

# CDC Policy Changes during the COVID-19 Pandemic

Saitejaswi Kanuri<sup>1</sup>, Allison Chen<sup>2</sup>, Daniel J. Barnett<sup>3</sup>, Edbert B. Hsu<sup>2,4</sup>

<sup>1</sup>William Carey University College of Osteopathic Medicine, Hattiesburg, USA

<sup>2</sup>School of Medicine, Johns Hopkins University, Baltimore, USA

<sup>3</sup>Department of Environmental Health and Engineering, Johns Hopkins Bloomberg School of Public Health, Baltimore, USA

<sup>4</sup>Johns Hopkins Office of Critical Event Preparedness and Response, Baltimore, USA

Email: [ehsu1@jh.edu](mailto:ehsu1@jh.edu)

**How to cite this paper:** Kanuri, S., Chen, A., Barnett, D. J., & Hsu, E. B. (2024). CDC Policy Changes during the COVID-19 Pandemic. *Open Journal of Social Sciences*, 12, 174-200.

<https://doi.org/10.4236/jss.2024.126009>

**Received:** May 7, 2024

**Accepted:** June 16, 2024

**Published:** June 19, 2024

Copyright © 2024 by author(s) and Scientific Research Publishing Inc. This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

---

## Abstract

Throughout the COVID-19 pandemic, the U.S. Centers for Disease Control and Prevention (CDC) provided guidance to the nation's public, often in the face of extremely challenging and novel circumstances. We review the CDC's COVID-19 policies and the subsequent public response pertaining to masks, social gatherings, travel, return to work/school, quarantine, and vaccinations, between January 2020 and April 2023. Rapidly changing conditions as well as evolving science and information necessitated frequent updates to CDC guidance, however, the decision-making processes, implementation, and communication regarding changes in policy have drawn criticism. Identifying areas for improvement and implementing strategies to address these concerns will be of importance to better prepare the nation for issuing and communicating public health guidance during future pandemics.

## Keywords

COVID-19, CDC COVID-19 Guidance, COVID-19 Policy, Disaster Preparedness

---

## 1. Introduction

During the COVID-19 pandemic, as in other major health emergencies, the U.S. Centers for Disease Control and Prevention (CDC) has been responsible for issuing public health guidance. This guidance has been utilized by policymakers, organizations and businesses, local leaders, and individuals, to inform aspects of the response to the COVID-19 pandemic including travel restrictions, masking, quarantine, social distancing, and vaccination.

As a novel and evolving pathogen, SARS-CoV-2 and the resultant COVID-19 pandemic posed continuing challenges for agencies issuing public health guidance. At times, the decisions and changes in guidance by the CDC during the pandemic drew significant criticism from many quarters, including political and public figures, medical and public health experts, and the news media (Simmons-Duffin, 2021; Hamblin, 2022; Tyson & Funk, 2022). Certain changes simply reflected better understanding and more data becoming available. However, others were highlighted as being motivated by nonmedical considerations to the detriment of public health, poorly communicated, improperly timed, or seemingly arbitrary.

The CDC itself has acknowledged shortcomings in its pandemic response, and recognized the consequences of declining trust in public health and scientific establishments, as well as declining trust in the CDC itself (Hamblin, 2022; Simmons-Duffin, 2021; Tyson & Funk, 2022). In April 2022, the agency began to conduct internal reviews, commissioned by then CDC Director Rochelle Walensky. Two reports were released in August 2022 (Griffin, 2022; LaFraniere & Weiland, 2022). Planned reforms based on the reports aim to make the agency more responsive and communicative (LaFraniere & Weiland, 2022).

This work seeks to synthesize selected major changes in CDC guidance during the COVID-19 pandemic between January 2020 and April 2023, exploring where possible what prompted them and how they were received, with the goal of identifying commonalities or trends that could inform future strategies to more effectively issue and communicate federal public health guidance

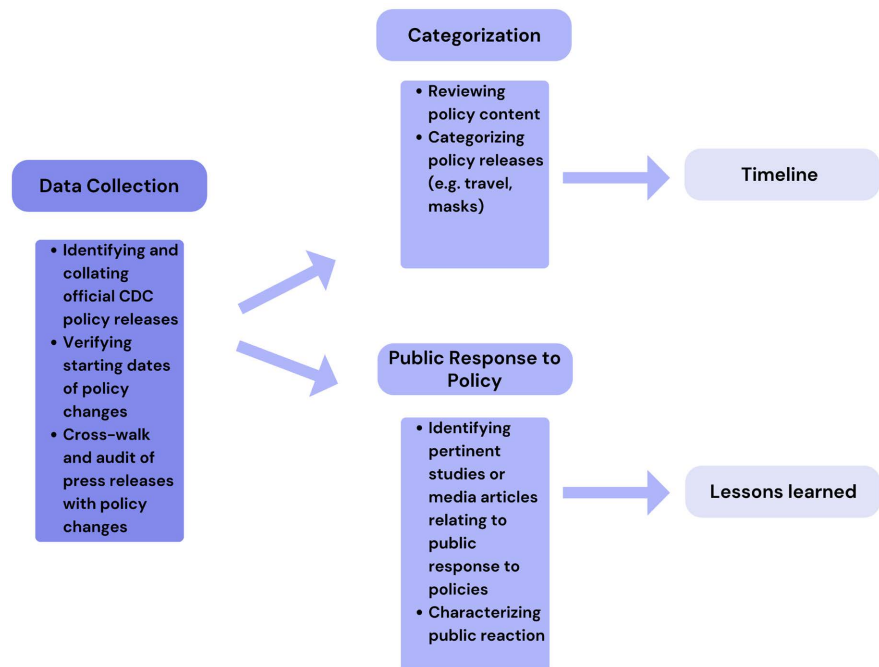
## 2. Methods

### 2.1. Data Collection

The team extracted, collated, and examined policy releases from the CDC drawn from publicly available data sources including the CDC coronavirus website (Coronavirus Disease 2019 (COVID-19), 2020) and official CDC newsroom releases that had been subsequently archived online (CDC Archives, n.d.) according to the methodological depiction (Figure 1). Dates when policy changes went into effect were verified through a crosswalk and audits of policies and press releases. Information was reviewed for specific policy content to be abstracted. Policy releases were subsequently categorized into topics, including travel, masking, quarantine, social gatherings and return to work/school and vaccines.

### 2.2. Timeline Development

Based upon abstracted information from official sources, an initial timeline of the CDC's policies in response to the COVID-19 pandemic was constructed. This timeline was further developed by information from other relevant non-official sources obtained through the search strategy detailed below. In addition, the Wayback Machine (<https://archive.org/web/>) was used to review



**Figure 1.** Depiction of methodological approach.

archives of the CDC website. This enabled identification of timing discrepancies between CDC press releases and updates of the CDC official website that matched these policy changes.

### 2.3. Supplemental Search for Public Response to Policy

The team focused on identifying information pertaining to the timeline as well as public reaction to policies and trends. Further information from these additional sources contextualize the contemporaneous challenges and the narrative of public response to release of CDC guidelines. This information was collected from non-official sources (e.g. news articles), covering the period January 2020, when WHO declared COVID-19 a pandemic, through April 2023. These were generated by the search terms, “CDC guidelines”, “COVID-19”, “travel”, “masks”, “quarantine”, “vaccines”, “social gatherings”, “return to school”, and “return to work”, using Google search tools. Articles from news organizations and media outlets such as The Washington Post, ABC News, Forbes, US News, CNN, PBS, served to cross reference the CDC newsroom releases and further characterize public response to policy releases as well as lessons learned.

## 3. Results

### 3.1. Travel

Recognition of the COVID-19 outbreak began with reports of a cluster of “pneumonia of unknown etiology” in Wuhan, China, at the end of December 2019 (World Health Organization, 2020; Centers for Disease Control and Prevention, 2020i). In response, the CDC issued a Level 1 Travel Health Notice

(“practice usual precautions”) and released guidance for healthcare workers encountering patients with respiratory symptoms and a history of recent travel to Wuhan (Centers of Disease Control and Prevention, 2020i). When cases began to be reported outside of China, namely in Thailand and Japan, the CDC sent personnel to three major airports—John F. Kennedy International in New York, San Francisco International in California, and Los Angeles International in California—to screen passengers from Wuhan for symptoms (American Journal of Managed Care, 2021; Centers for Disease Control and Prevention, 2020g).

The first domestic case of COVID-19 was confirmed in Washington state on January 21, 2020, in a patient who had traveled from Wuhan six days prior (Centers for Disease Control and Prevention, 2020h). Within five days, four additional travel-related cases had been confirmed in three other states (Centers for Disease Control and Prevention, 2022b). The CDC updated its travel guidance for China to a Level 3 Travel Health Notice, with the accompanying media statement advising travelers to “avoid all nonessential travel” (Messonnier, 2020).

By February 3, 2020, additional restrictions were placed on US-citizen passengers from China, including mandatory or self-quarantine depending on region traveled from, while foreign nationals who had been to China within 14 days prior were barred from entry (Centers for Disease Control and Prevention, 2022b). As case numbers in other nations and regions increased, with cases in Europe growing from double digits into the tens of thousands in just over two weeks (Europe: COVID-19 Tracker, 2022) foreign nationals who had been to an expanding list of countries within the past 14 days were barred from entry. These countries included Iran beginning March 2, 2020, 26 European countries beginning March 13, 2020; Britain and Ireland beginning March 16, 2020; and Brazil beginning May 27, 2020 (Exec. Order 2021, Department of Homeland Security, 2020b; Dwyer & Doubek, 2020; Shepardson, 2020). US citizens and permanent residents traveling from restricted locations would arrive at one of several designated airports, where health screening was conducted. The CDC provided personnel and financial support for these efforts (Dollard et al., 2020). Screening was stopped on September 14, 2020, with the CDC citing “limited effectiveness” due to the prevalence of asymptomatic cases (Centers for Disease Control and Prevention, 2020o).

Within the US, increases in cases and community transmission beginning in March 2020 led to a domestic travel advisory. The CDC issued an advisory recommending against non-essential travel in three northeastern and mid-Atlantic states—New York, New Jersey, and Connecticut—on March 28, 2020 (Centers for Disease Control and Prevention, 2020k).

In November 2020, the CDC added a fourth level to its COVID-19-related Travel Health Notice system, and issued the recommendation that travelers test 1 - 3 days before and 3 - 5 days after international air travel, and quarantine for 1 - 2 weeks after travel depending on testing availability (Centers for Disease Control and Prevention, 2022b).

Testing before air travel changed from being a recommendation to becoming mandatory in some situations for travelers entering the US. Due to the emergence of the Alpha variant, beginning on December 28, 2020 passengers from the UK were required to have a negative test within three days of boarding a flight to the US (Centers for Disease Control and Prevention, 2020e). This requirement was expanded to all travelers in January 2021 (Centers for Disease Control and Prevention, 2022b). The emergence of the Omicron variant prompted the CDC to shorten the testing window from three days before departure to within one day before departure, beginning December 6, 2021 (Centers for Disease Control and Prevention, 2020n). All testing requirements for entering the US were eliminated beginning June 12, 2022 (U.S. Department of State, 2022).

