Careers in Virology: Public Health Opportunities for Early-Career Basic Scientists

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Running Title:

Public Health Opportunities for Basic Scientists

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Abstract:

Undergraduate, graduate, and postdoctoral scientists trained as virologists can play critical roles within public health, such as health science policy, epidemiology, and national defense. Despite a need for basic science backgrounds within these fields, finding entry-level careers can be challenging. Volunteer opportunities are a great way to experience public health careers while still in school, and this article describes volunteering with the Medical Reserve Corps and outlines unique postgraduate opportunities for early-career virologists.

Word Count: 73
Recent outbreaks of viral pathogens like MERS-CoV and multiple influenza strains coupled with the continued threat of bioterrorism highlight the need for experts in infectious disease to play integral roles in public health. As a graduate student training in molecular virology, my energy was primarily devoted to research in the lab. However, I wanted to explore other career opportunities where a background in basic science was helpful, but wet lab research wasn’t necessarily a requirement. This led me into the public health field and the desire to experience how public health officials plan for and respond to emergencies involving infectious disease. In my search for volunteer opportunities, I was fortunate to discover the Medical Reserve Corps (www.medicalreservecorps.gov). The Medical Reserve Corps was founded in response to the terrorist attacks of September 11th, 2001 and has been critical to the local response during natural disasters and remain part of emergency planning for communicable disease outbreaks or bioterrorism events (2). Scientists (including basic scientists) are not common volunteers in organizations like the Medical Reserve Corps, while other health professions more regularly volunteer.

My local Medical Reserve Corps (MRC) unit was very receptive to new volunteers and was involved in training exercises with local public health departments. Upon joining, I was immediately integrated into MRC training and activities including a planned live, full-scale exercise designed to test mass prophylaxis plans in conjunction with the Cook County Department of Public Health. In addition to my participation in the training exercise, I was able to contribute scientifically by helping evaluate the exercise and communicating the results and conclusions from the planning and execution (1). To illustrate the benefit of participating in public health and how these experiences can influence a graduate student’s career outlook, I’d like to share the details of my participation in the joint exercise with the MRC and the Cook
County Department of Health (CCDPH, Cook County, IL) and outline some of the career opportunities that correlated with my volunteer activity.

Training for the full-scale exercise began over a month in advance, with training modules being developed and presented to us for each of the volunteer roles necessary during the exercise (triage, antibiotic administration, security, etc). These training modules were very informative, because coming in as a new volunteer, I didn’t have a good grasp on what my role would be during an emergency. Our MRC consists of nurses, MDs, pharmacists, and EMTs, with myself as the only scientist. The training modules allowed for me to understand the role of each MRC volunteer and what skills are needed during a public health emergency. This is important as the role of MRC personnel changes based on the situation and who responds to an emergency. After these sessions and with a solid foundation of training in place, I felt like I was well prepared to operate in any role during an emergency.

The full-scale exercise began at 8:45 am on a Saturday, with a full contingent of MRC volunteers, department of public health officials, police and fire personnel, and a wide range community participants who volunteered to act as affected citizens in the exercise (Figure 1). My assignment was to act as a communication runner between the pharmacy station (where prophylaxis is stored), the dispensary (where prophylaxis is dispensed), and the exercise command post (where the operation is controlled). The exercise started off calmly, as the volunteers who acted as clients (individuals affected by the simulated anthrax exposure in need of prophylaxis) slowly filtered into the exercise. As the rate of clients increased, things got more hectic, and the operational picture of the exercise broke down. In my role as a runner, I was able to identify where the client flow was being slowed and could communicate this to the individuals...
within the dispensary and the command post. This information allowed for adjustments to be made that eased the pressure on the volunteers dispensing the prophylaxis and helped the client flow though the dispensary increase. The exercise continued until 12:45 pm, and afterwards the MRC and the Cook County Department of Public health conducted a debriefing where the observations and comments from volunteers were incorporated into their analysis of the exercise events.

My volunteering with the Medical Reserve Corps was and continues to be a great experience. We participate in many local events, and in addition to training for public health situations, we have contributed to community education on vaccination and emergency preparation. I learned a lot from volunteering and now feel more prepared to respond to a public health emergency. However, it was clear to me that more participants are needed that have great problem solving skills and the ability to think on their feet (all skills that basic scientists use every day). Even though it was just a simulation, the exercise got muddled very quickly during the prophylaxis, and it became overwhelming to everyone participating. In situations like these, participants from the scientific community would shine. Our ability to identify problems before they arise, respond to problems, and solve them efficiently are vital skills during emergency situations.

There has been work done to encourage nursing and medical students and medical professionals to volunteer for local MRCs (3, 4). It would be equally beneficial for basic science graduate students to volunteer, and research has demonstrated that diversity in responder background during public health emergencies would be beneficial (5). Some efforts have been made to reach out and interact with the scientific community (6), and it is critical that these efforts continue and basic science students and faculty are receptive to the need for volunteers with their backgrounds.
and skills. The talents of basic scientists are useful in applications outside of the lab, and in situations where problem solving and communication are paramount, well trained scientists add to the diversity and skill set needed for a volunteer organization like the Medical Reserve Corps and for many of the diverse areas within the public health.

