

## Infectious diseases pharmacy residency programs

Infectious diseases have been a constant threat to humankind with plagues, leprosy, the Black Death in the Middle Ages, the 1918 “Spanish Flu” pandemic, and the HIV/AIDS pandemic introduced in the 1980s.<sup>1</sup> Unfortunately, this trend has not decreased. New diseases continue to emerge, such as severe acute respiratory syndrome-associated coronavirus, avian influenza, and West Nile virus, along with the resurgence of more resistant and virulent pathogens, such as tuberculosis, malaria, *Clostridium difficile*, *Staphylococcus aureus*, *Klebsiella* species, and *Enterococcus* species.

In 2002, infectious and parasitic diseases were listed as the second leading cause of death worldwide, with approximately 15 million deaths (26%) directly attributed to them and many more that may have been indirectly caused by an infection. Infectious diseases remain the third leading cause of death in the United States.<sup>1</sup>

Pharmacists with specialized infectious diseases training have become an integral part of many health care facilities, as they can optimize the management of health care resources and help reduce the spread of antimicrobial resistance. The role of the infectious diseases clinical pharmacist in improving health outcomes has been well documented,<sup>2,3</sup> and the 2007 Infectious Diseases Society of America and the Society

for Healthcare Epidemiology of America guidelines for developing an institutional program to enhance antimicrobial stewardship recognize the clinical pharmacist with training in infectious diseases as a core member of a multidisciplinary antimicrobial stewardship team.<sup>4</sup>

**What is an infectious diseases pharmacy residency?** An infectious diseases pharmacy residency is designed to prepare graduates to participate as “integral members of interdisciplinary teams car-

ing for patients with infectious diseases, assuming responsibility for their pharmaceutical care.”<sup>5</sup> Because infectious diseases pharmacy residency programs are specialty or postgraduate year 2 (PGY2) residency programs, they are designed to build on the competencies established in postgraduate year 1 (PGY1) residency training and produce a well-rounded practitioner to care for patients with infectious diseases. Recent changes in the American Society of Health-System Pharmacists (ASHP) standards require that PGY2 resident applicants have completed a PGY1 residency program.<sup>6</sup> Infectious diseases pharmacy residency edu-

cational outcomes, goals, and instructional objectives have also changed significantly since 1998, when the goals and objectives were last revised. These changes were based on expectations as to where infectious pharmacy practice is moving in the future and the Institute of Medicine report entitled *Health Professions Education: A Bridge to Quality*, which cited competencies that should be shared by all health care professionals.<sup>5</sup>

Infectious diseases pharmacy residents receive training for at least 12 months. The core competencies ensure that residents have adequate knowledge of infectious diseases and their treatment and can make patient-specific decisions using evidence-based therapeutic regimens and optimal dosing and can monitor the safety and efficacy of the selected treatment. Residents also develop leadership skills to make formulary decisions for anti-infectives, conduct research related to infectious diseases (including medication-use evaluations), educate other health care professionals on infectious disease top-



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ics, and serve as a preceptor to pharmacy students. The focus of the residency may be site specific and resident specific (e.g., outpatient versus inpatient care); however, all infectious diseases pharmacy residents attend rounds with an infectious diseases consultation service and provide services for their patients.

**Program curriculum.** According to ASHP's newly adopted accreditation standards, infectious diseases pharmacy residency programs should serve a diverse patient population with a variety of diseases and whose problems range in complexity. Seventeen infectious diseases must be included in the curriculum (e.g., bone and joint infections, fungal infections, HIV/AIDS, sexually transmitted diseases), and five required anti-infective classes must be covered (antibacterials, antifungals, antivirals, antiparasitics, and immunomodulators).<sup>5</sup> Some examples of learning experiences that would meet the intent of required outcomes, goals,

and objectives include working with an infectious diseases consultation service serving an adult population, completing a microbiology rotation, participating in an ambulatory care clinic with an infectious diseases emphasis, and antimicrobial surveillance and outcomes programs. Other learning experiences may include working in an ambulatory care AIDS clinic, a bone marrow transplantation service, an infection control service, an infectious diseases consultation service serving pediatric patients, an inpatient AIDS service, or a medical oncology and hematology service. In addition to direct patient care activities, infectious diseases pharmacy residents are required to maintain their knowledge of distributive functions by preparing and dispensing medication according to an arrangement with the residency program's institution.

