educational:
 - Conceive, design, develop, pilot, implement, and assess one educational program
 - Pursuit of certification as a Certified Healthcare Simulation Educator (CHSE) through the Society for Simulation in Healthcare is encouraged, but not required

- Organize and deliver quarterly simulation session(s) for pediatric residents
- Work with pediatric residents and other trainees during their 2- or 4-week electives rotations at the Center for Simulation, including orientation, topic discussions, and evaluation
- Research: Develop an original project, including project conceptualization, protocol development, IRB submission (if indicated), enrollment of participants, measurement and analysis of outcomes, and manuscript development (if warranted). We recognize that this is difficult within a 1-year training program, however continued mentoring on our part after graduation should allow completion to manuscript. The fellow's research project will be mentored by Drs. Geis and Kerrey. The specific project will be chosen to maximize both feasibility and impact, as well as the educational value.

List of Program Faculty

- Gary L. Geis, MD - Medical Director, Fellowship Program Director
- Benjamin T. Kerrey, MD, MS – Research Director
- Aimee Gardner, BS, CP – Senior Operations Director
- Cheryl Marshall, MSN, RN, CHSE – Education Consultant

Qualifications of Applicants

All applicants must qualify for Ohio medical licensure and be either: (1) graduates of an ACGME-accredited residency and be board-certified or board-eligible, with the American Board of Pediatrics or the American Board of Emergency Medicine, or (2) certified as an advanced practice nurse in pediatric acute care medicine.

Duration of training program

One year (52 weeks)

- 47 weeks Medical Simulation fellowship core content
- 5 weeks paid time off (vacation)

Fellows are expected to spend 50% of their FTE fulfilling the above simulation curriculum requirements.

Number of trainees expected per year of training

One (1) fellow

Funding source for the training program

Individuals will work clinically in subspecialty to fund position

Impact statement

CCHMC and the Center for Simulation and Research will offer a non-ACGME accredited fellowship in medical simulation. Our center is accredited by the Society for Simulation in Healthcare in four domains: Core, Education, Systems Integration, and Research. The purpose of our simulation fellowship is to provide a foundational experience in medical simulation to qualified applicants, facilitating successful academic, clinical, and research careers in medical simulation and enhancing the quality of medical simulation in general. The cognitive and technical skills learned during the year-long fellowship will allow

applicants to independently lead the design and delivery of simulation-based training programs for graduate, continuing and interprofessional medical education. Applicants who wish to sub-specialize in medical simulation are preferred, as a prime focus of this fellowship is to develop future leaders in medical simulation and simulation-based training. Upon completion of this subspecialty training, the fellow will have the knowledge and skills necessary to augment a clinical and training environment with experiential learning through simulation-based training, thus bringing learning and education to the next level. Additionally, the fellow will work as a physician or advanced practice nurse in our emergency departments or other subspecialty unit not only to maintain and further develop their clinical skills, but also to augment our ongoing in situ simulation program in that clinical environment.

Evaluation process

The fellow will meet at the beginning of the academic year with the Fellowship Program Director to review and discuss learning objectives, responsibilities, and goals for the training year. Then, the fellow will meet monthly with the Fellowship Program Director to provide formative feedback, identify areas of need, and develop short-term and long-term plans to fulfill those needs. Input for each session will be obtained from each faculty member, the education specialists and other staff from the Center for Simulation and Research, and from clinical staff within the fellows' area of subspecialty practice. Additionally, the Fellowship Program Director will meet quarterly with the fellow and the fellow's research mentor to ensure the fellow is progressing in his/her research project. At least twice annually, the fellow will be evaluated by all the staff through an online survey instrument where all Center staff can provide feedback. Survey data will be organized and presented by the Program Director, then the fellow will be allowed to self-identify areas of need in comparison to the team-level feedback. At the end of the training year, the fellow will have an exit interview and receive summative feedback. The fellow will meet at the beginning of the academic year with the Research Director to begin planning their scholarly project. Research meetings will then occur regularly throughout the year, with the Research Director reviewing all products of the scholarly project, including the study proposal/protocol, abstract, and manuscript.

Formal training experience offered by the Center for Simulation and Research

Since 2009, the Center for Simulation and Research has offered an informal training experience for subspecialty fellows in the divisions of critical care, emergency medicine and neonatology. This grew out of a combined interest from the individual fellows and the educators and directors at the Center. These eight physicians continued their clinical, educational and training requirements within their divisions, but as time allowed they spent time at the Center to develop educational and research interests in medical simulation. Additionally, one practicing pediatric emergency medicine physician from Brazil spent one year with us on a Proctor Scholarship to further develop his expertise in medical simulation, including the development, completion and publication of a research project.

Starting in 2018, we began offering this formal 1-year fellowship in medical simulation. Over this time, we have trained one fellow per year. Our 2018-2019 simulation fellow was Dr. Sang Lee, who currently is an Emergency Medicine physician here at CCHMC and has 10% FTE as our Physician Lead – Resident Simulation. He has now received two grants focused on procedural training for prehospital emergency providers. He is also a Certified Healthcare Simulation Educator. Our 2019-2020 simulation fellow was Dr. Victoria Hartwell, who is currently a fellow in pediatric emergency medicine at CCHMC. She

developed and studied a virtual reality-based platform to train physicians and APRNs on digital block anesthesia. Our current 2020-2021 simulation fellow is Dr. Ryan Fredericks, who is a pediatric Critical Care Medicine attending at the University of Kentucky in Lexington, Ky. He is developing a simulation-based program to enhance their rapid response team process at Kentucky Children's Hospital.

In addition, the Center for Simulation and Research has offered a 2- or 4-week elective rotation for the senior (2nd and 3rd-year) pediatric residents and fellows at CCHMC since 2014. For that rotation, we have formal learning objectives, orientation, curriculum, and output requirement. Specifically, the resident must write a novel simulation scenario, partner with one of our educators to pilot the scenario in the lab, and then run this scenario at the end of their rotation in one of our standing courses. The resident facilitates the scenario and then co-debriefs the participants with one of our educators and/or directors. Our simulation fellow has a unique opportunity to work within this rotation to expand their teaching skills in scenario design, debriefing and procedural training.

References

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