

The Time is Now: A Call for Renewed Support of Infectious Diseases Physician-Scientist Trainees in the Era of Coronavirus Disease 2019

Jessica Queen,^{1,a} Sara Karaba,^{1,a} John Albin,^{2,a} Andrew Karaba,^{1,a} Jessica Howard-Anderson,^{3,a} Nicole Skinner,^{1,a} Jonathan David Herman,^{4,a} Molly L. Paras,² and Michael T. Melia¹

¹Division of Infectious Diseases, Johns Hopkins University, Baltimore, Maryland, USA, ²Division of Infectious Diseases, Massachusetts General Hospital, Harvard Medical School, Boston, Massachusetts, USA, ³Division of Infectious Diseases, Emory University, Atlanta, Georgia, USA, and ⁴Division of Infectious Diseases, Brigham and Women's Hospital, Harvard Medical School, Boston, Massachusetts, USA

Keywords. research fellows-in-training; COVID-19 pandemic.

The coronavirus disease 2019 (COVID-19) pandemic has caused unfathomable changes across society. This challenge, like the 1918 influenza pandemic, has highlighted the importance of physicians who can rigorously answer critical research questions. As was the case then, we are now confronted by daunting, pressing needs spanning basic, translational, and clinical research. Now more than ever, there is widespread, progressive appreciation of the devastating ways in which structural racism, social determinants of health, and health disparities tragically enhance and perpetuate the pathogenesis of infectious diseases (ID), as well as associated disease and deaths. Among the many lessons learned from this first year of the COVID-19 pandemic, a critically important one is the way in which a nimble, effective, well-funded ID research community is needed to immediately pivot and respond to public health emergencies in real-time.

As was the case for our predecessors who faced prior ID-related public health emergencies, this pandemic has provided us, ID fellows-in-training, with incredible educational opportunities. Unlike prior crises, however, the current pandemic is likely to fundamentally alter the ID research priorities and landscape. Before this pandemic, concerns were raised regarding declining numbers of ID physician-scientists and research career development awards, prompting the National Institute of Allergy and Infectious Diseases (NIAID) to pledge \$15 million over 5 years to promote research training [1]. While that is an excellent start, we now know that it must only be the start. Without clear, concerted efforts—such as K award payline and award duration increases, reappraisal of the K award review process, and funded extensions of T32 National Research Service awards from the NIAID, as well as funding innovations from the ID and academic medicine communities to support early-career investigators through this challenging time—we risk new leaks in the physician-scientist pipeline and an inability to effectively respond to future public health crises [2–4].

On 11 March 2020, the World Health Organization declared COVID-19 a pandemic. Over the next month, universities in the United States closed and required cessation of existing research activities while encouraging COVID-19-related

research to expand [5, 6]. Laboratories remained shuttered for 3–4 months, after which non-COVID research began to tentatively resume. However, physical distancing guidelines and shutdowns limiting supply chains continue to slow research. Owing to restrictions on travel and public gatherings, many fellows undertaking global health or community-based research found their projects halted. In addition, the publishing non-COVID-related research slowed, alongside a concomitant influx of COVID-related submissions [5].

Coinciding with the research slowdown, many upper-level ID fellows were redeployed from research back to clinical work. Clinical responsibilities for ID fellows included additional inpatient consult time, covering COVID-19 response pagers, helping with testing, and collaborating with hospital leadership on outbreak responses [7]. On a national call for ID fellows hosted by the Infectious Diseases Society of America, many expressed a desire to help with COVID-19 efforts. However, as the pandemic continues, ID fellows worry about continuing to leave their research careers on hold.

The pandemic has created other less tangible, but no less daunting, strains on productivity, including social and financial stressors that risk deepening health-care workforce disparities. Serving on the front line has exacerbated high baseline rates of anxiety and depression, a

Received 5 January 2021; editorial decision 18 March 2021; accepted 22 March 2021; published online March 26, 2021.

^aJ. Q., S. K., J. A., A. K., J. H. A., N. S., and J. D. H. contributed equally to this work.

Correspondence: Michael T. Melia, Johns Hopkins University School of Medicine, 1830 E Monument St, No. 448, Baltimore, MD 21205 (mmelia4@jhmi.edu).

