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Review article

The United States public health services failure to control the coronavirus epidemic

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ABSTRACT

The unprecedented COVID-19 epidemic in the United States (US) and worldwide, caused by a new type of coronavirus (SARS-CoV-2), occurred mostly because of higher-than-expected transmission speed and degree of virulence compared with previous respiratory virus outbreaks, especially earlier Coronaviruses with person-to-person transmission (e.g., MERS, SARS). The epidemic's size and duration, however, are mostly a function of failure of public health systems to prevent/control the epidemic. In the US, this failure was due to historical disinvestment in public health services, key players equivocating on decisions, and political interference in public health actions. In this communication, we present a summary of these failures, discuss root causes, and make recommendations for improvement with focus on public health decisions.

1. Introduction

The unprecedented COVID-19 epidemic in the United States (US) and worldwide, caused by a new type of coronavirus (SARS-CoV-2), occurred mostly because of higher-than-expected transmission speed and degree of virulence compared with previous respiratory virus outbreaks, especially earlier Coronaviruses with person-to-person transmission (e.g., MERS, SARS). (Rando et al., 2021; Abdelrahman et al., 2020) The epidemic's size and duration, however, are mostly a function of failure of public health systems to prevent/control the epidemic. In the US, this failure was due to historical disinvestment in public health services, key players equivocating on decisions, and political interference in public health actions. (Viglione, 2020; Tollefson, 2020; Berg, 2022)I n this short communication, focus is on public health decisions.

2. Background

The United States Public Health Service (USPHS) along with health agencies in 50 states and District of Columbia (DC) plus about 3,000 local health agencies are legally and politically responsible for public health services and protecting population health. The USPHS is composed of nine agencies, including Centers for Disease Control and Prevention (CDC) and Food and Drug Administration (FDA) (Fig. 1). (Affairs (ASPA), 2015) CDC's mandate is to protect the public health of the nation and states, to protect the health of their state's population. CDC works directly with state and local health agencies for public health actions contracted by the federal government to states, localities, and private organizations. In most localities, funding of essential public health functions (e.g., health surveillance and infectious disease outbreak investigations) is dependent on state guidance and funding through both state and federal programs.

In the COVID-19 epidemic that started in the winter of 2019–2020, CDC and the network of state and local health agencies failed to protect the US population's health due to inaction or ineffective actions before and during the epidemic. Decentralization of actions and CDC's lateness issuing guidelines and providing additional personnel/other resources contributed to uncoordinated contact tracing and follow up measures among different actors. In this communication, we present a summary of these failures, discuss root causes, and make recommendations for improvement.

3. Public health inactions or ineffective actions "During the COVID-19 Epidemic"

In this epidemic, CDC and its network of state, local, and private organization partners failed in four critical actions that, if implemented early and effectively, were key to controlling this outbreak and reducing its burden (infection, complications, deaths). Needed actions were: 1)