Infectious diseases pharmacy residents are also required to complete a major research project and give presentations on infectious diseases topics; some programs may require that these presen-

tations meet the Accreditation Council for Pharmacy Education (ACPE) requirements for providing continuing education to pharmacists. In addition, certain programs may require residents to provide didactic training to pharmacy students or other health care professionals at an affiliated college or university.

**How to apply for a PGY2 infectious diseases pharmacy residency.**

Currently, there are 22 ASHP-accredited (or accreditation submitted) infectious diseases pharmacy residency programs.<sup>7</sup> Each program usually accepts only one infectious diseases pharmacy resident per year; however, certain positions may not be filled in a particular year. An online directory of these residencies is available from ASHP.<sup>7</sup> From this directory, a candidate can obtain pertinent information about each residency program, including contact information, benefits offered, and a brief overview of the training site that lists special features of the program.

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Institutional websites may provide additional information about the residency program training sites.

When applying to an infectious diseases pharmacy residency program, potential residents should examine the program's accreditation status, quality, patient population and services, teaching commitment, staffing expectations, work environment, and residency project requirements, as well as the popularity of the program among other potential residents.

The application process for an infectious diseases pharmacy residency and other PGY2 residencies recently changed, with the new standards becoming effective this year. Completion of a PGY1 residency is now a prerequisite for entering a PGY2 residency program.<sup>6</sup> In addition, PGY2 residency programs now participate in the ASHP Resident Matching Program, which allows candidates to interview at various institutions and rank them according to their preference. The exception to this process is at sites that offer both a PGY1 and a PGY2 residency, where an applicant can sign an early commitment during the PGY1 residency to stay at the institution for a PGY2 program.

**Career outlook.** Graduates of infectious diseases pharmacy residency programs have a variety of career options from which to choose, including infectious diseases clinical pharmacist positions in inpatient or outpatient settings, clinical pharmacy practice faculty, staff pharmacist, clinical coordinator, pharmaceutical industry positions, and fellowship training to further enhance their skills.

**Personal perspective.** After completing a PGY1 pharmacy practice residency at the Department of Veterans Affairs New York Harbor Healthcare System in New York City, I decided to pursue a specialty residency in infectious diseases and chose, after careful consideration, the James A. Haley Veterans' Hospital in Tampa, Florida.

The first month of my residency was primarily spent on facility orientation, distributive function training, and learning the functions of the antimicrobial pharmacokinetic service, which was a

longitudinal experience. During the next several months, I worked with the inpatient infectious diseases consultation service to develop my clinical knowledge of infectious diseases to meet the core program requirements. I also participated for a half-day each week in an outpatient infectious diseases ambulatory care clinic, working directly under the supervision of an attending physician and my residency director. During that time, I also participated in journal clubs, presented patient cases, delivered ACPE-accredited lectures to the pharmacy staff, and provided other lectures to infectious diseases attending physicians and fellows. Toward the end of my residency, I had the opportunity to work in the microbiology laboratory at Bay Pines Veterans Affairs Medical Center, Moffitt Cancer Center, where I received training related to infectious diseases in oncology, and Hillsborough County Health Department and Tampa General Hospital, where I was involved in the care of patient populations that were not usually seen at my primary site. Although my residency did not have a major teaching component, I did have the opportunity to serve as a preceptor to students completing their infectious diseases rotation.

During my residency, my major research project involved observing for correlations between *C. difficile* infections and outpatient fluoroquinolone use and looking for intraclass variability using a data warehouse. This study proved to be extremely challenging but provided me with experience in protocol development, institutional research and development board approval, investigational review board approval, data collection, data interpretation, and presentation of the research. This project also helped me improve my literature evaluation and writing skills.

After completing my infectious diseases pharmacy residency, I accepted a position as an assistant clinical professor at St. John's University in Queens, New York. I maintain a practice site at Jacobi Medical Center in the Bronx where I participate in rounds with the internal medicine teams. I am grateful for the versatility I acquired from the two residency programs I completed, as I am practicing at a new site that has had no previous clinical pharmacist on the service. My

PGY2 residency developed my ability to function as an independent clinical practitioner. In addition to mentoring students onsite, I teach the infectious diseases and the respiratory diseases modules at the college of pharmacy.

I chose a career in academia because it offers me the ability to teach students, conduct research, and take care of patients alongside other health care professionals. I continue to apply and build upon the skills obtained during my residency experience.

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