Throughout history, physicians have dealt with the emergence of new infectious diseases. Some became endemic, some pandemic, and some episodic. Each of these occurrences challenged our healthcare system to modify common practices, to adapt our facilities to serve an unusual subset of patients, and to educate both healthcare workers and the public. Most of the modifications (made to the way we approach patients during counseling, triage, and management) during these instances were transient; our practices returned to the prior status quo after “alert” was removed. Even when practice modifications were not maintained, these events highlighted the need to adapt our systems of care to the changing needs of our communities and to foster a culture of “continuous learning” for the medical community.

Impact of HIV on Isolation Precautions

The practice of universal infectious precautions (gloves, gowns, masks), although widely used in the operating room, was not formally introduced to other clinical practice settings until the CDC published the “Guideline for Infection Control in Hospital Personnel” in 1983. These recommendations were based on the assumption that every patient (and healthcare worker) was potentially a transmitter of blood-borne pathogens.

In 1996, the Guideline for Isolation Precautions in Hospitals, last updated in 2007, replaced “universal precautions” with “standard precautions.” The guideline introduced the concept of “transmission based precautions”—recommendations focused on the clinical presentation of the patient or syndrome in question and informed by knowledge of the most likely causative pathogens. The Human Immunodeficiency/AIDS epidemic was one of the main drivers of this change for the healthcare setting as well as for society at large. Despite the best intentions for protecting and promoting public health, these education campaigns also resulted in stigmatization and fear within our communities.

Reports of universal precautions being viewed as “discriminating” against HIV patients, as well lack of evidence behind the “need” for universal precautions to prevent blood-borne infections when no contact with bodily fluids was anticipated, led to the switch from universal to standard precautions in 1996. The HIV pandemic led to some of the most recent, long-lasting behavioral changes in health care (and society) since the advent of immunizations.

SARS

On March 15, 2003, we awoke to the news of a Heightened Global Health Alert issued by the World Health Organization (WHO) regarding Severe Acute Respiratory Syndrome (SARS), after cases in Singapore and Canada were identified. The alert included an emergency travel advisory for international travelers, health care professionals, and health authorities. This outbreak began in November 2002 in China and, within five months, became a global epidemic due to air travel. By April 2003, Canadian scientists isolated the causative agent as a novel Coronavirus (CoV), a zoonosis with small mammals as its reservoir. SARS-CoV mortality ranged from 9-12%, reaching 50% in persons 65 and older. Pictures of individuals wearing surgical masks in airports, streets, and crowded places flooded the media. By mid-May 2004, the WHO lifted the alert as no new cases had been reported within a three-week period.

H1N1 Influenza

In April 2009, panic took over the streets and once again surgical masks became “the new fashion.” This time, the outbreak started in North America, not in China. A new virus containing genetic sequences from human and swine influenza viruses resulted in the H1N1 influenza pandemic. It spread rapidly through Mexico and the southwestern United States. The WHO advisory issued in late April became a Grade 6 Alert in June and the 2009 H1N1 outbreak became the first flu pandemic since 1968. By the end of October 2009, President Barack Obama declared it to be a National Emergency. H1N1 pandemic was responsible of more than 18,000 deaths in more than 214 countries and resistance to oseltamivir was detected in some isolated viruses. Several international airports initiated temperature monitoring of travelers upon arrival before deciding if entrance to the country was allowed or if quarantine was necessary. After intense international collaboration by vaccine developers, an effective vaccine was successfully developed and offered to at-risk populations in October 2009. Since 2010, many countries have reported limited outbreaks of H1N1. 

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MERS-CoV
Another emergent zoonosis was reported in 2012, this time originating in Saudi Arabia. The Middle Eastern Respiratory Syndrome (MERS-CoV) is attributed to a Coronavirus. Interestingly, despite the clinical similarities with SARS, MERS is cause by a different, more virulent Coronavirus, and camels have been described as reservoirs. Since September 2012, 1,826 cases were confirmed with a mortality rate of 36%. No vaccine or treatment is currently available. Preventive measures are therefore limited to stressing personal hygiene; avoidance of contact with sick camels, and standard precautions. As of today no travel advisory or notice has been instituted.