Vaccination status affected CDC recommendations surrounding travel within the US. On April 2, 2021 testing or quarantine was no longer recommended for fully vaccinated individuals traveling domestically. Fully vaccinated individuals were still required to abide by testing requirements if they were entering the US from abroad (Centers for Disease Control and Prevention, 2021a). On November 8, 2021, foreign nationals became required to present proof of full vaccination status before entering the US. This requirement replaced the ongoing restrictions on foreign nationals entering the US from certain countries (U.S. Department of State, 2021).

Restrictions on individuals traveling into the US from other countries proved to be controversial when they were implemented. The European Union strongly criticized the March 2020 restrictions on travel from Europe, and European leaders expressed disapproval regarding statements made by the United States President Donald Trump's administration, criticizing Europe for their handling of COVID-19 and accusing European travelers of "seed[ing]" a "large number of new clusters in the United States," the latter statement without support (Onishi, 2020). Initial travel bans regarding China were also criticized, in some cases for their perceived xenophobia (Spinks, 2020). The Director-General of the World Health Organization (WHO), Tedros Adhanom Ghebreyesus, spoke against broad bans regarding China in early February 2020. However, there were also allegations that the bans were too porous and incomplete (Braun et al., 2020). Furthermore, top US public health officials, including Anthony Fauci of the National Institutes of Health (NIH), defended travel restrictions at several points (Beaubien, 2020; Cathey & Flaherty, 2020).

Requirements regarding testing surrounding travel were similarly controversial. The expense of required testing, as well as the difficulty and uncertainty of getting test results within a limited amount of time, were criticized, particularly when the window for pre-flight testing was reduced from 72 to 24 hours (Shear et al., 2021). Airline officials however were initially supportive of testing requirements, although they opposed any permanent requirements (Aratani, 2021).

### 3.2. Masks

The CDC's guidance regarding masking, and changes in its guidance as the pandemic progressed, has been arguably the most visible and controversial aspect of the agency's recommendations among the general public. At the beginning of January 2020, CDC-issued guidance for healthcare workers in contact with individuals suspected of having COVID-19 was for patients to wear a mask and providers to wear N95s (Centers for Disease Control and Prevention, 2020i). In a February 12, 2020 press briefing, the CDC also recommended mask-wearing for sick individuals who may have COVID-19, and those caring for sick individuals unable to wear a mask. During this same briefing, the general public was not advised to mask due to a lack at the time of community transmission (Centers for Disease Control and Prevention, 2020f). However, this guidance continued even when community transmission in the US escalated to the point that states began issuing stay-at-home orders. The CDC's stated rationale was that the limited supply of masks "should be saved for caregivers" (McReynolds, 2020).

CDC guidance changed on April 3, 2020, influenced by data on asymptomatic cases and transmission (Jingnan et al., 2020). All individuals were advised to wear cloth masks in public spaces (Dwyer & Audrey, 2020); the recommendation of cloth and nonmedical masks was explicitly to maintain a supply of N95s for healthcare workers (Honein et al., 2020). The CDC also began recommending wearing two layers of masks (Centers for Disease Control and Prevention, 2020b). In the wake of this new guidance, states issued so-called "mask mandates," which typically required face coverings in certain indoor public spaces and outdoor spaces where social distancing was unfeasible. Beginning with New Jersey on April 10, 2020, over the next year 39 states enacted some form of mask mandate ("State-Level Mask Requirements", (n.d.)). The majority of these ended in mid-2021, with the remainder ending in early 2022 ("State-Level Mask Requirements", (n.d.)).

While mask-wearing was largely enforced throughout 2020 by state and local orders as opposed to nationwide requirements, at the start of the Biden administration in January 2021, several nationwide orders were issued. Among them were requirements to wear masks in federal buildings, and while taking public transportation including planes. The CDC issued its order beginning February 2, 2021 requiring masks on public transportation (Centers for Disease Control and Prevention, 2022c).

On March 8, 2021, CDC revised its guidelines for fully vaccinated individuals, who no longer had to wear masks around other either vaccinated or unvaccinated individuals (Centers for Disease Control and Prevention, 2021h). However, with the emergence of the Delta variant, guidance was changed in July 2021 to recommend mask-wearing in areas of higher transmission, even for vaccinated individuals. At that point almost two-thirds of counties across the US were considered to have higher transmission (Collins, 2021).

From then on, mask guidance was loosened over time. In February 2022, individuals in counties at low or medium risk, encompassing almost three-quarters of the US population, were no longer recommended to mask indoors regardless of vaccination status (Lovlace & Edwards, 2022). On April 18, 2022, the mask mandate on public transportation was ended (Centers for Disease Control and Prevention, 2022f).

Throughout the pandemic, resistance to mask-wearing and masking regulations has been multifaceted. Adherence to masking guidelines became markedly partisan, with surveys conducted in mid-2020 by the Pew Research Center, the New York Times, and University of Chicago researchers, among other analyses, finding that those who identified as Republican were less likely to wear masks than those who identified as Democrat (Igielnik, 2020; Katz et al., 2020). Political affiliation was found to be a predictive factor of mask wearing that outweighed even local policies (Igielnik, 2020; Katz et al., 2020). This split was fueled by political leadership, with President Trump at times opposing or voicing ambivalence about masking and mask mandates (Victor et al., 2020). Several governors also began to oppose mask mandates, even those who had instituted them in their state early in the pandemic. Governor Greg Abbott of Texas issued an Executive Order in May 2021 preventing mask mandates by governmental entities and public schools within the state (Office of Texas Governor, 2021). Governor Ron DeSantis of Florida issued an Executive Order in July 2021 barring mask mandates in public schools (Exec. Order No. 21-175, 2021).

Contributing to the controversy was the CDC's changes in guidance. In particular, the initial recommendation against mask wearing for healthy individuals was cited by those opposing masking after CDC guidelines changed. In addition, the resumption of masking in the summer of 2021, after recommendations of mask wearing were lifted in the spring of that year, sparked backlash from political and public figures, and hesitancy even from some public health figures who were skeptical of adherence (Diamond, 2021).

Requirements surrounding masking for travel prompted mixed reactions. In October 2020, when new CDC guidelines recommended masking on public transportation, these guidelines were welcomed by industry and union leaders who had pushed for such measures to protect employees, but were also criticized for a lack of penalties, making them difficult to enforce. The CDC's initial plan to institute an order that included penalties was rejected by the White House (Sun et al., 2020a). The institution of an enforceable mandate in January 2021 was welcomed by industry employees (Sampson, 2021). It was less popular among a subset of passengers; during the time that masking requirements were in place, over 70% of passenger incidents were related to their enforcement (Shepardson, 2022; Thomaselli, 2022). By December 2021, executives from several large airlines asserted in a congressional hearing that onboard air filtration systems and disinfection procedures were sufficient to prevent COVID-19 spread even without masks, a view that was disputed by representatives from a flight attendants' union (Kelleher, 2021). A slim majority of Americans contin-



ued to favor masking on transportation into spring 2022, even after a federal court ruling striking down mask mandates on public transportation was issued in April 2022 and numerous carriers rapidly made masks optional (Franklin & Chappell, 2022; “Support for Mask Requirements”, 2022).

### 3.3. Quarantine

Early in the outbreak, in January 2020, the CDC estimated the incubation period of COVID-19 to be 2 - 14 days. Travelers from China who were allowed to enter the US were required to quarantine for up to 14 days; those who had not come from Hubei province were allowed to self-quarantine (Department of Homeland Security, 2020a). Initial guidelines for individuals with potential exposure to COVID-19 also recommended 14 days of self-quarantine (Clelland, 2020).

On April 8, 2020, the CDC revised its guidelines to allow “essential workers,” such as employees of healthcare facilities and grocery stores, to continue to work after exposure as long as they were asymptomatic. Some healthcare facilities had already begun eliminating mandatory post-exposure quarantines prior to the change in CDC guidance, due to shortages of personnel (Department of Homeland Security, 2020b). A 14-day self-quarantine was still recommended for other individuals with exposure. On December 2, 2020, the recommended self-quarantine period was reduced to 10 days, which individuals could exit without testing as long as they remained asymptomatic during the entire period. If testing was available to the individual, they could exit quarantine after 7 days if they tested negative. Individuals were still recommended to monitor their symptoms and wear a mask for a full 14 days (Centers for Disease Control and Prevention, 2020c).

Once COVID-19 vaccines became broadly available, guidelines were updated to reflect vaccination status. By December 27, 2021, vaccinated and boosted individuals were no longer recommended to quarantine after an exposure, only to wear a mask for 10 days. For unvaccinated individuals, or those who had been vaccinated over 6 months prior without a booster, a 5-day quarantine was recommended followed by 5 days wearing a mask (Centers for Disease Control and Prevention, 2021c).

Guidance for infected individuals also changed over time. As of May 3, 2020, quarantine periods were extended from an initial 7 days to 10 days after first symptoms or first positive test, and in the case of symptomatic individuals also at least 72 hours after the end of fever (Centers for Disease Control and Prevention, 2020a; “Ending Isolation”, 2022). In July 2020, the 72-hours post-fever period was shortened to 24 hours, and asymptomatic individuals could exit quarantine 10 days after their positive test with no additional requirements (Centers for Disease Control and Prevention, 2020a). For severely symptomatic individuals, a 20-day quarantine was recommended. In February 2021, it was recommended that severely immunocompromised individuals, who could transmit COVID-19 even after 20 days, undergo additional testing and consultation with healthcare workers (Centers for Disease Control and Prevention, 2020a).



On December 27, 2021, the recommended quarantine period for asymptomatic and mildly symptomatic individuals was cut in half to 5 days, and 24 hours after the end of fever. For individuals with more severe cases, the quarantine period was reduced to 10 days (Centers for Disease Control and Prevention, 2020a).

As exemplified by the April 2020 guidance exempting essential workers from quarantine after an exposure, workforce considerations influenced CDC guidelines alongside scientific considerations. When the CDC reduced the self-quarantine period from 14 to 10 days in December 2020, it noted that the aim was to encourage more people to quarantine for at least a period of time by “reducing the economic hardship associated with a longer period [of quarantine]” (Centers for Disease Control and Prevention, 2020d). Some public health experts explained this as a “harm reduction” proposal, balancing the greater risk of spreading COVID-19 with a burdensome quarantine period that could discourage individuals from entering quarantine at all. From a purely health standpoint the CDC still preferred a 14-day quarantine, although it was noted that this was not clearly communicated (Lopez, 2020).

