

# PROFILE

## Fogarty Fellow fights cholera in Bangladesh

By Karin Zeitvogel

Dr. Eric Nelson still vividly remembers the distraught father he met in Dhaka when he was a Fogarty Fellow in 2005-06. “Holding his daughter in his arms, he gripped my arm and implored, ‘Doctor, I have three children. Two died yesterday from cholera. Please save this child,’” Nelson recalled.

“In 2005, no one should have been dying of cholera,” Nelson said. “To me, this simple meeting expressed failings at so many levels and crystallized my purpose as a researcher and clinician.”

Nelson was paired with Dr. Ashraf Khan from Bangladesh for the year-long Fogarty fellowship. After training together at NIH, the two researched different topics in Bangladesh, with Nelson focusing on cholera transmission in mice.

Nelson’s days started before dawn, when he would pump water from a pond in Dhaka into a barrel on the back of a flatbed rickshaw and then accompany the rickshaw to the hospital. Throughout the day, he would run between the “mouse-house,” the hospital and lab, always making time to study and analyze what was going on around him. “As a Fellow, I learned how to be a good observer and how to act on those observations, such as building tools that improve care in challenging environments,” Nelson said.

As often happens in science, one project or idea led to another. For weeks, as he watched the Bangladeshi lab technician who was studying samples under a darkfield microscope to see which ones contained cholera and which didn’t, Nelson mentally calculated that around half were autoclaved, meaning they were cholera-free. That discovery eventually led to published papers in which Nelson identified key factors that contribute to the understanding of cholera transmission. “One was starvation of *Vibrio cholerae* in nutrient-limited pondwater, and the second was predation by little viruses called phages that infect and kill the *V. cholerae*,” Nelson explained. “About half the samples that were autoclaved had these viral particles.”

As he continued his research, Nelson found antibiotics in the majority of cholera patients who insisted they



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Fogarty Fellow: 2005-2006

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Research areas: Cholera transmission

hadn’t taken antibiotics. What this said to Nelson was that scientists studying cholera transmission have to think not only about how phage particles affect cholera transmission but also about how antibiotics do. That finding, in turn, led Nelson to help create a tool, which seeks to change antibiotic prescription habits among doctors. Thirteen years after the fellowship, Nelson and Khan officially conducted their first project together in 2018, running a clinical trial to test whether this tool was more effective in paper form or as a mobile phone app at changing the behavior of doctors managing diarrheal disease in challenging environments. The trial, which looked at doctors’ decision-making processes when ordering fluid replacement and prescribing antibiotics, not only achieved some significant outcomes but also exemplified the “international collaboration that the NIH and Fogarty make possible, and the huge return on investment that Fogarty gets when it supports early career researchers,” Nelson said.

Nelson was recruited during his Fogarty fellowship by then-icddr,b executive director Dr. David Sack to collaborate on a method to rapidly train personnel to manage cholera and shigellosis outbreaks in resource-poor settings. Called Cholera Outbreak Training and Shigellosis (COTS), the method he helped to devise has since been used globally. An updated version is part of an immersive one-week outbreak response course Nelson leads in Haiti.

Nelson attributes the innovative projects he’s been involved with to the support he got from Fogarty and NIH as an early-career scientist. “Every aspect of my research has been positively impacted by Fogarty, in ways that are still declaring themselves,” he summarized. “Had Fogarty not put me at the bench for a year in Bangladesh, my portfolio would either be empty or filled by traditional bench science.”

Photo courtesy of Dr. Eric Nelson