Ebola
Since its discovery from Africa in 1976, the largest outbreak of Ebola was in 2014-2015. A total of 11,310 out of 28,161 cases reported during this outbreak died with a mortality rate of close to 40%. The outbreak affected West Africa (Liberia, Guinea, and Sierra Leone) and, due to air travel, cases were also reported in Europe and America. Travel notice to affected countries was implemented in July 2014. Hospitals in the United States responded by creating protocols, designating triage and treatment areas, educating staff, and training a limited number of health care workers on the use of protective garments. Four cases were treated in the United States, two were returning travelers (one died) and two were health care workers exposed to a patient in Dallas, Texas. The WHO terminated the Public Health Emergency of International Concern on March 29th, 2016, due to no new cases in the previous 6 months.

Zika
The current Zika pandemic originated in South America in early 2016. The 20-fold increase in microcephaly in Brazil attributed to the Zika virus (ZKV) infection in April 2016 led patients worldwide to seek travel and family planning counseling. Zika virus was first isolated in Uganda in 1947, with the first human case described in 1952. The first major outbreak in humans occurred in 2007 in the Yap Islands. In 2011, sexual transmission was confirmed in a traveler returning to the United States from Senegal as well as several other cases also confirmed in Europe. Although Zika virus infection is an arthropod-borne disease, its transmission includes vector, sexual, vertical, and suspected parental (yet to be confirmed) pathways. Since the first Brazilian case was reported in March 2015, Zika has spread to more than 56 countries and territories. After an incubation phase of around one week, up to 80% of infected individuals remain asymptomatic while 20% develop mild symptoms including arthralgias, fever, rash, and conjunctivitis. Guillain-Barre syndrome has also been associated with ZKV. Viremia has been reported to last one week and the virus has been detected in sperm for up to 60 days. This fact supports the recommendation for returning male travelers (both symptomatic and asymptomatic) to use barrier contraception if pregnancy is present or planned in their partners for six months post exposure. Prevention guidelines and travel advisories are evolving. We therefore should refer our colleagues and patients to the Center for Disease Control (CDC) and/or WHO Web sites for the latest recommendations.

Over the last 15 years, our health care system has confronted the emergence and/or resurgence of multiple infectious pathogens, some preventable through immunizations and many others for which no vaccines are available. Extensive literature and publications describe the “anti-vaxer” movement and its public health implications, including recent resurgence of poliomyelitis and measles in developed countries. It continues to be our duty to educate health professionals and our communities about both individual and societal risks (few) and benefits (many) of immunizations. (Further discussion of immunization-preventable outbreaks exceeds the scope of this article.)

When reviewing the aftermath of the most recent outbreaks, many questions arise:

- What does it take for an emerging or resurgent disease to shape behaviors in healthcare workers and society?
- What changes have we made in our practice to address the eventuality of dealing with an “outbreak” in our system? and
- What can we, as general internists, do to help our communities and patients prepare for the next emerging pathogen?

Answers to these questions are complex and will require further analysis; however, I hope that this article will initiate a conversation.

General internists, whether in primary care or in hospital medicine, have a unique opportunity and responsibility to steer our patients, our communities, and our health care system to prepare for future infectious disease threats.
primary care or hospital medicine, will be at the front lines of any future outbreak. Our roles will vary from discussing “pre-travel planning” with our patients to recognizing the patient who presents to clinic or is admitted to the hospital with symptoms suggestive of a new acute infectious outbreak. Our ability to recognize and respond appropriately to such an outbreak will require continued vigilance, awareness, and ongoing epidemiologic knowledge. Such vigilance will determine how effective we will be in rapidly diagnosing and implementing the correct treatment for our patients while also protecting the public in appropriate ways. It is imperative to bear in mind that a “local” remote outbreak can become “global” just by air travel, and the first responder may not have the adequate triage questions in mind. It is our duty to protect our patients and communities and the best way to do it is to stay informed and vigilant.

References