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Editorial

Reflections on the COVID-19 pandemic in the USA: Will we be better prepared next time?



“By failing to prepare, you are preparing to fail.” Benjamin Franklin

Faced with the threat of the 2019 novel human coronavirus (COVID-19), communities worldwide turn to healthcare systems with expectations of emergency preparedness. The ultimate scope and reach of the current COVID-19 pandemic are unknown. At the time of this writing (May 8, 2020), the COVID-19 toll in the United States of America (US) exceeds 1.2 million infections and 78,000 deaths, the greatest count per country worldwide (John Hopkins University, 2020). We reflect on the US and its response to the COVID-19 pandemic and focus on cultural, economic, and structural barriers that threaten both current and future responses to infectious disease emergencies.

Healthcare as a commodity, decentralization, and impact on critical supplies and emergency preparedness in the US

The US spends more on healthcare than any other country, with little evidence of better, or even comparable, health outcomes (Tikkanen and Abrams, 2020). In most developed nations, governments maintain universal access to healthcare services for citizens and coordinate resources across the span of the healthcare system. A central agency can effectively plan healthcare services, reduce inefficiency, and develop infrastructure and workforce capacity to meet population needs (Schneider et al., 2020). Conversely, the US relies on a patchwork of public and private payors to finance healthcare delivery (Padilla, 2020). The fragmented US healthcare system also produces fragmented self-interests. Health insurance agencies may seek to limit insurance plan members' expenditures to remain solvent, while hospital systems seek maximum reimbursement for care from insurers to cover high costs. Physicians may seek to limit interference with their practice, while states may seek to regulate practice in certain settings. While the federal government acts as the largest payor nationally, with over 50% of healthcare spending contributed through programs such as Medicare and Medicaid, there is no one central agency for all US healthcare.

Approximately 28 million Americans are un- or under-insured (Gluck and Jost, 2020), forcing them to delay seeking medical care

until there is no alternative option. Most insured Americans obtain health insurance through employment; consequently, the number of uninsured individuals will increase as Americans continue to lose their jobs due to the financial impact of COVID-19 (Glenza, 2020; Robeznieks, 2020). Although the federal government has made assurances that healthcare systems will not bill uninsured patients for care related to COVID-19, some uninsured patients have received bills (Seville and Lehren, 2020). Like many issues related to the American healthcare system, much of an uninsured person's bills are subject to the laws of the individual state in which the person resides (Zaragovia, 2020). A growing pool of unemployed, uninsured persons will almost certainly impact access to COVID-19 testing with a negative impact on transmission dynamics. This could result in significant numbers of undiagnosed people with minimal or mild symptoms, who are not under public health surveillance nor contact tracing, transmitting the virus.

Fragmentation, disparities in care, and misaligned incentives do not provide a strong foundation for public health emergencies. A for-profit business model strives for maximal efficiency and minimal redundancy in the supply chain structure. However, the global supply chain “just-in-time” manufacturing is not positioned to support the healthcare system's needs during a pandemic. This system has forced health care providers to resort to pleas on social media to secure personal protective equipment (PPE) (National Research Council (US) et al., 2013). Other developed countries, such as Finland, effectively prioritized, funded and maintained adequate PPE stockpiles following the Cold War, better positioning themselves for the threat of infectious diseases (Boyd, 2020).

In the US, the federal government's response to COVID-19 included invoking the Defense Production Act (DPA), which requires industries to produce specific products (like PPE) needed to meet critical demands. Yet procurement of raw materials for PPE production continues to be challenging for manufacturers. As the pandemic lengthens, supply management organizations increasingly experience severe disruptions (Ranney et al., 2020). The US federal government wavered on providing centralized leadership to maximize the DPA's effectiveness in obtaining raw materials and getting products to locations where

they are needed most (Anderson and Libell, 2020). Updating policies like the DPA must be a priority in an increasingly complex global economy.

The US public health framework, challenges to a coordinated response and defunding of public health

Like most aspects of American governance, public health laws and mandates vary from state to state. The Centers for Disease Control and Prevention (CDC) provides guidance and recommendations to states but does not provide oversight. The CDC can enforce isolation and quarantine for specific communicable diseases in certain circumstances like interstate travel (Centers for Disease Control and Prevention website, 2020), but each state ultimately has responsibility for its own public health. Relaxing the social distancing mandate clearly highlighted each states' approach to the COVID-19 pandemic, with some states lifting nearly all social distancing requirements while others taking a slower, incremental approach (Kaiser Family Foundation, 2020a). Without federal oversight, each state is free to enact public health measures it feels are safe, creating confusion and distrust among American citizens.

The US government is the single largest funding source for global health worldwide, with precedent for widespread infectious disease programming beginning with the US President's Emergency Plan for AIDS Relief (PEPFAR) in 2003. However, the budget for global health stagnated over the past ten years, despite public health crises like the outbreaks of the Ebola virus from 2014 to 2016 and the Zika virus from 2016 to the present (Kaiser Family Foundation, 2020b). After this decade of declining funding, 2019 brought some improvements in national public health emergency preparedness.

In June 2019, US President Donald Trump signed the Pandemic and All-Hazards Preparedness and Advancing Innovation Act, expanding funding for a wide range of public health emergencies. In the same year, the federal government increased public health preparedness funding by an average of 5% to each state (Trust for America's Health, 2020). However, significant budget cuts to the CDC followed these modest increases in state funding for emergency preparedness. The national budget for the fiscal year 2021 removes an estimated \$700 million in CDC funding, representing 9% of its total budget. These budget cuts will directly affect The National Center for Emerging and Zoonotic Infectious Diseases (responsible for fighting new outbreaks such as the COVID-19). If adopted, this decreased funding will further strain health departments, which collaborate closely with healthcare systems in response to novel and re-emerging infectious disease threats.

