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EDITORS' PAGE



Pandemics and Clinical Practice

How History Can Inform Our Future



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“Let us learn from the past to profit in the present, and from the present, to live better in the future.”

—William Wordsworth (1)

During the coronavirus pandemic, we are acutely aware that future generations and historians will study this timeframe. This realization has caused us to recall previous epochs of clinical crisis in order to consider what we could and should learn from our predecessors.

1918 TO 1920 PANDEMIC

The first publicly reported case of the 1918 H1N1 virus outbreak, subsequently called the Spanish flu, was detected in Philadelphia in September 1918, with 20,000 cases diagnosed in a 2-week span (2). The 1918 pandemic lasted for 2 years, with infections reaching 500 million, or one-third of the global population—with an estimated mortality rate of 50 million globally and approximately 675,000 deaths in the United States (3). With no vaccine nor antibiotics to treat secondary infections, social distancing measures were implemented throughout many U.S. cities. A 2007 *JAMA* analysis showed that 43 U.S. cities eventually implemented such measures (including school closure, public gathering cancellations, isolation, and quarantine), and the time of activation, duration, and choice or combination of these interventions were integral in their regional success (4). For example, New York City responded to its first influenza cases and the perceived severity of the epidemic without waiting for excess deaths to accumulate, which resulted in a far less extreme mortality rate than its less prepared neighbor of Philadelphia (4). Based on their analysis, Markel et al. (4) concluded that:

Although these urban communities had neither effective vaccines nor antivirals, cities that were able to organize and execute a suite of classic public health interventions before the pandemic swept fully through the city appeared to have an associated mitigated epidemic experience.

These measures could and should serve as important examples for 2020 policymakers and each of us as global citizens. Social distancing, while personally challenging, unequivocally saves lives and slows the progression of disease—both in 1918 and in 2020. While urban citizens in the late 1910s had some modern transportation conveniences, they did not have our contemporary residential amenities, including microwaves, food delivery services, or entertainment technologies—and most importantly, the ability to work from home. We should remain cognizant of our predecessors' sacrifices before we bemoan our own.

Importantly, there are some misconceptions about the 1918 to 1920 influenza pandemic. While the first public case was reported in Philadelphia—and while it is colloquially referred to as the Spanish flu—scientists now suggest the outbreak originated in U.S. military camps and was brought across the Atlantic by U.S. troops who were deploying for World War I (3,5). In May 1918, >100 soldiers at Camp Funston in Kansas had become ill with flu, and the cases had quintupled within a week (3). Despite being warned by his health advisors, Woodrow Wilson and his administration chose to focus on the War abroad. Historian John M. Barry (5), author of *The Great Influenza: The Story of the Deadliest Pandemic in History*, stated:

He did absolutely nothing. Never made a public statement...Despite medical advice, he continued to send troops to Europe and troopships, which were essentially floating coffins. The Army Surgeon

General staff suggested that at the very least, he rearranged the shipment of troops by sending people from bases where the pandemic had already struck...because they had some immunity, but he wouldn't even shift the order in which troops were being sent to Europe.

From 1918 to 1919, the War Department reported that influenza infected 26% of the army (>1 million men), killing ~30,000 before they even reached France (6-9). Unfortunately, the failure of leadership during the 1918 influenza outbreak caused further illness and death—and demonstrates the necessity of leaders to follow their medical advisors during a national or global health crisis.

Presidential historian John Meacham (5) stated 2 very clear lessons came from 1918:

One is tell the truth. If you want the public to maintain trust in authority and if you want the public to comply with any recommendations you make, you have to be honest and truthful with them. The second lesson [concerning] social distancing was crystal clear...cities that were better at social distancing had better outcomes.

One additional lesson regards patience: we need to recognize that the 1918 to 1920 pandemic lasted approximately 2 years. It is highly unlikely that this current pandemic will have any sudden conclusion or cure, so we need to be patient to allow the disease to take its course. Sadly, we recognize that this is having a devastating impact on the global economy, and importantly, furthering the economic division between the elite and working class. Those who cannot work from home have never been more challenged, and their mental and physical health considerations will be more at risk.

