COUNTY OF SAN LUIS OBISPO
PUBLIC HEALTH LABORATORY

Messenger

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IN THIS ISSUE

Predicting the Next Pandemic: A Retrospective

In 2008, an article titled "Predicting the next pandemic" was published in The Lancet (vol 372: 1025-1026). The author, Eliza Barclay, surveyed public health and information experts, taking inventory of modern assets such as surveillance systems, advanced laboratories and internet data-mining technology. The narrative cited the advantage that early detection would have conferred on the response to HIV and SARS.

More than a decade has passed since this publication. How have we done? (In this case, "we" refers to international public health and medical authorities, information brokers, and scientific society experts.) The following events serve as examples indicating where we are and what we might expect in the future.

Influenza A H1N1 2009 Pandemic. Emerging unexpectedly from Mexico rather than Asia, this relatively non-severe infection was detected early. The Centers for Disease Control and Prevention (CDC) sequenced the virus, developed molecular amplification diagnostic tests and provided protocols and reagents to the Laboratory Response Network (LRN) within a few weeks to allow for specific testing. The vaccine came in the following few months as the virus encircled the planet, infecting millions but killing only a small fraction of those infected. The time required for production of an embryonated egg-based vaccine was regarded as a vulnerability, especially if the strain had been a killer like the 1918-19 H1N1 strain.

MERS Coronavirus. A SARS-like coronavirus began causing severe respiratory illness in Saudi Arabia in September 2012, spreading most often by direct contact. The CDC again developed and equipped LRN laboratories with a reliable assay and public health authorities in the U.S. and Europe dealt with a minimum number of cases spread by travel. Now endemic in the Middle East (the virus also spread briefly to Korea in 2015), MERS coronavirus continues to be reported in Saudi Arabia with a mortality of 30-40 percent. More than half of documented infections are due to person-to-person close contact.

Chikungunya Virus. An old world mosquito-borne alpha virus (spread primarily by *Aedes aegypti*) suddenly appeared in the Caribbean islands in 2013 and rapidly spread throughout the Gulf of Mexico countries and South America, causing cases wherever the vector thrived—including U.S. gulf-coast state residents and travelers. Again, the CDC responded with diagnostics for the LRN. Affected nations mounted a response focusing on prevention of mosquito bites—similar the effort to deal with West Nile virus that arrived in the U.S. in 1999. A vaccine has not been developed. The virus is now endemic in

the new world.

Ebola Virus in West Africa, 2014-2016. An epidemic that threatened to evade control by civil and medical authorities began when Ebola virus cases appeared in West African countries in a heretofore uncharted poor urban environment. The deadly virus required herculean public health efforts, with numerous countries providing trained personnel, supplies and equipment to bring the epidemic under control. The toll: 28,610 cases and 11,308 deaths (39 percent mortality). Fortunately, a vaccine is now available and was employed successfully to deal with an Ebola outbreak in 2018 in the eastern Democratic Republic of the Congo.

Influenza A H7N9 in China. Since a new avian influenza strain was reported in China in March 2013, annual epidemics of influenza A (H7N9) have been documented. Most cases are linked to exposure to poultry, with rare instances of person-to-person transmission. A total of 1,565 cases have been reported, with a mortality rate of 39 percent. The pandemic potential of this strain, should it mutate sufficiently to allow for efficient person-to-person spread, is a concern. Public health authorities in China have developed a vaccine for this strain, but as yet have not had to deploy it. The CDC has equipped LRN laboratories with the capability to detect influenza A H7 viruses, a continuing concern for travelers returning from China. This caution also extends to influenza A H5N1 virus, which continues to cause sporadic cases in the Middle East, Southeast Asia, and Indonesia.

Zika Virus Pandemic. An obscure virus, first detected in Africa in 1947 and known primarily to scientists who study the yellow fever virus group, began to catch the attention of the CDC with an epidemic on the isolated Micronesian island of Yap in 2007. While this seemingly unusual event provided an opportunity for CDC scientists to study the virus—especially the convoluted serologic diagnosis—the outbreak escaped the attention of the world. But in 2013 and 2014, the virus caused major outbreaks in French Polynesia and many other Pacific islands. Then cases were discovered in Brazil in early 2015, and the propensity of Zika virus to damage the brains of fetuses was revealed with the recognition of hundreds, then thousands of babies born with microcephaly. Intense study continues to tease out the pathogenic potential of this once-unknown virus that has since circled the world.

So, where do we stand in the effort to predict pandemics?

Certainly the development of surveillance networks and the rapid implementation of reliable molecular diagnostics to national, state and local public health laboratories are important assets that have served us well.

Communication networks continue to provide streams of data, yet challenge data watchers to convert big data into a pandemic prediction that will galvanize focused action.

Effective vaccines can be developed but the lead time required to use a vaccine in response to a particularly lethal agent is still a concern.

Finally, worldwide travel and commerce make resource-poor and politically volatile countries where a pandemic might begin especially vulnerable.

Will we see a pandemic this year? Perhaps. If we do, it will likely be a virus that is known by virus experts.

Measles Outbreaks Nationwide and Worldwide

The CDC reports a total of 268 cases of measles thus far in 2019, with cases in Arizona, California, Colorado, Connecticut, Georgia, Illinois, Kentucky, Michigan, Missouri, New Hampshire, New Jersey, New York, Oregon, Texas, and Washington. In California, several jurisdictions have reported a total of six cases, all associated with international travel.

The CDC also reports a total of 151 cases of mumps virus infection in 30 states and the District of Columbia.

Rash illness cases—especially with exposure to a known measles case—should prompt inquires with the communicable disease staff at the Public Health Department. Call 805-781-5500 (Monday-Friday, 8:00-5:00) and 805-781-4553 (on weekends and after hours).

Rapid, reliable measles or mumps virus PCR testing is performed by the Public Health Laboratory staff in the space of a few hours.

For collection supplies, contact the laboratory at 805-781-5507.

Questions?

Please contact the Laboratory Director at 805-781-5512 or jbeebe@co.slo.ca.us.

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