A growing scarcity of infectious diseases physicians in the US

In the US today, there is a growing shortage of infectious disease (ID) physicians, and even fewer ID trained hospital epidemiologists. The number of medical school graduates seeking a career in ID has consistently decreased over the last decade, with nearly 40% of ID training fellowships going unfilled. A combination of rising medical education tuition costs and a growing reliance on loans, increased the mean medical education debt to \$190,000 (US dollars) for medical graduates. Reimbursement for ID specialty services is the lowest across the medical subspecialties. These economic factors result in an ID specialist recruitment disincentive, with most medical graduates seeking higher-paying specialties. Adequate funding is required to incentivize ID as a career track and staff both health departments and infection prevention programs.

Antibiotics and vaccines: a market failure in the US and beyond

Antimicrobial resistance is a public health crisis. Estimates predict that 10 million deaths per year related to antimicrobial resistance will occur beginning in 2050, coming at an enormous economic cost (O'Neill, 2020). Compounding this problem is a paucity of new antimicrobials in development against organisms designated by the World Health Organization as priority pathogens (Beyer and Paulin, 2020). Although government and non-governmental organizations have created incentives to encourage antibiotic research and development, pharmaceutical companies continue to abandon antibiotic discovery and development efforts. This is primarily due to concerns over a poor monetary return on investment (Renwick and Mossialos, 2018).

The current COVID-19 pandemic highlights a complex and potentially vulnerable global supply chain for many pharmaceuticals, in addition to personal protective equipment (PPE) (McGinley and Johnson, 2020). The US has experienced critical supply shortages related to natural disasters in the past. In 2017, Hurricane Maria devastated Puerto Rico; this disaster contributed to a national shortage of normal saline and highlighted US supply chain issues (Sacks et al., 2018).

Vaccine development and commercialization is a long and expensive process and, with emerging infectious diseases, comes at significant economic risk. In the recent past, vaccine development in the setting of emerging infectious disease outbreaks (for viruses such as Ebola and Zika) has not been fast enough to measurably alter the course of those outbreaks. Reducing vaccine development timelines necessitates changes in vaccine development funding and requires global collaboration (Billington et al., 2020). New funding sources must be a priority in the race to discover a safe COVID-19 vaccine.

Successful models of COVID 19 pandemic response: Germany and South Korea

American exceptionalism, "an unwavering belief in the uniqueness of the United States" (Sacks et al., 2018) may have contributed to the US COVID-19 response. Under this framework, an underlying mistrust of the government promotes individualism and special interests, which supersede the common good. Despite the United States spending more per capita on health care, it consistently ranks at or near the bottom of health outcomes compared to other developed countries (American Public Health Association website, 2020). This is inconsistent with the common good. American exceptionalism, particularly as applied to healthcare, may have contributed to a poorly conceived, underfunded, and ill-coordinated national response to COVID-19.

In the US, the Food and Drug Administration (FDA) oversees clinical diagnostics. At the start of the pandemic, testing was limited to the CDC, which developed and deployed an approved assay to state labs. State labs were unable to validate the assay, leading to significant delays in testing. Inconsistent funding of public health programs contributed to COVID-19 testing shortages. In late February 2020, the FDA approved an Emergency Use Authorization allowing private laboratories to produce testing products to meet the diagnostic needs, but test shortages persist despite gradual increases in both public and commercial test capacity.

Both Germany and South Korea mounted COVID-19 responses with more speed, complexity, and urgency than the United States. Both countries quickly developed large-scale testing capabilities. This was a function of central oversight, coordinated healthcare delivery, public health infrastructure,

and public trust. Within the first two months of diagnosing the first case of COVID-19 in South Korea (population 51 million) (The World Bank), 600 testing sites had been set up, eventually allowing for 20,000 tests each day (Her, 2020). High testing volume allows asymptomatic, COVID-19 individuals to self-isolate. In addition to testing large segments of the population, South Korean public health officials designed their test to detect the genetic targets recommended by the WHO.

As of May 5, 2020, Germany was able to test 120,000 people daily (population 83 million) (The New York Times, 2020). Prior to the arrival of the COVID-19 virus in Germany, a German lab had created a diagnostic test and published a “how-to” online for other labs to use (Bennhold, 2020). Publishing the test “blueprint” allowed other German laboratories to develop their own COVID-19 tests, maximizing test availability. Germany and South Korea’s responses to the COVID-19 pandemic differ in many ways, but widespread, sustained testing allowed for prompt diagnosis, isolation, and contact tracing in both countries.

Will we be better prepared for the next pandemic? A call for a sustained focus on infectious diseases, public health, and emergency response systems

A country’s ability to prepare for a new infectious disease relies on planning, sustaining, and executing emergency response systems. This requires emergency preparedness as a national priority. Within a loosely integrated and complex combination of private and public healthcare payers, commonly under a for-profit model, supply chain emergency response priorities must be uncoupled from *business as usual* and supported by state and federal funding. Public health systems must be adequately funded and staffed to address both present and future infectious disease threats. Healthcare systems must incentivize contagious diseases and epidemiology as careers for graduates to meet both current needs and coming plagues. The slow development of antivirals, antibiotics, and vaccines is a market failure requiring robust public-private partnerships for sustained enhancement.

Will the US be better prepared for the next pandemic? Resilience and ingenuity are part of the US cultural fabric, most notably demonstrated in the last century during World War II. However, resilience and ingenuity are necessary, but not sufficient. Without institutionalizing the lessons learned from COVID-19, the US will be positioned to repeat the missteps of COVID-19 with the next pandemic. The future of US emergency preparedness will reflect the wisdom of US political leader, inventor, and intellectual Benjamin Franklin: “*by failing to prepare, you prepare to fail.*”

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