

MDH Speaks: “A Tale of Two Poxviruses” by Emily Yarosz (12:43)

Anna Strain: “So our next speaker is Emily Yarosz, who is a laboratory leadership fellow here with the Infectious Disease Lab and through CDC for the next couple of years.

“Dr. Yarosz is from Pennsylvania, where her family still lives. She is the oldest of nine children and loves being from a big family. In her spare time, she loves to bake - I can attest to that because she came over and baked some cookies with me over Christmas - and she loves to read, play video games, and snuggle with her dog, Olive. Her talk today is ‘A Tale of Two Pox Viruses: My Journey Into Public Health.’”

[applause]

Emily Yarosz: “Thanks Anna, for that introduction, and thanks everybody for coming here today to listen to all of us speak. I’m really excited to have the opportunity to share some of my career journey with all of you and how I got to where I am today. But first, before we get into what I do at MDH, we’re going to throw it back to where it all began.

“When I was young, I thought that career paths went in a straight line. I thought that you just woke up one day and decided to be a doctor or an astronaut or a bus driver - all of which I wanted to be at some point - and voila, you magically were that thing. But I think as all of us sitting in the audience know, it’s rarely that simple. My journey into public health is no exception.

“It all begins back in the seventh grade when I read this book called ‘Code Orange’ by Carolyn B. Cooney. In the book, the main character, whose name is Mitty, is doing a book report for his science class, and he decides to do the book report on the Smallpox virus, which is a deadly virus that causes a sometimes itchy and painful rash like the one you can see here in the diagram. The Smallpox rash is actually made up of individual pox, which actually act as little factories that create the Smallpox virus, which you can see in the circle. When you come into contact or touch somebody who has a Smallpox rash, that’s how you can contract Smallpox. One day, while doing his research for his book report, Mitty opens an old medical textbook and an envelope falls out and curious, he opens envelope, which not going to lie, I would have done the same thing. But to his shock and honestly, horror, the envelope contains scabs from a Smallpox patient.

“So, Mitty has now been exposed to smallpox, and this is actually a nightmare because Smallpox killed 30% of the people that it infected, and those that survived had to deal with severe side effects, such as scarring and blindness. What’s more, if Mitty actually spread this disease to others in his community, it could kick off a global outbreak of Smallpox, which would be a really big issue because not many people are vaccinated against Smallpox these days. And that’s because the world was declared free of Smallpox in 1980 following a worldwide vaccination effort that eliminated the virus from the globe.

Emily Yarosz (con't): “So how could we prevent a global outbreak of Smallpox from happening? Well, this is where the CDC comes in. In the book, the CDC found Mitty before he was able to develop symptoms, and they put him in quarantine, and watched him to make sure he didn't get any sicker. They then got into contact with everybody that Mitty had hung out with or talked to after he was exposed to the scabs, and they put those people under surveillance and watched them to see if they developed any symptoms. They didn't just do all this really fantastic epidemiology work, though. They also involved the lab, and they tested the smallpox scabs. And actually, the scabs were not Smallpox scabs at all. They came back negative, which means that Mitty did not have smallpox, and everybody that he had been in contact with was actually free of the disease.

“This book was really my first introduction into concepts that have become kind of commonplace ever since the COVID 19 pandemic. Concepts like contact tracing, containment, and clinical lab testing. From reading this book, I became enthralled with learning more and more about how diseases were spread, how they were tracked, and how we could eliminate them, that I forgot all about being a veterinarian or zookeeper, or the owner of a ranch for retired racehorses or rescue dogs - more things I wanted to be one day when I grew up - and suddenly I was like, ‘I'm going to be one of those people in ‘Code Orange.’ I'm going to be a disease detective.’

“So I went to college at Penn State, and I majored in Immunology and Infectious Diseases, which allowed me to study all of the cells of your immune system that help keep you safe and keep you healthy from invading germs. While I was in college, I had the opportunity to work with a research lab where they studied the development of red blood cells, and we were hoping that our data would lead to cures for blood cancers like leukemia. But what was really formative about this experience for me is that I got to sit at the bench every single day, pipetting little amounts of liquid into tubes and running gels, and then I got to see how the data that I collected actually translated into biologically meaningful data. This was so exciting to me, and it really fueled my passion for discovery. Suddenly I was making another career pivot. I forgot all about ‘Code Orange,’ I forgot all about Smallpox, I even forgot about the CDC. And you know what? Now, I was going to go to grad school and get my Ph.D. and be a full-time researcher and a professor.