The CDC’s change in December 2021 reducing recommended quarantine time for infected individuals from 10 to 5 days was controversial among public health experts, who criticized the lack of communication surrounding the change. The CDC justified the recommendation by noting that most transmission “occurs early in the course of illness,” which was acknowledged by some public health experts (Centers for Disease Control and Prevention, 2020c; Schwartz & Diaz, 2021). However, the CDC allegedly did not consult other public health groups or health officials, as they would typically have done, before announcing the recommendations. Furthermore, there was a lack of official materials to communicate the rationale behind these changes to the general public (Fox, 2021). Public health officials also favored a testing component to exit quarantine, or at least the recommendation of a negative test.

### 3.4. Social Gatherings and Return to Work/School

When community spread increased to an extent where quarantining infected and potentially infected individuals as they emerged became ineffective, the CDC began issuing recommendations regarding physical interactions. The strategy of “social distancing” was intended to reduce person-to-person transmission by limiting the situations in which individuals would be in proximity for long enough to transmit. From early in the pandemic, as exemplified by a March 3, 2020 press briefing, the CDC favored the regulation of social distancing at a local level, while it would make general recommendations (Centers for Disease Control and Prevention, 2020l).

In mid-March 2020, the CDC recommended canceling or rescheduling events with 50 or more individuals (Kopecki, 2020). Additional recommendations included staying 6 feet away from other individuals, avoiding dine-in food options,

refraining from visiting older relatives, and generally avoiding in-person social activities (Godoy & Audrey, 2020; Pearce, 2020). On March 19, 2020, California issued a stay-at-home order with the only exceptions being working an essential job or buying essential needs, the first state to have such an order (American Journal of Managed Care, 2021). Between March and the end of May 2020, 42 states and territories issued similar mandatory stay-at-home orders (Moreland et al., 2020). An additional 3 states had local stay-at-home orders, typically instituted by officials of individual cities (Mervosh et al., 2020).

The CDC continued to recommend limiting physical contact and gatherings, although social distancing regulations began to be relaxed during late April and early May in most states and continuing throughout the summer of 2020. Individual states set their own thresholds, such as a trend of decreasing cases and hospitalizations, for reopening (Honein et al., 2020; “More US States”, 2020; National Governor’s Association, 2020).

In addition, the CDC classified outdoor gatherings, small gatherings, and events involving minimal travel for attendees, as lower risk (National Center for Immunization and Respiratory Diseases (U.S.). Division of Viral Diseases, 2020).

As the new school year was set to begin in fall 2020, the CDC stated the importance of having in-person learning, with the CDC director at the time, Robert Redfield, considering it “critically important for our public health to open schools this fall” (Centers for Disease Control and Prevention, 2020j). To that end, the CDC released resources throughout late spring and summer 2020 on how to safely reopen schools, including guidelines for ventilation, cleaning, distancing, and how to deal with cases arising. In March 2021, the recommended distance between individuals in in-person classrooms was decreased from 6 to 3 feet (Centers for Disease Control and Prevention, 2021f).

On March 8, 2021, the CDC released its recommendations for vaccinated individuals with regards to social gatherings. Vaccinated individuals could be unmasked around other fully vaccinated individuals in any situation. They could do the same with a limited number of unvaccinated individuals, namely from only one other household (Centers for Disease Control and Prevention, 2021h). However, they were still recommended to mask around at-risk individuals and to avoid large gatherings.

In February 2022, the CDC released information to help communities determine their COVID-19 risk, with no need for social distancing in low-risk areas (Mandavilli, 2022a). In August 2022, the CDC ended its 6-feet-apart recommendation (Stobbe & Binkley, 2022).

Of all the COVID-19 related measures, social distancing requirements leading to lockdowns had the most widespread and profound impact. The specific impact of official lockdown measures has been difficult to determine, with one study by researchers at the University of Chicago concluding that state orders had a limited effect because individuals were already choosing to distance prior to the orders (Berry et al., 2021; Lewis, 2022). However, studies have largely concluded that social distancing measures had an impact on reducing COVID-19

infections and deaths.

Lockdowns carried with them economic, social, and health costs. In April 2020, the unemployment rate in the US spiked to 14.7 percent, the highest since data was first collected in 1948. The number of unemployed individuals more than doubled (U.S. Bureau of Labor Statistics, 2020). Disruptions to schooling and a lack of in-person socialization led to loss of academic gains and social development for children, the effects of which are still being felt even as reopening has progressed (Campbell, 2021; Dorn et al., 2021; Moyer, 2022).

In striking a difficult balance between recommending lockdowns to prevent disease spread and avoid overwhelming the healthcare system, while minimizing their disruptive impact, the CDC's recommendations have faced backlash both from those who favored stricter guidelines and those who favored looser ones. Protests against lockdowns emerged almost as soon as lockdown orders were instituted, fueled in part by statements from President Trump (Folkenflik, 2020; Slotkin, 2020). In late April 2020, after an emergency stay-at-home order was extended by Michigan Governor Gretchen Whitmer, protestors in Michigan marched on the state's Capitol (Dorn et al., 2021). Protests also emerged around the same time in other states including Minnesota, Utah, North Carolina, Maryland, Texas, and Ohio (Andone, 2020; Beckett, 2020).

There was evidence, however, that anti-lockdown opinions at the time reflected those of the minority of Americans, with an April 2020 Pew Research Center poll finding that about two-thirds of Americans were concerned that state governments would end lockdown restrictions too early, as opposed to one-third concerned about restrictions being ended too late (Pew Research Center, 2020). Public health officials also warned that states were lifting lockdowns too early, potentially leading to an increase in infections again and necessitating the reimposition of restrictions (Fadel, 2020). The CDC compiled detailed guidance to state and local officials regarding reopening in mid-April 2020 (Sun et al., 2020b). Their report, rather than being released, was reportedly rejected by the Trump administration in favor of guidelines that provided more discretion to individual states, although the CDC was prepared to provide advice directly to state and local officials (Dearen & Stobbe, 2020; Valencia et al., 2020). The CDC ultimately released a guidance document on May 20, 2020 (Centers for Disease Control and Prevention, 2020m; Lovelace, 2020).

Later changes in CDC guidance met with more criticism for their content. As an example, the CDC's reduction of distancing within schools from 6 feet to 3 feet was approached cautiously by teachers' groups who questioned whether differing school environments and procedures had been taken into account, and whether issues of classroom space and capacity had motivated the change more than scientific findings. Some encouraged the CDC to make available the data involved in the decision (Mascarenhas, 2021).

### 3.5. Vaccine

The first COVID-19 vaccine available for use in the US was the two-dose Pfiz-

er-BioNTech vaccine, which received an Emergency Use Authorization from the U.S. Food and Drug Administration (FDA) on December 11, 2020 (U.S. Food and Drug Administration, 2020). This was followed by the two-dose Moderna vaccine on December 18, 2020 (Centers for Disease Control and Prevention, 2022b), and the one-dose Janssen (Johnson & Johnson) vaccine on February 27, 2021 (U.S. Food and Drug Administration, 2022). Vaccines became available to individuals in phases, decided based on recommendations from the Advisory Committee on Immunization Practices (ACIP) adopted by the CDC. ACIP is a committee that provides guidance to the CDC on issues related to disease control using vaccines; ACIP guidance is reviewed by the Director of the CDC before potential adoption and publication as a CDC recommendation (“Advisory Committee on Immunization Practices”, 2022). Each state designed its own plan, which was then reviewed by the CDC (The Council of State Governments, 2023). First to receive the vaccine under all plans were healthcare workers and those in long-term care facilities. Other groups with early eligibility included essential workers and teachers, residents of congregate living facilities, and those at risk of severe illness due to age or preexisting condition. Later phases, which began in most states by May 2021, aimed to vaccinate the general public over 16 years of age (“Vaccine State Plans, n.d.”).

Early on during vaccination efforts, on April 13, 2021, the CDC and FDA announced reports of severe hematologic side effects in six individuals who had received the Johnson & Johnson vaccine. They recommended a pause in administration of the Johnson & Johnson vaccine. After convening a review, it was determined that the pause should be ended due to the very low risk of such side effects, with 6 cases from over 6.8 million administered doses, and the comparative benefits of the vaccine (U.S. Food and Drug Administration, 2021).

The CDC, among other entities, conducted and released studies evaluating the effectiveness of vaccines in reducing or preventing infection and severe disease. A CDC study of healthcare workers and essential workers released March 29, 2021, indicated that the Pfizer-BioNTech and Moderna vaccines were “highly effective” in preventing infection (Centers for Disease Control and Prevention, 2021g). A continuation of this study, with findings released June 7, 2021, indicated that vaccinated individuals were “more likely to have a milder and shorter illness” as compared to unvaccinated individuals (Centers for Disease Control and Prevention, 2021e). In spring of 2021, the CDC began to issue recommendations stratified based on vaccination status (Centers for Disease Control and Prevention, 2022b).

The CDC also reviewed data that indicated decreasing immunity over time after vaccination. While on July 9, 2021, the CDC alongside the FDA announced that fully vaccinated individuals would not need boosters at the time, in August 2021 both agencies alongside the U.S. Department of Health and Human Services (HHS) released a statement that concluded that “a booster shot will be needed to maximize vaccine-induced protection.” The announcement included that booster shots would become available in late September 2021, to be administered

8 months after initial full vaccination (Centers for Disease Control and Prevention, 2021b). This interval was later reduced to 6 months after initial full vaccination, and by October 2021 the CDC recommended booster shots for all higher-risk adults (Centers for Disease Control and Prevention, 2021j). This recommendation was extended to all individuals 16 years and older on December 9, 2021 (Centers for Disease Control and Prevention, 2021d).

In May 2021, the CDC began to recommend administration of vaccines to children ages 12-15 years (Wallace et al., 2021). A recommendation to vaccinate children ages 5-11 years was issued in November 2021 (Centers for Disease Control and Prevention, 2021i), and children ages 6 months to 5 years in June 2022 (Hause et al., 2022).

The increase and dominance in 2022 of the immune-evading Omicron variant led manufacturers to develop updated COVID-19 vaccines. On September 1, 2022, the CDC endorsed ACIP recommendations regarding updated boosters for teens and adults (Centers for Disease Control and Prevention, 2022d).

The CDC has remained consistent in its fundamental recommendation regarding COVID-19 vaccines, namely that people should get them (Centers for Disease Control and Prevention, 2023a). Major challenges have been in messaging in a way that promotes trust in the safety and necessity of vaccines. As of mid-March 2023, the US had a vaccination rate (completed primary series) of around 68%, placing it in the middle of the pack among countries (Holder, 2023). The issue, since late 2021, has been not supply, but resistance. A survey released by the Census Bureau in December 2021 found that among adults who had not received any doses of a COVID-19 vaccine, side effects were a concern for around half of respondents, while other major reasons included that they “don’t trust the COVID-19 vaccine,” “don’t trust the government,” and “don’t believe [they] need a COVID-19 vaccine.” Less than 4% of respondents cited logistical difficulties obtaining a vaccine, such as cost (Monte, 2021).