Getting novel experiences outside of the laboratory setting is an excellent way to enhance a CV as well as revealing new career opportunities as well as contacts and references. My experiences working with public health officials helped refine the career path I wanted to pursue after graduation. I knew I wanted a blend of basic and applied science while retaining aspects of public health practice for my postdoctoral career, a track that would likely take me away from academia. Finding a non-academic postdoctoral position can be a challenging task, but there are good opportunities for scientists wanting to cross into different disciplines or refocus their careers (Table 1). The key is to start looking early and often, as some of the programs can take up to a year from application to start date, and gathering references and other application materials can extend that time frame. The sooner in an undergraduate or graduate career these options are explored, the sooner an applicant can obtain extracurricular experience that relates to an alternative career path. Beyond the larger domestic programs listed here, subject matter experts in virology and infectious disease are always in demand with private corporations, industry, and international organizations.

I hope by sharing my experiences interacting with the public health community and volunteering as an emergency responder will encourage some of my colleagues to do the same. Not only is volunteering in your community a rewarding experience (and volunteers are always needed), but the insight into other career paths and the people you meet can shape your career as a scientist in
ways that are inaccessible from the confines of the academic laboratory. It is never too soon to begin considering what you want to do after graduation, and finding good volunteer opportunities, internships, etc. can lead to exciting new fields and career paths that might otherwise go overlooked.
Figure 1. Initial Clinic Setup and Client Flow Through. These images depict the clinic setup for client prophylaxis distribution before and during the mass prophylaxis exercise. The flow through of clients was key data for the evaluations of the plans of the MRC and the Cook County Department of Public Health. Images are courtesy of the Cook County Department of Public Health.
References


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Table 1. Public Health Postgraduate Opportunities for Basic Scientists

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<thead>
<tr>
<th>Opportunity</th>
<th>Description</th>
<th>Website</th>
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<tr>
<td>Presidential Management Fellowship (PMF)</td>
<td>The PMF acts as a central recruiting tool for advanced degree candidates (MA, MS, PhD, JD, MD) interested in federal opportunities in all aspects of science and government. Recently introduced a separate STEM track in 2013 to recruit more scientists.</td>
<td><a href="http://www.pmf.gov">http://www.pmf.gov</a></td>
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<td>Oak Ridge Institute for Science and Education (ORISE)</td>
<td>A Department of Energy sponsored initiative; ORISE facilitates many postdoc opportunities within federal organizations such as the DOE, FDA, EPA, and CDC.</td>
<td><a href="http://orise.orau.gov/">http://orise.orau.gov/</a></td>
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<td>National Research Council Research Apprenticeship</td>
<td>The National Academy of Science’s National Research Council promotes excellence in government research by sponsoring graduate and postdoctoral research. Armed services, EPA, and NOAA opportunities are available through the NRC.</td>
<td><a href="http://sites.nationalacademies.org/pga/rap/">http://sites.nationalacademies.org/pga/rap/</a></td>
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<td>American Society for Microbiology Fellowships</td>
<td>ASM sponsors fellowships at ASM headquarters, a congressional science fellowship in Washington, DC, and a joint CDC/ASM Program in Infectious Disease and Public Health Microbiology.</td>
<td><a href="http://www.asm.org/index.php/fellowships-2">http://www.asm.org/index.php/fellowships-2</a></td>
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<td>NIH Training Fellowships</td>
<td>Fellowships that are on location at the NIH include training programs for technology transfer, biosafety, health communications, biosafety and bioccontainment. Opportunities for fellowships at the undergraduate, graduate, and postdoctoral levels.</td>
<td><a href="https://www.training.nih.gov/fellowships_at_the_NIH">https://www.training.nih.gov/fellowships_at_the_NIH</a></td>
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<td>CDC Public Health Training Fellowships</td>
<td>The CDC offers fellowships for undergraduate, graduate, and PhD level scientists. The Emerging Infectious Disease (EID) fellowship prepares scientists for research in public health laboratories.</td>
<td><a href="http://www.cdc.gov/fellowships/">http://www.cdc.gov/fellowships/</a></td>
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<td>CDC Epidemic Intelligence Service (EIS)</td>
<td>The EIS is a two-year postdoctoral program that trains scientists (MD, PhD) in applied epidemiology. Trainees provide public health assistance in the field during epidemiologic investigations and though disease surveillance.</td>
<td><a href="http://www.cdc.gov/EIS/">http://www.cdc.gov/EIS/</a></td>
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<td>United States Public Health Service (USPHS)</td>
<td>The USPHS employs PhD-level scientists who work in public health planning and response, provider education, and other areas of need within the US.</td>
<td><a href="http://www.usphs.gov/profession/scientist/">http://www.usphs.gov/profession/scientist/</a></td>
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<td>FBI Visiting Scientist Program</td>
<td>FBI Laboratory’s Counterterrorism and Forensic Science Research Unit sponsors undergraduate, graduate, and postdoctoral scientists for appointments working on counterterrorism and forensic science in support of the FBI and state law enforcement agencies.</td>
<td><a href="https://www.fbijobs.gov/242.asp">https://www.fbijobs.gov/242.asp</a></td>
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