The Journal of Infectious Diseases® 2021;224:1452–4
 © The Author(s) 2021. Published by Oxford University Press for the Infectious Diseases Society of America. All rights reserved. For permissions, e-mail: journals.permissions@oup.com. DOI: 10.1093/infdis/jiab162

problem particularly prevalent among women physicians [8, 9]. Fellows from racial and ethnic backgrounds disproportionately affected by COVID-19 have the added stress of witnessing disproportionate loss in their communities. Fellows with children have endured challenges with childcare and remote learning. Many fellows in ID, one of internal medicine's lowest compensated specialties, rely on moonlighting for supplemental income [10], but moonlighting activities have decreased during pandemic emergency status, and trainees were reassigned to clinical work without additional compensation. The cumulative weight of these burdens on trainees, particularly those ready to launch faculty careers, is already substantial.

Dedicated research time during fellowship training is short and, owing to the pandemic, fellow research productivity has been derailed. Now is the time for action. We propose concrete steps to realize our research potential and that of our colleagues, outlined below.

1. Increase K award payline and duration. Most physician-scientists pursue career development (K) awards from the National Institutes of Health (NIH), as these awards are nearly synonymous with tenure-track positions at research universities. Unlike research project grants, funding for career development awards has not kept pace with the 24% increase in applications over the past decade. Within NIAID, K award paylines, the funding cutoff points for grant applications, where a lower number indicates a higher and more competitive funding threshold, [11] have fallen from a peak of 31 in 2011 to a nadir of 18 in 2017–2018; the payline is currently 20 [12]. This payline typically requires one to apply not just for K awards but also for bridge research funding; however, the economic recession triggered by COVID-19 has heightened the challenge of obtaining bridge funding, and some private foundations have stopped offering grants.

While we appreciate the recently announced opportunity for early career

scientists affected by COVID-19 to apply for F and K award extensions, it is not enough [13]. Restoring the K award payline to something closer to the values of a decade ago and extending the K award duration to 6 years would be good first steps toward encouraging fellows to remain in research careers. The NIH's own analysis shows that K-funded researchers are more likely to progress in their careers and be awarded an R01 grant. We urge the NIH and academic institutions to strategically reinvest and help early career scientists progress to K and then R awards, thus ensuring a future generation of physician-scientists.

2. Refocus the K award review process. A corollary of the shrinking payline at NIAID is the stringent standards for review. The requirement for publications and preliminary data challenges applicants' abilities to meet reviewers' expectations with 2 years of dedicated research time during fellowship training. While we have been privileged to receive grant funding to support 2 or more dedicated research years during our fellowships, many fellows are afforded at most 12 months for research activities; during the pandemic, that number may have shrunk even smaller because of pandemic-related clinical demands. Specific to the pandemic, accommodations must be made for K award applicants who have been unable to collect needed preliminary data due to past, current, and future research interruptions. The NIH policy of directing reviewers to consider the impact of COVID-19 on proposed research should be extended at least through the next fiscal year.

In addition, applications should be allowed at least 2 resubmissions rather than just a single resubmission, as COVID-19 challenges may limit an applicant's ability to expeditiously respond to reviewer comments. Finally, fellows who contributed to COVID-19 research should be viewed positively for this work even if it is unrelated to their ultimate career development plan. Now more than ever is the time to reward young physician-scientists

who have a well-developed plan, a prior history of completing research projects, and a strong mentoring team. We encourage study sections to remain focused on the goal of supporting ID physician-scientist career development.

3. Provide supplements to T32 awards. Fellows newly committed to research careers may need additional time in fellowship to bolster their research portfolios before submitting K award applications. Taking the unprecedented step of allowing fellows supported by a T32 National Research Service award during the pandemic to extend their time on this award without compromising the ability of subsequent fellows to secure pivotal T32 spots (ie, pandemic-related T32 award supplements) would help research fellows be better poised to submit competitive K award applications.

4. Increase non-NIH sources of funding. The NIH cannot be expected to shoulder the entirety of this weight. New awards and grants from organizations targeting young ID investigators—such as the Infectious Diseases Society of America, the Gates Foundation, and the Howard Hughes Medical Institute—would help retain talented and driven physician-scientists. Moreover, academic institutions can help weather this storm by providing salary support to protect research time for fellows and junior faculty delayed in securing independent funding. Because many academic medical centers have suffered financially during the pandemic, they should be incentivized and rewarded for these efforts. Supporting emerging physician scientists will help institutions fulfill their academic mission and reap the rewards of their prior investments in fellow and junior faculty futures.