Influencing concern about side effects were reports, often taken out of context, of deaths or severe health problems allegedly associated with COVID-19 vaccines. For example, some anti-vaccination activists have seized on reports in the Vaccine Adverse Event Reporting System (VAERS), a database managed by the CDC and the FDA where individuals and healthcare workers can report post-vaccination adverse events. These reports are not vetted and do not prove causation; the individual could have developed the condition independently of having received a vaccine (Wadman, 2021a).

Furthermore, belief that a COVID-19 infection itself would be mild has motivated some individuals’ belief that the vaccine is unnecessary. Studies that indicate a stronger immune response after natural infection as opposed to vaccination have fueled these beliefs (“Natural Infection versus Vaccination”, 2021; Wadman, 2021b); messaging contextualizing these studies and clarifying why vaccination is still important has been lacking in clarity and accessibility. Further confusing the matter were statements such as a July 27, 2021 briefing by CDC director Rochelle Walensky, during which she cited data indicating that the viral

load of individuals infected with the swelling Delta variant was “indistinguishable” based on vaccination status (Stobbe, 2021; Tufekci, 2021). At the time of the statement, this data had not yet been released. When it became available several days later, self-acknowledged limitations of the paper included that asymptomatic breakthrough infections were likely “underrepresented because of detection bias,” and furthermore there was no data collected on whether vaccinated and unvaccinated individuals have differences in transmission (Brown et al., 2021). A different study released around the same time found that viral load declined more rapidly in vaccinated individuals, who also were less likely to develop severe symptoms (Chia et al., 2022).

#### 4. Limitations

Although an all-inclusive effort was made on identifying relevant CDC policy changes, certain information regarding the guidelines collected from non-official resources may not have been recognized due the sheer volume of information found on these topics. In addition, certain topics like infection control, cleaning/disinfecting, were not included in this discussion due to the lack of information found on the subject.

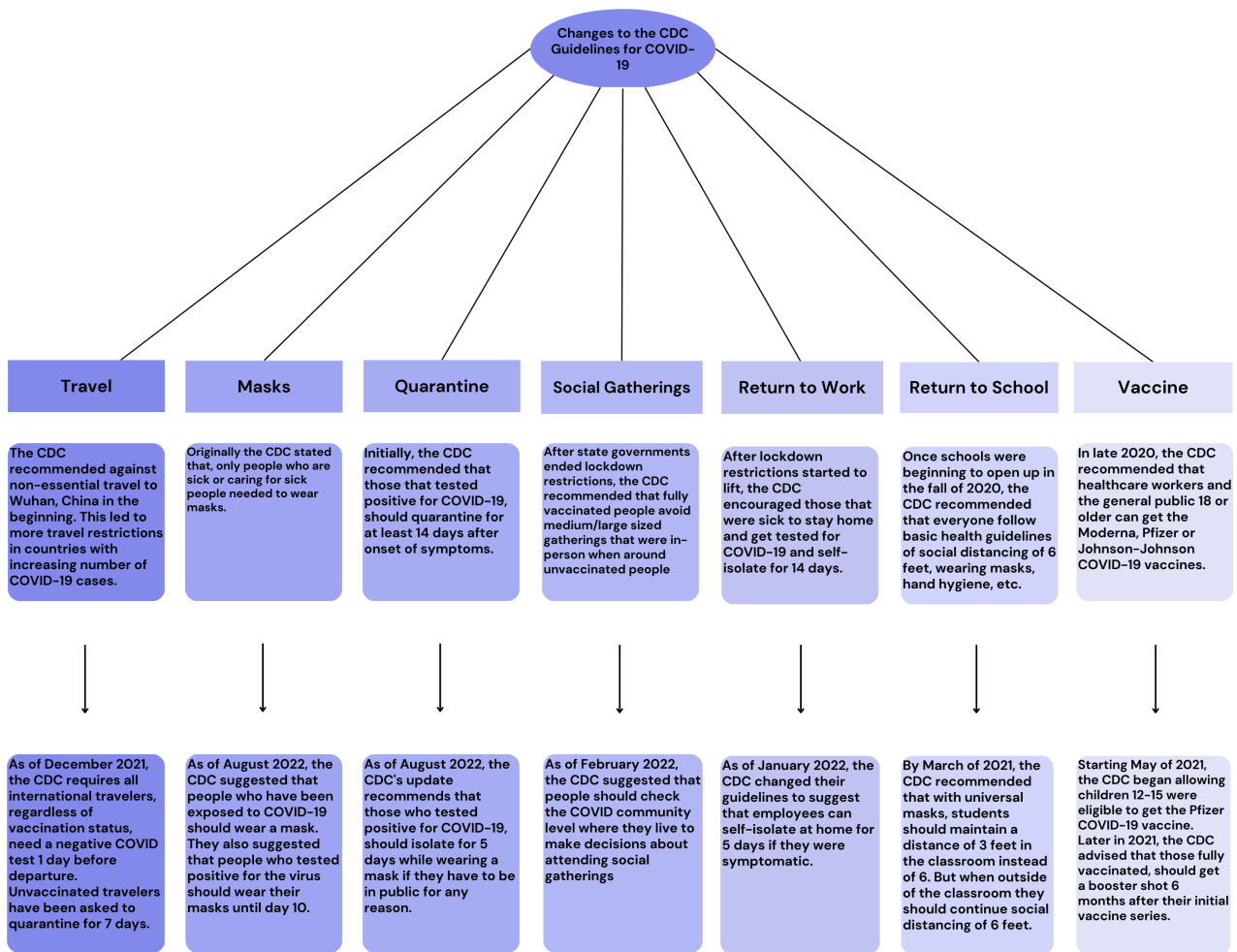
Despite these limitations, this analysis nonetheless points to timely challenges and opportunities for CDC’s decision-making, policy, and related communication efforts in the face of the highly nuanced and dynamic public health threat presented by COVID-19.

#### 5. Discussion

Recommendations provided by the CDC throughout the COVID-19 pandemic were necessarily shaped by evolving knowledge of the disease and the SARS-CoV-2 virus, changing public health situations, and economic, social, and political considerations. (Figure 2 and Figure 3) While changes in guidance were inevitable, decision-making processes and communication by the agency could have been improved in various respects. Some highlighted challenges include inconsistent messaging, communication challenges, lack of transparency, and the impact of political influence.

The CDC has been criticized for inconsistent messaging and changing guidelines during the pandemic, which led to confusion among the general public, healthcare providers, and policymakers (Segal, 2022; Wadman, 2021b). Although it should be appreciated that certain changes in guidelines were inevitable due to the constantly evolving nature of the disease and progression of the pandemic, some could have been more effectively communicated, and others avoided. Complexity of recommendations along with later reversals on topics such as mask-wearing, social distancing, and vaccine efficacy led to a lack of clear and unified guidance that resulted in confusion, misinformation, and distrust. A perceived lack of transparency in the CDC’s communication during the pandemic also drew criticism. The agency has been criticized for not sharing





**Figure 2.** Key changes made by the CDC throughout the COVID-19 pandemic categorized by topic.

data, evidence, and decision-making processes behind certain guidelines and recommendations in a timely and thorough manner, leading to questions about the basis for those policy decisions (Mahr, 2022; Mandavilli, 2022b; Schwartz & Diaz, 2021). More accessibility to data used to formulate recommendations has been called for.

An important consideration of this is also ensuring that data is put in context, to mitigate issues such as a misunderstanding of what reports to the Vaccine Adverse Event Reporting System (VAERS) involve; such reports are unvetted when they are released. Keeping VAERS open to submission and accessible to the public is important despite the potential for misinterpretation, as open submission increases the likelihood of noticing true effects and trends, and accessibility is important for transparency. However, the CDC could aim to further clarify what a report in VAERS entails, and consistently release its findings when potential side effects are investigated.

Additional criticism focused on perceived political influence on its decision-making process during the pandemic. Concerns that political or other non-medical considerations may have influenced the CDC's communication



Travel	Masks	Quarantine	Social Gatherings	Return to Work/School	Vaccines
March 14, 2020: The CDC issues a "No Sail Order" to all cruise ships.	April 3, 2020: At a White House press briefing the CDC announces new mask wearing guidelines and recommends that everyone wear masks when outside of their home.	Early 2020: The CDC recommended that anyone who contacted COVID-19, quarantine for at least 14 days after the onset of symptoms.	March 2021: CDC recommends that people that are fully vaccinated people continue to avoid medium to large sized social gatherings that are in-person with unvaccinated people in attendance.	July 23, 2020: The CDC is releasing new science-based resources/guidelines for school administrators, teachers, parents, and guardians to refer to when re-opening schools.	In late 2020/early 2021: Moderna, Pfizer and Johnson & Johnson COVID-19 vaccines became available for healthcare workers and then to the general public 18 or older.
Jan. 30, 2021: The CDC recommends that people avoid non-essential travel.	January 30, 2021: The CDC announced that beginning February 2nd of 2021, people were required to wear masks while traveling using public transportation.	January 2021: The CDC now state that children and adults with mild symptoms of COVID-19, isolation can end after 5 days after the onset of symptoms and "after the fever ends for 24 hours as long as they wear a mask around others for "5 more days after the 5-day isolation period." The same was said for those that have COVID-19 but are asymptomatic. However, those that have moderate symptoms have to isolate for 10 days and those who are severely ill may need to isolate for up to 20 days after symptom onset.	February 2021: The CDC website suggests that people get vaccinated and to check COVID community levels where they live to make decisions about attending large social events.	March 19, 2021: The CDC now recommends that with "universal" masks, students should maintain at least 3 feet between them. In elementary schools, CDC recommends all students remain at least 3 feet apart in classrooms where mask use is universal. In middle and high schools, CDC also recommends students should be at least 3 feet apart in classrooms where mask use is universal. Middle school students and high school students should be at least 6 feet apart in communities where transmission is high, if cohorting is not possible.	May of 2021: The CDC began allowing children aged 12-15 to get the Pfizer COVID-19 vaccine.
April 2, 2021: The CDC now recommends that fully vaccinated people can travel safely domestically without a COVID test or post-travel self-quarantine, if they take precautions while traveling.	February 17, 2021: The CDC urged people to wear masks not just when outside but also when going to a public building.	August 2022: CDC recommends that those who are exposed to COVID-19 can wear a high quality mask for 10 days rather than quarantine. However, if individuals get infected with the virus, they should isolate from others.		August 4, 2021: CDC recommend universal indoor masking for all students, staff, teachers, and visitors to K-12 schools, regardless of vaccination status. They also note that fully vaccinated people who have a known exposure to someone with suspected or confirmed COVID-19 to be tested 3-5 days after exposure, regardless of whether they have symptoms.	Mid-late 2021: CDC recommended that those who were fully vaccinated, especially those people in high risk populations, to get a booster shot at least 6 months after their initial vaccination series.
Oct. 25, 2021: The CDC is issuing orders to implement the new travel policy issued by the Biden Administration that will go into effect on November 8, 2021.	March 8, 2021: CDC notes that those fully vaccinated against COVID-19 do not have to wear their masks while visiting others in small indoor gatherings. But everyone should still wear their masks outside in public.				
December 2, 2021: Due to the Omicron variant starting Dec. 6, 2021, the CDC is shortening the timeline for required testing for all international air travelers to one day before departure to the United States regardless of citizenship or vaccination status. CDC continues to recommend that all travelers get a COVID-19 viral test 3-5 days after arrival, and that unvaccinated travelers should quarantine for 7 days after travel.	April 27, 2021: The CDC relaxes mask guidelines as COVID cases drop. They are now saying that people do not need to wear masks outdoors while they are out and about.				
	July 27, 2021: With the increasing cases of the Delta variant, the CDC now recommends everyone start wearing their masks outside as well.				
	Feb. 25, 2022: Effective February 25, 2022, CDC does not require wearing of masks on buses or vans operated by public or private school systems, including early care and education/child care programs.				