POLIO VACCINE

Mid-20th century America was also challenged by another pandemic, even though the poliovirus infected far fewer individuals. Although it was a very old condition (with the first medical case dating back to 1789), by 1952, the United States reached its peak, with nearly 60,000 cases and >21,000 paralytic cases (10-12). However, due to the pediatric population, which was most often affected, the outbreaks caused widespread panic, especially in the Northeastern United States in the 1940s and 50s. Symptoms ranged from the minor headache and nausea and fever to the terrifying paralysis, temporary and permanent, and in the worst of cases, death. However, the scientific efforts for a cure were well underway due to Franklin Roosevelt's 1938 launch of the March of Dimes, which had a profound impact on U.S. philanthropy and

science (11). As a silent polio victim his whole adult life—and throughout his 3-term presidency from 1933-1945—Roosevelt dedicated his influence in the White House toward the March of Dimes charity. This fund garnered public and governmental funding to support science to combat the poliovirus.

By the mid-1950s, the poliovirus vaccine race was well underway. The discovery that the various antigenic strains of poliovirus could be grouped into 3 distinct viral types and the propagation of the poliovirus in vitro led to the development of the vaccines against poliomyelitis: the formalin-inactivated vaccine (IPV) by Jonas Salk (1953) and the live-attenuated vaccines (OPV) by Albert Sabin (1956) (13,14). Educated at NYU Medical School, Salk interned at Mount Sinai Hospital and after World War II sought a research opportunity at the University of Pittsburgh, including polio in his initial proposals, largely due to the abundance of funding for polio because of FDR and the March of Dimes (11). Over the next decades of research whilst the race for vaccines was intense, Salk and Sabin pursued different pathways—Salk used a killed virus and Sabin used live virus. By 1955, Salk had shown sufficient progress, and President Eisenhower announced the breakthrough in the Rose Garden (11). As a result of this nearly 20-year process of vaccine development, the poliovirus was eliminated from the United States in 1979 (10).

How should this story of this historical vaccine process inform us today and in the future? First, these scientists tried and failed for decades to get the perfect vaccine. They had to rely on government support and guidance for their research. While the process may be equally arduous—albeit less long—the efficacy of a coronavirus disease vaccine is far less likely to be curative when it is approved. Current best estimates suggest that efficacy could be closer to 70%, and the safety implications will not be known for 5 to 6 years. Unfortunately, contemporary impatience may not allow for these considerations to be fully vetted, as they were in the poliovirus era.

HISTORY AND CLINICAL PRACTICE

Recognizing how lessons from previous pandemics can inform the present and future in dealing with our current crisis, *JACC* has launched a new historical series, entitled *JACC Historical Breakthroughs in Perspective*. While the *Journal's* series will be historically based, it will be focused on cardiovascular care, not on global health crises or vaccination pathways. This series seeks to contextualize important advances to demonstrate how these breakthroughs can inform

contemporary cardiovascular practice, and even elucidate how future investigations can further inform the field. Our first published installment was “Type A Aortic Dissection—Experience Over 5 Decades” (15) from a large group of experts from Stanford University, ranging in experience. As the title implies, the paper evaluated historical changes of acute type A aortic dissection repair since the establishment of the aortic dissection classification 50 years ago. The surgical approaches to the proximal and distal extent of the aorta, cerebral perfusion methods, and cannulation strategies are reviewed, and it called for further investigations to delineate factors associated with the improved outcomes observed. Forthcoming paper topics include atrial fibrillation ablation, and coronary surgery revascularization that will be paired with interventional

revascularization. We hope you enjoy this series and welcome your feedback.

In conclusion, these lessons of the past do not seem so distant as we look to our immediate present and future. In fact, if we ignore these lessons or if we ignore the advice of experts, we are likely to repeat the mistakes of predecessors. U.S. history is speckled with wonderful medical advancements—as is its future—but that progress may be dependent on our ability to learn from our history.

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