To conclude, as in 1918, today's pandemic illustrates why we need more physician-scientists. Infections can have sudden and massive effects on human health in ways that few noncommunicable diseases can. Even as we face the current pandemic, the threat of rising antibiotic resistance, the tremendous ID burden throughout the world, and future, novel pandemics illustrate the urgency of

supporting ID physician-scientists. We, physician-scientists in training, want careers in which we will be able to build on the investments already made in us to combat current and future ID challenges. Our training, however, is not complete. If we are to realize our potential for aiding human health, we need our leaders to support us now. We know it will be expensive. But given the catastrophic devastation of the past year, the questions that remain unanswered, and the challenges that lay ahead, as stimulus packages are discussed and debated, the question in our minds is not how can we afford to provide this funding, but, rather, how can we afford not to?

Notes

Acknowledgment. We thank Kristina Bryant, MD, Jeanne Marrazzo, MD, William Powderly, MD, Cindy Sears, MD, and Upinder Singh, MD, for their thoughtful reviews.

Disclaimer. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

Financial support. This work was supported by the National Institute of Allergy and Infectious Diseases (training grant T32-A1007291 to J. Q., S. K., and N. S.; Antibacterial Resistance Leadership Group fellowship UM1AI10468 to J. H. A.; and Infectious Disease and Basic Microbiological Mechanisms training grant T32 AI007061 to J. A. and J. D. H.) and the Cystic Fibrosis Foundation (postdoctoral research fellowship to J. A.).

Potential conflicts of interest. All authors: No reported conflicts. All authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Conflicts that the editors consider

relevant to the content of the manuscript have been disclosed.

The information and opinions in this manuscript have not previously been presented.

References

1. Gaillard SR, Strickland PS, Fenton MJ. The National Institute of Allergy and Infectious Diseases and scientific societies meeting on research training efforts: summary of recommendations to address early-stage investigators. *J Infect Dis* **2020**; 222:1589–91.
2. Singh U, Levy J, Armstrong W, et al; Infectious Diseases Society of America, HIV Medicine Association, and Pediatric Infectious Diseases Society. Policy recommendations for optimizing the infectious diseases physician-scientist workforce. *J Infect Dis* **2018**; 218:49–54.
3. Collins JM, Wallender EK, Woodworth MH. Improving the infectious diseases physician scientist workforce from the view of junior investigators: vision, transparency, and reproducibility. *Clin Infect Dis* **2020**; 70:162–8.
4. Jain MK, Cheung VG, Utz PJ, Kobilka BK, Yamada T, Lefkowitz R. Saving the endangered physician-scientist—a plan for accelerating medical breakthroughs. *N Engl J Med* **2019**; 381:399–402.
5. BaHammam AS, Jahrami H, Faris MA. Non-COVID-19 research and publications must never be at the mercy of COVID-19 research. *J Nat Sci Med*. **2020**; 3:143–5.
6. Omary MB, Eswaraka J, Kimball SD, Moghe PV, Panettieri RA Jr, Scotto KW. The COVID-19 pandemic and research shutdown: staying safe and productive. *J Clin Invest* **2020**; 130:2745–8.

7. Beh DLL, Ng DHL, Ong SWX, et al. The pandemic academy: reflections of infectious diseases fellows during COVID-19. *Open Forum Infect Dis* **2020**; 7:ofaa256.
8. Barzilay R, Moore TM, Greenberg DM, et al. Resilience, COVID-19-related stress, anxiety and depression during the pandemic in a large population enriched for healthcare providers. *Transl Psychiatry* **2020**; 10:291.
9. Mata DA, Ramos MA, Bansal N, et al. Prevalence of depression and depressive symptoms among resident physicians: a systematic review and meta-analysis. *JAMA* **2015**; 314:2373–83.
10. Ritter JT, Lynch JB 3rd, MacIntyre AT, Trotman R. Infectious diseases physician compensation: an improved perspective. *Open Forum Infect Dis* **2016**; 3:ofw083.
11. National Institute of Allergy and Infectious Diseases. Understanding Paylines and Percentiles. <https://www.niaid.nih.gov/grants-contracts/understand-paylines-percentiles>. Accessed 4 June 2021.
12. National Institute of Allergy and Infectious Diseases. Archive of final NIAID paylines by fiscal year. <https://www.niaid.nih.gov/grants-contracts/archive-paylines-fiscal-year>. Accessed 28 September 2020.
13. National Institutes of Health Office of Extramural Research. Requesting extensions for early career scientists whose career trajectories have been significantly impacted by COVID-19. https://grants.nih.gov/grants/guide/notice-files/NOT-OD-21-052.html?fbclid=IwAR1v93jiPF-Kq16erAB-k-TJ9C_QnMb3PQ7wGVVKIjJfjCQ381IKpnaIUZY. Accessed 15 March 2021.