Figure 3. Timeline of the CDC policies categorized by topic.

and policy decisions, potentially undermined the agency’s credibility and independence as a trusted source of public health guidance.

To emphasize these issues further, Biesiadecki et al. (2023), highlighted important recommendations made by members of the 2022 Preparedness Summit Planning Committee, where representatives from over a dozen federal agencies and public health organizations came together to discuss the strengths and weakness of the COVID-19 response. Specifically regarding communication, members noted challenges including “inconsistent delivery of effective messaging to the public” (Biesiadecki et al., 2023). Suggestions for future improvement included better coordination of messaging between the local, state, and federal levels, the importance of “rebuilding community trust,” and searching for additional funding including to manage the communications-related staffing needs required by a “24-hour news cycle” (Biesiadecki et al., 2023).

The CDC plans to undergo an overhaul following the conclusions of two reports commissioned earlier in 2022. Focuses of the reorganization include generating and releasing data more efficiently (“data for action” instead of “data for publication”), establishing more consistency in public health leadership and consolidating command structures, and improving communication strategies with the general public (Centers for Disease Control and Prevention, 2022a; La-Franiere & Weiland, 2022; Tanne, 2022). These measures, if implemented, seem poised to advance the leading agency’s effectiveness in providing guidance during future public health emergencies.

Specific recommendations include more frequent and rapid release of data,

while creating a standardized system to indicate the CDC's level of "confidence" in the data, as well as its "current level of scientific understanding." This is aimed at ensuring that the most recent information is available for decision making, while not overstating the strength of this information. Additional recommendations include creating a "standardized policy development process" that includes developing and sharing multiple options for acting on new data, inviting commentary from parties inside and outside of the CDC before making a final policy recommendation. The report also suggests broad use of "Bottom Line Upfront" summaries for the general public, including in scientific publications (Centers for Disease Control and Prevention, 2022e).

The CDC had already begun taking steps to address issues of data availability and sharing. There remain differing opinions within the CDC about the prudence of releasing data faster, with concerns that this may result in the agency putting its name to data which turns out to be incomplete or inaccurate, which could further damage public trust. In addition, difficulties in quickly acquiring data from the state and local levels, where it is collected and whose systems are often technologically outdated, have been highlighted by former CDC director Walensky, who has asked for more congressional funding (Mahr & Banco; 2022). As reforms are discussed and moved to implementation, the hope is that the agency will be able to provide its crucial functions more effectively the next time they are urgently and critically in need.

While COVID-19 was a pandemic of a magnitude unseen in over a century, the CDC's ongoing efforts to enhance its timely response, optimally leverage agency resources, and conduct effective crisis risk communication in the context of political and equity considerations, remain critically relevant throughlines for its ongoing readiness and response efforts in addressing future pandemics and other evolving public health emergencies and disaster threats.

## Acknowledgements

The authors would like to thank the CDC for their efforts and guidance throughout the Coronavirus pandemic.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

## References

- Advisory Committee on Immunization Practices (ACIP) Charter|CDC (2022, March 31). Centers for Disease Control and Prevention.  
<https://www.cdc.gov/vaccines/acip/committee/charter.html>
- American Journal of Managed Care Staff (2021, January 1). *A Timeline of Covid-19 Developments in 2020*.  
<https://www.ajmc.com/view/a-timeline-of-covid19-developments-in-2020>
- Andone, D. (2020, April 17). *Protests Are Popping up across the US over Stay-at-Home*

*Restrictions*. CNN.

<https://www.cnn.com/2020/04/16/us/protests-coronavirus-stay-home-orders/index.html>

Aratani, L. (2021, December 3). New Covid Test Rules for International Travel Begin Monday—The Washington Post. *Washington Post*.

<https://www.washingtonpost.com/transportation/2021/12/03/international-travel-covid19-testing/>

Beaubien, J. (2020, March 13). *Public Health Experts Question Trump's Ban on Most Travelers from Europe*. NPR.

<https://www.npr.org/sections/health-shots/2020/03/12/815146007/public-health-experts-question-trumps-ban-on-most-travelers-from-europe>

Beckett, L. (2020, April 18). Protesters Decry Stay-at-Home Orders in Maryland, Texas and Ohio Capitals. *The Guardian*.

<https://www.theguardian.com/world/2020/apr/18/stay-at-home-order-protest-lockdown-maryland-texas-ohio>

Berry, C. R., Fowler, A., Glazer, T., Handel-Meyer, S., & MacMillen, A. (2021). Evaluating the Effects of Shelter-in-Place Policies during the COVID-19 Pandemic. *Proceedings of the National Academy of Sciences*, 118, e2019706118.

<https://doi.org/10.1073/pnas.2019706118>

Biesiadecki, L., Hess, B., Schoch-Spana, M., & on Behalf of the Members of the 2022 Preparedness Summit Planning Committee (2023). Reimagining Preparedness in the Era of COVID-19. *Health Security*, 21, S1-S7. <https://doi.org/10.1089/hs.2023.0131>

Braun, S., Yen, H., & Woodward, C. (2020, July 18). *AP FACT CHECK: Trump and the Virus-Era China Ban That Isn't*. AP News.

<https://apnews.com/article/asia-pacific-anthony-fauci-pandemics-politics-ap-fact-check-d227b34b168e576bf5068b92a03c003d>

Brown, C. M., Vostok, J., Johnson, H., Burns, M., Gharpure, R., Sami, S., Sabo, R. T., Hall, N., Foreman, A., Schubert, P. L., Gallagher, G. R., Fink, T., Madoff, L. C., Gabriel, S. B., MacInnis, B., Park, D. J., Siddle, K. J., Harik, V., Arvidson, D., & Laney, A. S. (2021). Outbreak of SARS-CoV-2 Infections, Including COVID-19 Vaccine Breakthrough Infections, Associated with Large Public Gatherings—Barnstable County, Massachusetts, July 2021. *MMWR. Morbidity and Mortality Weekly Report*, 70, 1059-1062.

<https://doi.org/10.15585/mmwr.mm7031e2>

Campbell, L. (2021, October 31). Impact of Covid-19 on Children's Social Skills. *Forbes*.

<https://www.forbes.com/sites/leahcampbell/2021/10/31/impact-of-covid-19-on-childrens-social-skills/>

Cathey, L., & Flaherty, A. (2020, March 12). *Government Response to Coronavirus: Fauci Backs Trump Travel Ban, Says Testing System "a Failing"*—ABC News. ABC News.

<https://abcnews.go.com/Politics/government-response-coronavirus-fauci-backs-trump-travel-ban/story?id=69557417>

CDC Archives (n.d.). <https://archive.cdc.gov/#/>

Centers for Disease Control and Prevention (2020a, August 14). *Updated Isolation Guidance Does Not Imply Immunity to COVID-19*.

<https://www.cdc.gov/media/releases/2020/s0814-updated-isolation-guidance.html>

Centers for Disease Control and Prevention (2020b, August 31). *How to Select, Wear, and Clean Your Mask*. <https://emergency.cdc.gov/newsletters/epic/08312020.htm>

Centers for Disease Control and Prevention (2020c, December 2). *Science Brief: Options to Reduce Quarantine for Contacts of Persons with SARS-CoV-2 Infection Using Symptom Monitoring and Diagnostic Testing*.

<https://public4.pagefreezer.com/browse/CDC%20Covid%20Pages/11-05-2022T12:30/https://www.cdc.gov/coronavirus/2019-ncov/science/science-briefs/scientific-brief-options-to-reduce-quarantine.html>

Centers for Disease Control and Prevention (2020d, December 2). *Transcript for CDC Telebriefing on the COVID-19 Outbreak.*

<https://www.cdc.gov/media/releases/2020/t1202-covid-19-telebriefing.html>

Centers for Disease Control and Prevention (2020e, December 24). *CDC to Require Negative COVID-19 Test for Air Travelers from the United Kingdom to the U.S.*

[https://archive.cdc.gov/www\\_cdc.gov/media/releases/2020/s1224-CDC-to-require-negative-test.html](https://archive.cdc.gov/www_cdc.gov/media/releases/2020/s1224-CDC-to-require-negative-test.html)

Centers for Disease Control and Prevention (2020f, February 12). *Transcript for CDC Telebriefing: CDC Update on Novel Coronavirus.*

<https://www.cdc.gov/media/releases/2020/t0212-cdc-telebriefing-transcript.html>

Centers for Disease Control and Prevention (2020g, January 17). *Transcript of 2019 Novel Coronavirus Response Telebriefing.*

<https://www.cdc.gov/media/releases/2020/t0117-coronavirus-screening.html>

Centers for Disease Control and Prevention (2020h, January 21). *First Travel-Related Case of 2019 Novel Coronavirus Detected in United States.*

[https://archive.cdc.gov/www\\_cdc.gov/media/releases/2020/p0121-novel-coronavirus-travel-case.html](https://archive.cdc.gov/www_cdc.gov/media/releases/2020/p0121-novel-coronavirus-travel-case.html)

Centers for Disease Control and Prevention (2020i, January 8). *Outbreak of Pneumonia of Unknown Etiology (PUE) in Wuhan, China.*

<https://emergency.cdc.gov/han/han00424.asp>

Centers for Disease Control and Prevention (2020j, July 23). *CDC Releases New Resources and Tools to Support Opening Schools.*

[https://archive.cdc.gov/www\\_cdc.gov/media/releases/2020/p0723-new-resources-tools-schools.html](https://archive.cdc.gov/www_cdc.gov/media/releases/2020/p0723-new-resources-tools-schools.html)

Centers for Disease Control and Prevention (2020k, March 28). *CDC Issues Domestic Travel Advisory for New York, New Jersey and Connecticut.*

[https://archive.cdc.gov/www\\_cdc.gov/media/releases/2020/s038-travel-advisory.html](https://archive.cdc.gov/www_cdc.gov/media/releases/2020/s038-travel-advisory.html)

