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We declare no competing interests.

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Death of infectious diseases physicians as the USA faces a global pandemic

Published Online
 May 7, 2020
[https://doi.org/10.1016/S1473-3099\(20\)30377-7](https://doi.org/10.1016/S1473-3099(20)30377-7)

For data on the number of active physicians in the USA by specialty see <https://www.aamac.org/data-reports/workforce/interactive-data/active-physicians-largest-specialties-2017>

For compensation data on paediatrics and infectious diseases specialists see <https://www.medscape.com/slideshow/2019-compensation-overview-6011286#1>

For compensation data on paediatric and adult infectious diseases specialists see <https://blog.doximity.com/articles/doximity-2019-physician-compensation-report-d0ca91d1-3cf1-4cbb-b403-a49b9ffa849f>

For National Resident Matching Program statistics see <http://www.nrmp.org/fellowship-match-data/>

The ongoing coronavirus disease 2019 (COVID-19) pandemic has exposed stark problems in the US health-care system. With more than half a million Americans infected with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the health-care industry is at the front line of grappling with a type of disaster that has not been seen in generations. There remains a shortage of testing kits, scalable infrastructure, and personal protective equipment to keep health-care workers and first responders safe, as well as an absence of adequately run clinical trials or clear recommendations from many of the governing bodies to guide practice. As health-care systems continue to navigate the logistics of coordinating a response to a unique problem, increased focus needs to be on infectious diseases physicians.

Infectious diseases physicians are experts who are trained in internal medicine and who complete extensive training in infections and associated diseases. Their training encompasses multiple practice settings, including epidemiology, antibiotic stewardship, international health, sexually transmitted infections, and comprehensive care of people living with HIV. Despite being one of the most frequently consulted services in most hospitals, the number of infectious diseases physicians is not keeping up with the need. According to the National Resident Matching Program statistics

for the most recent physician fellowship match in 2020, 84 (21%) of 406 available infectious diseases trainee positions in the USA went unfilled, compared with two (<0.1%) of 1010 available cardiology positions, or two (<1%) of 615 available oncology positions that went unfilled. Although the number of infectious diseases physicians in the USA has increased steadily from 6424 in 2008, to 9136 in 2018 (a 42% increase, including physicians in patient care, teaching, and research faculty), the rate of future increase is uncertain.

There are several reasons for such discrepancies in the number of infectious diseases physicians in the US health-care workforce. One reason is that infectious diseases physicians are some of the lowest paid physicians among all specialties. Paediatric infectious diseases specialists were paid the least in 2019, with adult infectious diseases specialists not paid much more. Several medical and surgical specialties, such as cardiology and neurosurgery, on average earned two to three times the amount that their infectious diseases counterparts did. This discrepancy in earning stems from a reimbursement system based on a numerical quantity, known as relative value units, which are inherently skewed toward procedure-based specialties. This system of reimbursement affects non-procedural specialties such as infectious diseases that often work at

least the same number of hours (if not more) as other physicians, but are reimbursed at a much lower rate for their services. The impact of newer payment models in Medicare, such as the Merit Based Incentive Program and Alternative Payment Models, on specialties such as infectious diseases is still unknown.

Other complicating factors include the retirement of older infectious diseases physicians (individuals older than 55 years make up a substantial portion of the infectious diseases workforce in the USA) and ensuring their timely replacement. There are also concerns around immigration policy and finding and retaining appropriate positions for the non-citizen physicians that form one-third of the infectious diseases workforce. Although the number of infectious diseases physicians is increasing, there is still substantial maldistribution that is likely to grow because rural areas are served by a smaller number of these physicians. Furthermore, the substantial cost of medical school, with the average US student graduating with US\$200 000 of debt, means that the economics of future income weighs heavily in specialty choice for many medical students.

The tangible and intangible benefits of robust infectious diseases programmes in hospitals have been known for some time. In studies of patients who have been admitted to hospital, appropriate consultation with an infectious diseases specialist has resulted in shorter stays and lower antibiotic costs,^{1,2} lower mortality for patients with sepsis,^{3,4} and fewer complications.⁵ Infectious diseases specialists are instrumental in improving transitions of care for outpatient antibiotic therapy,^{6,7} and spend considerable time leading infection prevention and antimicrobial stewardship programmes that prevent the spread of hospital-acquired infections and reduce hospital costs.^{8,9} Often overlooked, infectious diseases specialists also comprise pivotal teaching faculty at academic hospitals, honing the skills of the next generation of young physicians.

Given increasing global travel, continued emergence of new infectious diseases, antibiotic-resistant organisms, and a growing population, the role that infectious diseases specialists will have in the health of everyone in society will only increase. Similar to the AIDS epidemic in the 1990s, the current COVID-19 pandemic might spur a new generation of physicians to join the infectious diseases workforce. However, a more concerted effort might be needed to ensure a pipeline of future infectious diseases physicians in the USA that must include value-based reimbursement, pioneering policy interventions such as loan repayment eligibility for these physicians, and comprehensive immigration reform. Any less would endanger high value care in the US health-care system and under-prepare the country for future pandemics.

I declare no competing interests.

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