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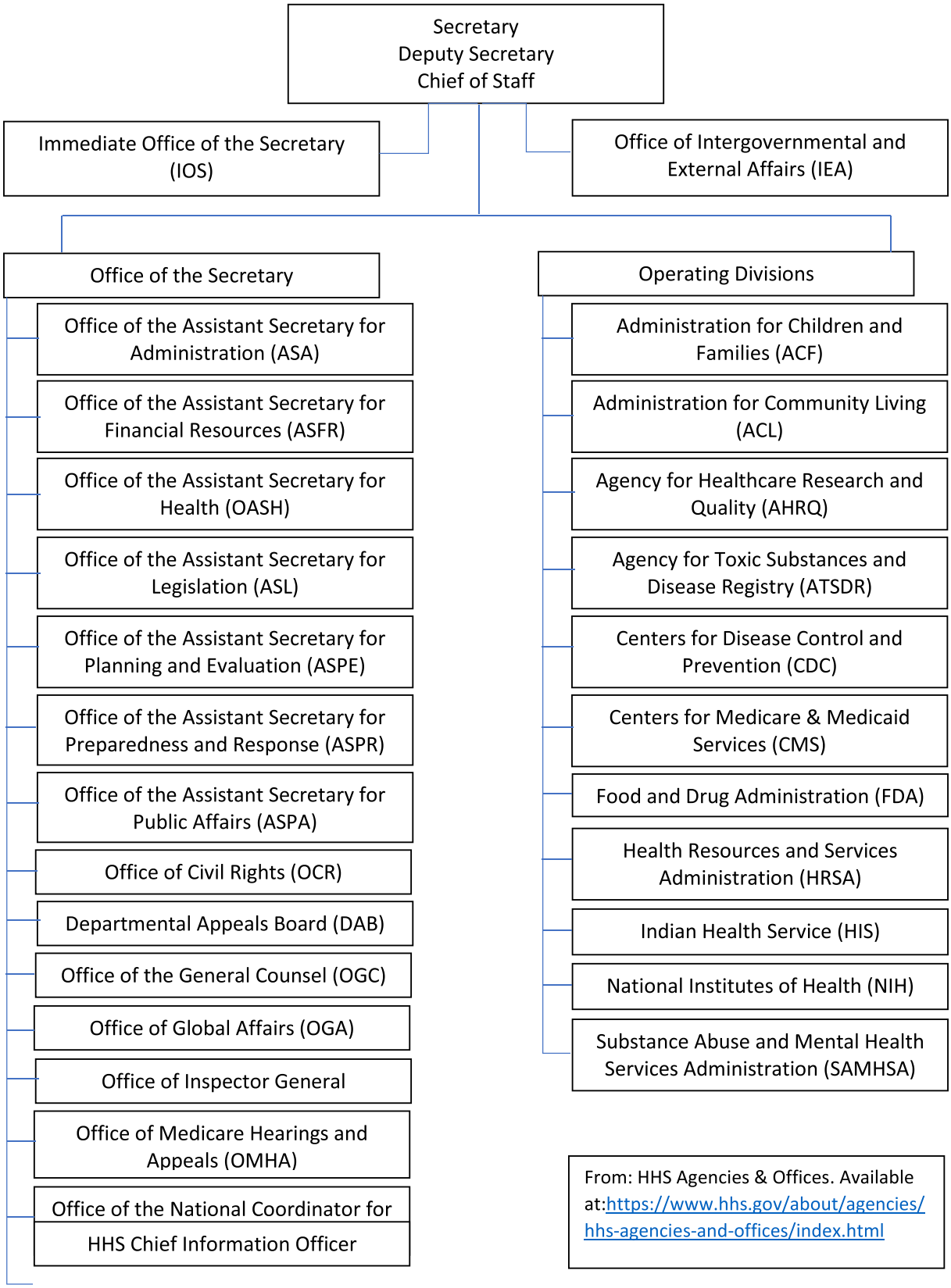

Fig. 1. The Department of Health and Human Services Organization Chart representing the different agencies that compose it.

effective contact tracing; 2) effective, available diagnostic screening; 3) promoting mask use and other prevention/control measures; and 4) protecting targeted high-risk populations.

3.1. Contact tracing – delayed, insufficient, ineffective, and uncoordinated

Contact tracing early in an epidemic is one of the most effective actions needed to control infectious disease epidemics. Researchers have identified that COVID-19 contact tracing was less effective in identifying secondary cases than in other infectious diseases, but a reasonable level of efficiency was reported that justified its use. However, initiation of contact tracing was delayed beyond expected in most areas. CDC took too long to coordinate contact tracing and early preventive actions with local health agencies and state health departments for five reasons.