Centers for Disease Control and Prevention (2020l, March 3). *Transcript for the CDC Telebriefing Update on COVID-19.*

<https://www.cdc.gov/media/releases/2020/t0303-COVID-19-update.html>

Centers for Disease Control and Prevention (2020m, May 20). *CDC Releases Resources to Assist States to Open.*

[https://archive.cdc.gov/www\\_cdc.gov/media/releases/2020/s0520-cdc-resources-open.html](https://archive.cdc.gov/www_cdc.gov/media/releases/2020/s0520-cdc-resources-open.html)

Centers for Disease Control and Prevention (2020n, May 20). *CDC Tightens Testing Requirement for International Travel to the US to One Day.*

[https://archive.cdc.gov/www\\_cdc.gov/media/releases/2020/p1203-covid-testing-tightens-intl.html](https://archive.cdc.gov/www_cdc.gov/media/releases/2020/p1203-covid-testing-tightens-intl.html)

Centers for Disease Control and Prevention (2020o, September 9). *Federal Government Adjusts COVID-19 Entry Strategy for International Air Passengers.*

[https://archive.cdc.gov/www\\_cdc.gov/media/releases/2020/s-0909-covid-19-entry-strategy-air-passengers.html](https://archive.cdc.gov/www_cdc.gov/media/releases/2020/s-0909-covid-19-entry-strategy-air-passengers.html)

Centers for Disease Control and Prevention (2021a, April 2). *CDC Issues Updated Guidance on Travel for Fully Vaccinated People.*

[https://archive.cdc.gov/www\\_cdc.gov/media/releases/2021/p0402-travel-guidance-vaccinated-people.html](https://archive.cdc.gov/www_cdc.gov/media/releases/2021/p0402-travel-guidance-vaccinated-people.html)

- Centers for Disease Control and Prevention (2021b, August 18). *Joint Statement from HHS Public Health and Medical Experts on COVID-19 Booster Shots*.  
[https://archive.cdc.gov/www\\_cdc.gov/media/releases/2021/s0818-covid-19-booster-shots.html](https://archive.cdc.gov/www_cdc.gov/media/releases/2021/s0818-covid-19-booster-shots.html)
- Centers for Disease Control and Prevention (2021c, December 27). *CDC Updates and Shortens Recommended Isolation and Quarantine Period for General Population*.  
[https://archive.cdc.gov/www\\_cdc.gov/media/releases/2021/s1227-isolation-quarantine-guidance.html](https://archive.cdc.gov/www_cdc.gov/media/releases/2021/s1227-isolation-quarantine-guidance.html)
- Centers for Disease Control and Prevention (2021d, December 9). *CDC Expands COVID-19 Booster Recommendations to 16-and-17-Year-Olds*.  
[https://archive.cdc.gov/www\\_cdc.gov/media/releases/2021/s1208-16-17-booster.html](https://archive.cdc.gov/www_cdc.gov/media/releases/2021/s1208-16-17-booster.html)
- Centers for Disease Control and Prevention (2021e, June 7). *CDC COVID-19 Study Shows mRNA Vaccines Reduce Risk of Infection by 91 Percent for Fully Vaccinated People*.  
[https://archive.cdc.gov/www\\_cdc.gov/media/releases/2021/p0607-mrna-reduce-risks.html](https://archive.cdc.gov/www_cdc.gov/media/releases/2021/p0607-mrna-reduce-risks.html)
- Centers for Disease Control and Prevention (2021f, March 19). *CDC Updates Operational Strategy for K-12 Schools to Reflect New Evidence on Physical Distance in Classrooms*.  
[https://archive.cdc.gov/www\\_cdc.gov/media/releases/2021/p0319-new-evidence-classroom-physical-distance.html](https://archive.cdc.gov/www_cdc.gov/media/releases/2021/p0319-new-evidence-classroom-physical-distance.html)
- Centers for Disease Control and Prevention (2021g, March 29). *CDC Real-World Study Confirms Protective Benefits of mRNA COVID-19 Vaccines*.  
[https://archive.cdc.gov/www\\_cdc.gov/media/releases/2021/p0329-COVID-19-Vaccines.html](https://archive.cdc.gov/www_cdc.gov/media/releases/2021/p0329-COVID-19-Vaccines.html)
- Centers for Disease Control and Prevention (2021h, March 8). *CDC Issues First Set of Guidelines on How Fully Vaccinated People Can Visit Safely with Others*.  
[https://archive.cdc.gov/www\\_cdc.gov/media/releases/2021/p0308-vaccinated-guidelines.html](https://archive.cdc.gov/www_cdc.gov/media/releases/2021/p0308-vaccinated-guidelines.html)
- Centers for Disease Control and Prevention (2021i, November 2). *CDC Recommends Pediatric COVID-19 Vaccine for Children 5 to 11 Years*.  
[https://archive.cdc.gov/www\\_cdc.gov/media/releases/2021/s1102-PediatricCOVID-19-Vaccine.html](https://archive.cdc.gov/www_cdc.gov/media/releases/2021/s1102-PediatricCOVID-19-Vaccine.html)
- Centers for Disease Control and Prevention (2021j, October 21). *CDC Expands COVID-19 Booster Shots*.  
[https://archive.cdc.gov/www\\_cdc.gov/media/releases/2021/p1021-covid-booster.html](https://archive.cdc.gov/www_cdc.gov/media/releases/2021/p1021-covid-booster.html)
- Centers for Disease Control and Prevention (2022a, August 17). *CDC Moving Forward*.  
<https://www.cdc.gov/about/organization/cdc-moving-forward.html>
- Centers for Disease Control and Prevention (2022b, August 16). *COVID-19 Museum Timeline*. <https://www.cdc.gov/museum/timeline/covid19.html>
- Centers for Disease Control and Prevention (2022c, April 18). *Order: Wearing of Face Masks While on Conveyances and at Transportation Hubs*.  
<https://www.cdc.gov/quarantine/masks/mask-travel-guidance.html>
- Centers for Disease Control and Prevention (2022d, September 1). *CDC Recommends the First Updated COVID-19 Booster*.  
<https://www.cdc.gov/media/releases/2022/s0901-covid-19-booster.html>
- Centers for Disease Control and Prevention (2022e, September 1). *CDC Moving forward Summary Report*.  
<https://www.cdc.gov/about/organization/cdc-moving-forward-summary-report.html>

- Centers for Disease Control and Prevention (2022f, September 8). *Mask Recommendation*.  
<https://www.cdc.gov/coronavirus/2019-ncov/travelers/masks-public-transportation.html>
- Centers for Disease Control and Prevention (2023a, July 13). *Vaccines for COVID-19*.  
<https://www.cdc.gov/coronavirus/2019-ncov/vaccines/index.html>
- Chia, P. Y., Ong, S. W. X., Chiew, C. J., Ang, L. W., Chavatte, J.-M., Mak, T.-M., Cui, L., Kalimuddin, S., Chia, W. N., Tan, C. W., Chai, L. Y. A., Tan, S. Y., Zheng, S., Lin, R. T. P., Wang, L., Leo, Y.-S., Lee, V. J., Lye, D. C., & Young, B. E. (2022). Virological and Serological Kinetics of SARS-CoV-2 Delta Variant Vaccine Breakthrough Infections: A Multicentre Cohort Study. *Clinical Microbiology and Infection*, 28, 612.e1-612.e7.  
<https://doi.org/10.1016/j.cmi.2021.11.010>
- Cleeland, N. (2020, April 10). *New CDC Guidance Says Essential Employees Can Continue Working after Coronavirus Exposure*. Society for Human Resource Management.  
<https://www.shrm.org/topics-tools/news/employee-relations/new-cdc-guidance-says-essential-employees-can-continue-working-coronavirus-exposure>
- Collins, K., Harwood, J., Liptak, K., Diamond, J., & Sullivan, K. (2021, July 27). *CDC Changes Mask Guidance in Response to Threat of Delta Variant of Covid-19*. CNN.  
<https://www.cnn.com/2021/07/27/politics/cdc-mask-guidance/index.html>
- Coronavirus Disease 2019 (COVID-19). (2020, February 11). Centers for Disease Control and Prevention. <https://www.cdc.gov/coronavirus/2019-ncov/index.html>
- Dearen, J., & Stobbe, M. (2020, May 7). *Trump Administration Buries Detailed CDC Advice on Reopening*. AP News.  
<https://apnews.com/article/virus-outbreak-health-us-news-ap-top-news-politics-7a00d5fba3249e573d2ead4bd323a4d4>
- Department of Homeland Security (2020a, February 2). *DHS Issues Supplemental Instructions for Inbound Flights with Individuals Who Have Been in China*.  
<https://www.dhs.gov/news/2020/02/02/dhs-issues-supplemental-instructions-inbound-flights-individuals-who-have-been-china>
- Department of Homeland Security (2020b, May 27). *Department of Homeland Security Adds Brazil to List of Countries for COVID-19 Travel Restrictions*.  
<https://www.dhs.gov/news/2020/05/27/department-homeland-security-adds-brazil-list-countries-covid-19-travel-restrictions>
- Diamond, D. (2021, July 19). *Mask Mandates Make a Return—Along with Controversy*. *The Washington Post*.  
<https://www.washingtonpost.com/health/2021/07/19/mask-mandates-returning/>
- Dollard, P., Griffin, I., Berro, A., Cohen, N. J., Singler, K., Haber, Y., De La Motte Hurst, C., Stolp, A., Atti, S., Hausman, L., Shockey, C. E., Roohi, S., Brown, C. M., Rotz, L. D., Cetron, M. S., CDC COVID-19 Port of Entry Team, & Alvarado-Ramy, F. (2020). Risk Assessment and Management of COVID-19 among Travelers Arriving at Designated U.S. Airports, January 17-September 13, 2020. *MMWR. Morbidity and Mortality Weekly Report*, 69, 1681-1685. <https://doi.org/10.15585/mmwr.mm6945a4>
- Dorn, E., Hancock, B., Sarakatsannis, J., & Viruleg, E. (2021, July 27). *COVID-19 and Education: The Lingering Effects of Unfinished Learning*. McKinsey & Company.  
<https://www.mckinsey.com/industries/education/our-insights/covid-19-and-education-the-lingering-effects-of-unfinished-learning>
- Dwyer, C., & Aubrey, A. (2020, April 3). *CDC Now Recommends Americans Consider Wearing Cloth Face Coverings in Public*. NPR.  
<https://www.npr.org/sections/coronavirus-live-updates/2020/04/03/826219824/preside>



[nt-trump-says-cdc-now-recommends-americans-wear-cloth-masks-in-public](#)

Dwyer, C., & Doubek, J. (2020, March 14). *U.S. Adds U.K. And Ireland to Travel Ban; New Restrictions in Multiple Countries*. NPR.