“So here I am as a first year little Ph.D. student, and I'm going to cure cancer. However, as I got farther and farther into my Ph.D., I found that I was getting really far away from studying diseases and how to cure them, and even more intensely into just specific basic science principles. By the third year of my Ph.D., I found myself really longing to make a difference in global health and in public health. And kind of, I don't want to say fortuitously or serendipitously, but in the fourth year of my Ph.D., the COVID-19 pandemic hit, and just like so many of you, I was forced to stop researching, forced to stop pipetting. I quarantined at home and from my living room, I watched so many public health professionals like those at MDH, work tirelessly to flatten the curve. I watched so many health care workers spending long days and nights trying to help all the people who had COVID-19, and I wished that I could join them on the front lines of the outbreak. I wanted to be there making new tests and making a difference in patient lives, but I just didn't know how I was going to do that.

Emily Yarosz (con't): “So one day when I was bored in lockdown, like I think maybe all of us can relate to, I just started dusting my bookshelf, like one does, and that's where I saw it: ‘Code Orange’ just kind of staring back at me. And it really clicked in my brain that, you know what? You actually can be a disease detective if you want to. And so as my Ph.D. was nearing its end, I applied for the Laboratory Leadership Service or LLS Fellowship, which is a two year CDC fellowship that focuses on training the next generation of public health professionals and quality safety and quality science. I was luckily accepted, and I chose to do my training at the Minnesota Department of Health or MDH. I'm so glad I did, because I knew that the breadth of testing that happens at MDH, as well as the close collaboration between the lab teams and the epidemiology teams, would really help set me up well to make a difference in my community.

“But what I could have never predicted was that a second major outbreak would hit during my first year of my fellowship at MDH: Monkeypox, which is now called mpox, became a major public health concern in the summer of 2022, and I was called to be one of the testing personnel that would process, test, and mark samples to see whether or not they were positive or negative. And so if you're like me, you're sitting in the audience wondering, well, how do I even do that? The process is actually pretty simple. So because mpox is related to Smallpox, patients often get an itchy, painful, sometimes oozy rash that doctors can take a swab and rub against the rash, and then they send that swab to us at MDH. When I get the swab, I wash it in some salt water, which helps to free the human cells, that I show here in orange, from the swab and then I can take those human cells and wash them in a variety of different liquids called buffers, which help to break up the cells and release any and pox viruses that might be living within the cell. The way that we can detect mpox viruses in samples is that we can use this process called PCR, which you might have heard of because it was really popular as a diagnostic test during COVID 19. And so how PCR works is that you can take your mpox viruses and make many copies of the genetic material, and then we can use a special piece of lab equipment to detect this genetic kind of materials. To do this, we add special-colored dyes to the sample, and if the patient doesn't have mpox, then you won't see any difference in the color of the sample using the special machine. However, if the patient does have mpox, you will see a color change in the sample, and we can detect that using the machine.

“Being a part of this outbreak was extremely rewarding to me because I knew that it was the first time that I was actually getting to make a difference in my community and to my fellow Minnesotans. As a team, we processed 1277 total mpox samples during the outbreak last year. And of those samples, we were able to identify 123 positive mpox patients. However, not a single patient died of mpox in Minnesota, and I think that this is just a really big highlight of how the work that we do at MDH really does make a difference in patients’ lives because we were able to have no deaths, thanks to the hard work that everybody I work with did to try to get those results back to patients quickly. And what's more, my involvement in this outbreak also helped realize seventh grade Emily's dream from when she read ‘Code Orange:’ getting to work on the front lines of a public health emergency.

“I'm so grateful for the opportunity I've had to learn and grow at MDH over the past year, and I can't wait to see what the future has in store for me from pox viruses and beyond.

“Thanks.”

[applause]