First, due to political reasons, the federal government failed to alert the American people early in February 2020 when CDC's National Center for Immunization and Respiratory Diseases was ready to launch a planned campaign. (Tollefson, 2020; Piller, 2020) Second, contact tracing/outbreak investigation depend on availability of minimally sensitive, specific, and reliable diagnostic tests to screen and/or confirm cases; these were not available for many months. In early 2020, due to faulty reagents and bureaucracy CDC failed to develop reliable laboratory tests for COVID-19. (The United States Badly Bungled Coronavirus Testing—but Things May Soon Improve, 2022) Roll out of these tests to most state/local labs was slow, with samples sent to CDC for testing, and highly criticized by all users. Third, decentralization of public health actions, characteristic of the US public health network, provides agility for local-level action if resources are available locally. This decentralization, however, can hinder timing and coordination of efforts for problems with nationwide impact if agreed upon guidelines for engagement/intervention or key resources are not available. In the COVID-19 epidemic, state and local health agencies needed CDC's leadership, guidance, and rapid training early in 2020, but CDC only started working more closely with states and aimed to increase contact tracing and other epidemic control measures with the October 1, 2020, $2.59 trillion Coronavirus Aid, Relief, and Economic Security (CARES) Act. Fourth, in February 2020, state and local health agencies needed a coordinated and massive effort from CDC to train/deploy thousands of additional contact tracers needed to control the epidemic; these agencies did not have the necessary workforce ready to implement contact tracing at the scale needed. As of January 2022, seven state health departments had "0″ contact tracers on their roster; the remaining 43 states and DC had between 5 (Arizona) and 7,498 (California). Thus, there are 0 – 73 contact tracers per 100,000 population across 50 states and DC. For example, North Dakota had 73.2 contact tracers per 100 K population, Nebraska 51 per 100 K, California 19 per 100 K, Pennsylvania 10.2 per 100 K while Florida had zero contact tracers. (The National Academy for State Health Policy, 2022) In addition, there are wide variations in models, processes, levels of centralization, and uses of technology and deployment among states. Finally, lower than expected efficacy and effectiveness have been reported. A June-October 2020 study with data from 13 states and one territory found that 2 of 3 individuals with COVID-19 were not reached for interview or named no contacts when interviewed; a mean of 0.7 contacts were reached by telephone by public health authorities; and only 0.5 contacts per case were monitored, a lower rate than needed to overcome the estimated global SARS-CoV-2 reproductive number. (Lash et al., 2021) An August-October 2020 study in Washington state found the proportion of individuals disclosing contacts remained below 50 %, with minimal differences by demographic characteristics. The longest time interval occurred between symptom onset and test result notification. (Bonacci et al., 2021) Similar findings were reported for a study in North Carolina. (Lash, 2020).

3.2. Diagnostic screening for infection – Ineffective or unavailable

By February 2020, CDC had done only 459 tests. Also, FDA delayed approval of good test kits already made available by private sector. Despite a joint decision by CDC and FDA to create a workaround process, approval was delayed and staggered until May 2020. (Office of the Commissioner, 2020) First antigen test was approved on May 9, 2020; first antigen test where results could be read directly from testing card, on Aug 26, 2020; (Office of the Commissioner, 2020) and first antigen test for self-testing at home, on November 17, 2020. (Office of the Commissioner, 2020).

3.3. Promoting mask use and other prevention and control measures – Confusing and insufficient

Until the second half of 2020, due in part to flawed research on SARS-CoV-2′s aerosolizing potential, CDC continued to emphasize hand washing and surface cleaning as key strategies to prevent infection/disease, despite evidence that appropriate wearing of masks was more effective in reducing SARS-CoV-2 transmission. In addition, CDC flip-flopped on mask use. The original recommendation for wearing a cloth mask in July 2020 (https://www.cdc.gov/media/releases/2020/p0714-americans-to-wear-masks.html) was followed by modified recommendations for fully vaccinated people (visit others fully vaccinated without masking or distancing) in March 2021 (https://www.cdc.gov/media/releases/2021/p0308-vaccinated-guidelines.html). (Centers for Disease Control and Prevention, 2020; Centers for Disease Control and Prevention, 2021) In late July 2021, CDC recommended that fully vaccinated people should again mask indoors in high transmission areas (https://content.govdelivery.com/accounts/USFSIS/bulletins/2eaacee). (Centers for Disease Control and Prevention, 2021) A consequence of this lack of clear signaling was a low uptake of mask wearing that has persisted to this day. (Diamond, 2022; Whelan and Jared, 2022).

3.4. Protecting targeted high-risk populations – insufficient

Early in the epidemic, studies from CDC and academic researchers identified high-risk groups for COVID-19, its complications and death: older adults; people with medical conditions, especially chronic diseases, and obesity; pregnant women; and jailed/imprisoned people. CDC. "Cases, Data, and Surveillance." Centers for Disease Control and Prevention, February 11, 2020; Levin et al., (CDC, 2020; Levin et al., 2020; Emami et al., 2020; Laires et al., 2021) In addition, researchers had recommended a high-risk population strategy for prevention and control of COVID-19. (Govindarajan, 2020) Although CDC created health information material targeting high-risk groups, CDC and other public health agencies did little in the epidemic's first year to guide the healthcare sector and communities on strategies to reduce COVID-19 burden in this population group. (CDC, 2020) The number of COVID-19 related deaths among nursing home residents as of December 20, 2020accounted for 38 % of all COVID-19 deaths in the US and these numbers appears to be underestimated. (Girvan, 2021; Shen et al., 2021) There is also evidence that in the first year of the epidemic, lower quality nursing homes had worse outcomes than those with higher quality of care. (Gupta et al., 2021).