<https://www.npr.org/sections/health-shots/2020/03/14/815809952/to-fight-pandemic-pentagon-bans-domestic-travel-for-military-civilian-workers>

Ending Isolation and Precautions for People with COVID-19: Interim Guidance (2022, August 31). Centers for Disease Control and Prevention.

[https://archive.cdc.gov/www\\_cdc.gov/coronavirus/2019-ncov/hcp/duration-isolation.html](https://archive.cdc.gov/www_cdc.gov/coronavirus/2019-ncov/hcp/duration-isolation.html)

Exec. Order No. 21-175 (2021, July 30).

<https://www.flgov.com/2021/07/30/governor-desantis-issues-an-executive-order-ensuring-parents-freedom-to-choose/>

Fadel, L. (2020, May 9). *Public Health Experts Say Many States Are Opening Too Soon to Do So Safely*. NPR.

<https://www.npr.org/2020/05/09/853052174/public-health-experts-say-many-states-are-opening-too-soon-to-do-so-safely>

Folkenflik, D. (2020, April 22). *Fox News Executive Tries to Rein in Stars as They Cheer on Anti-Lockdown Rallies*. NPR.

<https://www.npr.org/2020/04/22/840751725/fox-news-executive-tries-to-rein-in-stars-as-they-cheer-on-anti-lockdown-rallies>

Fox, M. (2021, December 30). *CDC Changes to Quarantine, Isolation Advice Took Local Health Officials by Surprise*. CNN.

<https://www.cnn.com/2021/12/29/health/cdc-quarantine-guidelines-surprise/index.html>

Franklin, J., & Chappell, B. (2022, April 19). *These Airlines Are Dropping Mask Mandates after a Federal Judge's Ruling*. NPR.

<https://www.npr.org/2022/04/18/1093451075/masks-optional-airlines-travel>

Godoy, M., & Aubrey, A. (2020, March 17). *It's Time to Get Serious about Social Distancing. Here's How*. NPR.

<https://www.npr.org/sections/health-shots/2020/03/17/817251610/its-time-to-get-serious-about-social-distancing-here-s-how>

Griffin, R. (2022, August 17). *CDC Overhaul: Director Walensky Lays out New Course after Pandemic Missteps*. Bloomberg.

<https://www.bloomberg.com/news/articles/2022-08-17/cdc-overhaul-director-walensky-lays-out-new-course-after-pandemic-missteps>

Hamblin, J. (2022, March 12). *Can Public Health Be Saved?* *The New York Times*.

<https://www.nytimes.com/2022/03/12/opinion/public-health-trust.html>

Hause, A. M., Marquez, P., Zhang, B., Myers, T. R., Gee, J., Su, J. R., Parker, C., Thompson, D., Panchanathan, S. S., Shimabukuro, T. T., & Shay, D. K. (2022). COVID-19 mRNA Vaccine Safety among Children Aged 6 Months-5 Years—United States, June 18, 2022-August 21, 2022. *MMWR. Morbidity and Mortality Weekly Report*, 71, 1115-1120. <https://doi.org/10.15585/mmwr.mm7135a3>

Holder, J. (2023, March 13). *Tracking Coronavirus Vaccinations around the World*. *The New York Times*.

<https://www.nytimes.com/interactive/2021/world/covid-vaccinations-tracker.html>

Honein, M. A., Christie, A., Rose, D. A., Brooks, J. T., Meaney-Delman, D., Cohn, A., Sauber-Schatz, E. K., Walker, A., McDonald, L. C., Liburd, L. C., Hall, J. E., Fry, A. M., Hall, A. J., Gupta, N., Kuhnert, W. L., Yoon, P. W., Gundlapalli, A. V., Beach, M. J., Walke, H. T., & Williams, I. (2020). *Summary of Guidance for Public Health Strategies*



- to Address High Levels of Community Transmission of SARS-CoV-2 and Related Deaths, December 2020. *MMWR. Morbidity and Mortality Weekly Report*, 69, 1860-1867. <https://doi.org/10.15585/mmwr.mm6949e2>
- Igielnik, R. (2020, June 23). *Most Americans Say They Regularly Wore a Mask in Stores in the Past Month; Fewer See Others Doing It*. Pew Research Center. <https://www.pewresearch.org/fact-tank/2020/06/23/most-americans-say-they-regularly-wore-a-mask-in-stores-in-the-past-month-fewer-see-others-doing-it/>
- Jingnan, H., Aubrey, A., & Wroth, C. (2020, March 31). *Should We All Be Wearing Masks in Public? Health Experts Revisit the Question*. NPR. <https://www.npr.org/sections/health-shots/2020/03/31/824560471/should-we-all-be-wearing-masks-in-public-health-experts-revisit-the-question>
- Katz, J., Sanger-Katz, M., & Quealy, K. (2020, July 17). A Detailed Map of Who Is Wearing Masks in the U.S. *The New York Times*. <https://www.nytimes.com/interactive/2020/07/17/upshot/coronavirus-face-mask-map.html>
- Kelleher, S. R. (2021, December 17). Airline CEOs Tell Congress We Don't Need Masks on Planes, Get Fact Checked by Flight Attendant Union President. *Forbes*. <https://www.forbes.com/sites/suzannerowankelleher/2021/12/17/airline-ceos-congress-mask-mandate-factcheck-flight-attendant/?sh=47c07eb86666>
- Kopecki, D. (2020, March 15). *CDC Recommends Canceling Events with 50 or More People for the Next Eight Weeks Throughout US*. CNBC. <https://www.cnbc.com/2020/03/16/cdc-recommends-the-cancellation-of-events-with-50-or-more-people-for-the-next-eight-weeks-throughout-us.html>
- LaFraniere, S., & Weiland, N. (2022, August 17). Walensky, Citing Botched Pandemic Response, Calls for C.D.C. Reorganization. *The New York Times*. <https://www.nytimes.com/2022/08/17/us/politics/cdc-rochelle-walensky-covid.html>
- Lewis, D. (2022). What Scientists Have Learnt from COVID Lockdowns. *Nature*, 609, 236-239. <https://doi.org/10.1038/d41586-022-02823-4>
- Lopez, G. (2020, December 3). *Why the CDC Changed Its Covid-19 Quarantine Guideline*. Vox. <https://www.vox.com/future-perfect/22150189/covid-19-cdc-quarantine-guidelines-coronavirus>
- Lovelace Jr., B. (2020, May 20). *CDC Quietly Releases Detailed Guidelines for Reopening America*. CNBC. <https://www.cnbc.com/2020/05/20/coronavirus-cdc-quietly-releases-detailed-guidelines-for-reopening-us.html>
- Lovelace Jr., B., & Edwards, E. (2022, February 25). *Indoor Mask Use No Longer Necessary across Most of the U.S., CDC Says*. NBC News. <https://www.nbcnews.com/health/health-news/cdc-indoor-masking-no-longer-necessary-us-rcna17686>
- Mahr, K. (2022, August 17). *CDC Director Orders Agency Overhaul, Admitting Flawed Covid-19 Response*. Politico. <https://www.politico.com/news/2022/08/17/cdc-agency-overhaul-covid-19-response-0052384>
- Mahr, K., & Banco, E. (2022, October 21). *"No Quick Fixes": Walensky's Push for Change at CDC Meets Reality*. Politico. <https://www.politico.com/news/2022/10/21/rochelle-walensky-change-cdc-00062874>
- Mandavilli, A. (2022a, February 22). The C.D.C. Isn't Publishing Large Portions of the Covid Data It Collects. *The New York Times*.

- <https://www.nytimes.com/2022/02/20/health/covid-cdc-data.html>
- Mandavilli, A. (2022b, February 25). The C.D.C. Releases New Guidance That Will Allow Localities to Ease Masking and Social Distancing. *The New York Times*.  
<https://www.nytimes.com/2022/02/26/health/the-cdc-releases-new-guidance-that-will-allow-localities-to-ease-masking-and-social-distancing.html>
- Mascarenhas, L. (2021, March 19). *Updated CDC Guidance Says 3 Feet of Physical Distancing Is Safe in Schools*. CNN.  
<https://www.cnn.com/2021/03/19/health/cdc-physical-distancing/index.html>
- McReynolds, T. (2020, April 1). *CDC: An about Face on Face Masks?* American Animal Hospital Association.  
<https://www.aaha.org/publications/newstat/articles/2020-03/cdc-an-about-face-on-face-masks/>
- Mervosh, S., Lu, D., & Swales, V. (2020, April 20). See Which States and Cities Have Told Residents to Stay at Home. *The New York Times*.  
<https://www.nytimes.com/interactive/2020/us/coronavirus-stay-at-home-order.html>
- Messonnier, N. E. (2020, January 28). *CDC Advises Travelers to Avoid All Nonessential Travel to China*. <https://stacks.cdc.gov/view/cdc/84622>
- Monte, L. M. (2021, December 28). *Household Pulse Survey Shows Many Don't Trust COVID Vaccine, Worry about Side Effects*. United States Census Bureau.  
<https://www.census.gov/library/stories/2021/12/who-are-the-adults-not-vaccinated-against-covid.html>
- More US States Begin Lifting Virus Lockdown Orders (2020, April 27). BBC.  
<https://www.bbc.com/news/world-us-canada-52435648>
- Moreland, A., Herlihy, C., Tynan, M. A., Sunshine, G., McCord, R. F., Hilton, C., Poovey, J., Werner, A. K., Jones, C. D., Fulmer, E. B., Gundlapalli, A. V., Strosnider, H., Potvien, A., García, M. C., Honeycutt, S., Baldwin, G., CDC Public Health Law Program, CDC COVID-19 Response Team, Mitigation Policy Analysis Unit, CDC Public Health Law Program, & Popoola, A. (2020). Timing of State and Territorial COVID-19 Stay-at-Home Orders and Changes in Population Movement—United States, March 1–May 31, 2020. *MMWR. Morbidity and Mortality Weekly Report*, 69, 1198–1203.  
<https://doi.org/10.15585/mmwr.mm6935a2>
- National Center for Immunization and Respiratory Diseases (U.S.). Division of Viral Diseases (2020). *Considerations for Events and Gatherings*.  
<https://stacks.cdc.gov/view/cdc/97314>
- National Governor's Association (2020, June 9). *Summary of Public Health Criteria in Reopening Plans*. <https://www.nga.org/coronavirus-reopening-plans/>
- Natural Infection versus Vaccination: Differences in COVID Antibody Responses Emerge (2021, August 24). The Rockefeller University.  
<https://www.rockefeller.edu/news/30919-natural-infection-versus-vaccination-differences-in-covid-antibody-responses-emerge/>
- Office of Texas Governor (2021, May 18). *Governor Abbott Issues Executive Order Prohibiting Government Entities from Mandating Masks*.  
<https://gov.texas.gov/news/post/governor-abbott-issues-executive-order-prohibiting-government-entities-from-mandating-masks>
- Onishi, N. (2020, March 12). Chaos in Europe, and Anger, over U.S. Travel Ban to Curb Coronavirus. *The New York Times*.  
<https://www.nytimes.com/2020/03/12/world/europe/europe-coronavirus-travel-ban.html>
- Pearce, K. (2020, March 13). *What Is Social Distancing and How Can It Slow the Spread*