A CDC guideline for strategies and interventions only became available on July 30, 2021, when vaccination had already been established for six months and community transmission levels were better known. (Christie, 2021) However, in the document, recommendations and guidelines were very general; strategies provided were nonspecific and not targeted, regardless of health care facility or high-risk group.

4. Root causes of USPHS failure to control the COVID-19 epidemic

Two key reasons exist for less than effective action to control the US COVID-19 epidemic. First, before the epidemic's start, CDC and state health agencies failed to fully assess, raise necessary awareness, and address continued and relentless defunding and reducing of essential public health functions at the state level. (Trust for America's Health, 2020) Currently, the US spends approximately $3.6 trillion on health, but less than $100 billion on public health/prevention (<3%); CDC's funding is at its 2008 level. The combination of nearly-two decades of lower funding and reorganization substantially reduced the public health workforce at the state and, more significantly, local public health agency level. It reduced the number of contact tracers, health monitors and "shoe leather epidemiologists" essential for prevention and control of epidemics. (Last, 2007) By 2020, there were 26,000 fewer employees at state, county, and municipal health agencies than in 2009. In an outbreak investigation, the shoe leather epidemiologist approach, refined by CDC's Epidemic Intelligence Services (EIS), entails walking door-to-door (wearing out shoe leather in the process) asking patients and their contacts direct questions. (CDC. "CDC's Epidemic Intelligence Service (EIS)." Centers for Disease Control and Prevention, August 15, 2022. https://www.cdc.gov/eis/index.html). (CDC, 2022).

Second, USPHS was unable to deploy information and digital technology to prevention/control activities before and during the epidemic. Local, state, and federal health agencies were unable to deploy digital technologies during contact tracing on the scale necessary to reverse personnel deficiencies. For example, mobile apps with geolocation and associated technologies (used in Taiwan) should have been added to US contact tracing actions years ago. (Wang et al., 2020) CDC's lead public health surveillance system in approximately half of states has organizational/functional structure and technological applications developed in the late 1980s. For example, the US National Notifiable Disease Surveillance System (NNDSS) still relies mainly on National Electronic Telecommunications System for Surveillance (NETSS) developed in the late 1980s-early 1990s. (CDC, 2022) Although a CDC-led data modernization initiative (DMI) is on the way, NETSS has yet to fully transition to a system that takes advantage of technological innovations in digital communication/transmission and 21st century informatics architecture. (Richards et al., 2014; CDC, 2021) DMI allows for uses of mobile informatic technology to support early disease detection, outbreak investigation, and detection of population epidemics. However, only a handful of states have fully implemented process and structured surveillance functions. (CDC, 2022).

5. Conclusions – way forward

The USPHS, especially CDC and its network of federal, state, and local partners, has worked to build a robust public health surveillance system that effectively protected the health of Americans for over 40 years. This system's weaknesses and partial failures appear to have contributed to a less than effective management of the COVID-19 epidemic, resulting in over 76.4 million cases, 4.4 million new hospitalizations (August 01, 2020 – February 05, 2022) and 900,000 deaths in the US between January 1, 2020, and February 05, 2022. (CDC, 2020).

CDC's public health surveillance improvement strategy launched in 2014, its updated DMI and experience gained to control the COVID-19 epidemic promise to bring changes that could address problems identified with the USPHS response to population health threats. With DMI, CDC is making progress in automation of data sources, data interoperability, transparency, and shared governance with partners, retaining and training health IT and informatics workforce and investing in decentralized informatics innovation. These measures should increase speed of actions necessary to control and prevent epidemics. In addition, strengthening size and training of public health workforce at state and local levels is necessary. Finally, USPHS must readdress CDC's governance/hierarchical structure to guarantee independence and agility of action to control modern epidemics, with their ever-increasing potential to become pandemics due to rapid means of transportation and economic interdependence of countries.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

No data was used for the research described in the article.

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