- of COVID-19. HUB Johns Hopkins University.  
<https://hub.jhu.edu/2020/03/13/what-is-social-distancing/>
- Pew Research Center (2020, April 16). *Most Americans Say Trump Was Too Slow in Initial Response to Coronavirus Threat*.  
<https://www.pewresearch.org/politics/2020/04/16/most-americans-say-trump-was-too-slow-in-initial-response-to-coronavirus-threat/>
- Sampson, H. (2021, April 23). The TSA's Mask Mandate Expires Soon. Airline Industry Leaders and Politicians Are Calling for an Extension. *The Washington Post*.  
<https://www.washingtonpost.com/travel/2021/04/23/mask-flights-requirement-tsa-covid/>
- Schwartz, M. S., & Diaz, J. (2021, December 27). *CDC Cuts the Recommended Isolation and Quarantine Periods for Coronavirus Infections*. NPR.  
<https://www.npr.org/sections/coronavirus-live-updates/2021/12/27/1068358102/cdc-quarantine-covid>
- Segal, E. (2022, January 8). Mixed Messages and Sudden Policy Changes Sow Confusion, Opposition to Covid Guidelines. *Forbes*.  
<https://www.forbes.com/sites/edwardsegal/2022/01/08/mixed-messages-and-sudden-policy-changes-sow-confusion-opposition-to-covid-guidelines/?sh=6f5b6be67453>
- Shear, M. D., Stolberg, S. G., Yoon, J., Khan, A. J., & Minder, R. (2021, December 13). Covid News: U.S. to Tighten Testing for Travelers amid Omicron Worries. *The New York Times*. <https://www.nytimes.com/live/2021/11/30/world/omicron-variant-covid>
- Shepardson, D. (2020, March 14). *Exclusive: U.S. to Add Britain, Ireland to European Travel Ban-Airline, U.S. Officials*. Reuters.  
<https://www.reuters.com/article/us-health-coronavirus-usa-travel-exclusi/exclusive-u-s-to-add-britain-ireland-to-european-travel-ban-airline-u-s-officials-idUSKBN2110UF>
- Shepardson, D. (2022, May 4). *Unruly U.S. Air Passenger Incidents Fall to Lowest Level since 2020*. Reuters.  
<https://www.reuters.com/world/us/unruly-us-air-passenger-incident-falls-lowest-level-since-2020-2022-05-04/>
- Simmons-Duffin, S. (2021, May 13). *Poll Finds Public Health Has a Trust Problem*. NPR.  
<https://www.npr.org/2021/05/13/996331692/poll-finds-public-health-has-a-trust-problem>
- Slotkin, J. (2020, May 1). *Protesters Swarm Michigan Capitol amid Showdown over Governor's Emergency Powers*. NPR.  
<https://www.npr.org/sections/coronavirus-live-updates/2020/05/01/849017021/protestors-swarm-michigan-capitol-amid-showdown-over-governors-emergency-powers>
- Spinks, R. (2020, February 5). Who Says It's Not Safe to Travel to China? *The New York Times*. <https://www.nytimes.com/2020/02/05/opinion/china-travel-coronavirus.html>
- State-Level Mask Requirements in Response to the Coronavirus (COVID-19) Pandemic, 2020-2022 (n.d.). Ballotpedia.  
[https://ballotpedia.org/State-level\\_mask\\_requirements\\_in\\_response\\_to\\_the\\_coronavirus\\_\(COVID-19\)\\_pandemic,\\_2020-2022](https://ballotpedia.org/State-level_mask_requirements_in_response_to_the_coronavirus_(COVID-19)_pandemic,_2020-2022)
- Stobbe, M. (2021, July 27). *CDC Changes Course on Indoor Masks in Some Parts of the US*. AP News.  
<https://apnews.com/article/health-coronavirus-pandemic-79959d313428d98ab8aa905bbe287ba0>
- Stobbe, M., & Binkley, C. (2022, August 11). *CDC Relaxes COVID-19 Guidelines, Drops Quarantine and Social Distancing Recommendation*. PBS.  
<https://www.pbs.org/newshour/health/cdc-relaxes-covid-19-guidelines-drops-quarantine>

[ne-and-social-distancing-recommendations](#)

- Sun, L. H., Dawsey, J., & Wan, W. (2020a, April 14). CDC, FEMA Have Created a Plan to Reopen America. Here's What It Says. *The Washington Post*.  
<https://www.washingtonpost.com/health/2020/04/14/cdc-fema-have-created-plan-reopen-america-heres-what-it-says/>
- Sun, L. H., Laris, M., & Aratani, L. (2020b, October 19). CDC to Passengers and Workers: Wear a Mask When You Are on a Plane, Train, Bus or Other Public Transit. *The Washington Post*.  
<https://www.washingtonpost.com/health/2020/10/19/cdc-mask-plane-train-bus/>
- Support for Mask Requirements in Public Persists although Worries about Infection Continue to Decline (2022, April 20). The Associated Press and NORC at the University of Chicago.  
<https://apnorc.org/projects/support-for-mask-requirements-in-public-persists-although-worries-about-infection-continue-to-decline/>
- Tanne, J. H. (2022). US CDC Announces Major Changes after Criticism of Its Responses to Covid-19 and Monkeypox. *BMJ*, 378, o2074. <https://doi.org/10.1136/bmj.o2074>
- The Council of State Governments (2023, March 10). *COVID-19 Resources for State Leaders*. <https://web.csg.org/covid19/state-vaccine-plans/>
- Thomaselli, R. (2022, May 7). *Airline Incidents Fall More than 50 Percent after Mask Mandate Lifted*. Travel Pulse.  
<https://www.travelpulse.com/news/airlines/airline-incidents-fall-more-than-50-percent-after-mask-mandate-lifted.html>
- Tufekci, Z. (2021, August 4). The C.D.C. Needs to Stop Confusing the Public. *The New York Times*. <https://www.nytimes.com/2021/08/04/opinion/cdc-covid-guidelines.html>
- Tyson, A., & Funk, C. (2022, February 9). *Increasing Public Criticism, Confusion over Covid-19 Response in U.S.* Pew Research Center.  
<https://www.pewresearch.org/science/2022/02/09/increasing-public-criticism-confusion-over-covid-19-response-in-u-s/>
- U.S. Bureau of Labor Statistics (2020, May 13). *Unemployment Rate Rises to Record High 14.7 Percent in April 2020*.  
<https://www.bls.gov/opub/ted/2020/unemployment-rate-rises-to-record-high-14-point-7-percent-in-april-2020.htm>
- U.S. Department of State (2021, November 9). *Safely Resuming Travel by Vaccine Requirement and Rescission of Travel Restrictions on Brazil, China, India, Iran, Ireland, the Schengen Area, South Africa, and the United Kingdom*.  
<https://travel.state.gov/content/travel/en/News/visas-news/safely-resuming-travel-by-vaccine-requirement-and-rescission-of-travel-restrictions.html>
- U.S. Department of State (2022, December 28). *COVID-19 Travel Information*.  
<https://travel.state.gov/content/travel/en/traveladvisories/covid-19-travel-information.html>
- U.S. Food and Drug Administration (FDA) (2020, December 11). *FDA Takes Key Action in Fight against COVID-19 By Issuing Emergency Use Authorization for First COVID-19 Vaccine*.  
<https://www.fda.gov/news-events/press-announcements/fda-takes-key-action-fight-against-covid-19-issuing-emergency-use-authorization-first-covid-19>
- U.S. Food and Drug Administration (FDA) (2021, April 23). *FDA and CDC Lift Recommended Pause on Johnson & Johnson (Janssen) COVID-19 Vaccine Use Following thorough Safety Review*.  
<https://www.fda.gov/news-events/press-announcements/fda-and-cdc-lift-recommended-pause-on-johnson-johnson-janssen-covid-19-vaccine-use-following-thorough-safety-review>

[d-pause-johnson-johnson-janssen-covid-19-vaccine-use-following-thorough](#)

- U.S. Food and Drug Administration (FDA) (2022, May 5). *Janssen COVID-19 Vaccine*. <https://www.fda.gov/emergency-preparedness-and-response/coronavirus-disease-2019-covid-19/janssen-covid-19-vaccine>
- Vaccine State Plans—Johns Hopkins Coronavirus Resource Center (n.d.). Johns Hopkins Coronavirus Resource Center. <https://coronavirus.jhu.edu/vaccines/vaccine-state-plans>
- Valencia, N., Klein, B., Liptak, K., & Johns, J. (2020, May 7). *Trump Administration Rejects CDC Guidance on Reopening US amid Coronavirus*. CNN. <https://www.cnn.com/2020/05/07/politics/cdc-guidance-coronavirus-reopen-america/index.html>
- Victor, D., Serviss, L., & Paybarah, A. (2020, October 2). In His Own Words, Trump on the Coronavirus and Masks. *The New York Times*. <https://www.nytimes.com/2020/10/02/us/politics/donald-trump-masks.html>
- Wadman, M. (2021a, August 26). *Having SARS-CoV-2 Once Confers Much Greater Immunity than a Vaccine—But Vaccination Remains Vital*. Science. <https://www.science.org/content/article/having-sars-cov-2-once-confers-much-greater-immunity-vaccine-vaccination-remains-vital>  
<https://doi.org/10.1126/science.acx8993>
- Wadman, M. (2021b, May 26). *Antivaccine Activists Use a Government Database on Side Effects to Scare the Public*. Science. <https://doi.org/10.1126/science.abj6981>  
<https://www.science.org/content/article/antivaccine-activists-use-government-database-side-effects-scare-public>
- Wallace, M., Woodworth, K. R., Gargano, J. W., Scobie, H. M., Blain, A. E., Moulia, D., Chamberland, M., Reisman, N., Hadler, S. C., MacNeil, J. R., Campos-Outcalt, D., Morgan, R. L., Daley, M. F., Romero, J. R., Talbot, H. K., Lee, G. M., Bell, B. P., & Oliver, S. E. (2021). The Advisory Committee on Immunization Practices' Interim Recommendation for Use of Pfizer-BioNTech COVID-19 Vaccine in Adolescents Aged 12-15 Years—United States, May 2021. *MMWR. Morbidity and Mortality Weekly Report*, 70, 749-752. <https://doi.org/10.15585/mmwr.mm7020e1>
- Wenner Moyer, M. (2022). The COVID Generation: How Is the Pandemic Affecting Kids' Brains? *Nature*, 601, 180-183. <https://doi.org/10.1038/d41586-022-00027-4>
- World Health Organization (WHO) (2020, April 27). *Archived: WHO Timeline—COVID-19*. <https://www.who.int/news/item/27-04-2020-who-timeline---covid-19>