Journal of
Risk and Financial Management

MDPI

Article

The Transformation of the Healthcare Business through the COVID-19 Pandemic (2020–2021)

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Abstract: The COVID-19 pandemic has had a marked impact on healthcare businesses since 2020. Healthcare organizations suffered greatly from financial stress coupled with disruptions in national and global supply chains. Healthcare workers and patients alike experienced significant downturns in their physical and mental health. Large government and legislative reforms were enacted to combat the progression of the pandemic. This paper explores these areas in detail in order to provide a clearer understanding of the successes and inadequacies that exist within the United States healthcare system as illuminated by the COVID-19 pandemic.

Keywords: COVID-19; healthcare; financial stress; supply chain; reform

Citation: Patel, Rishi. 2023. The Transformation of the Healthcare Business through the COVID-19 Pandemic (2020–2021). *Journal of Risk and Financial Management* 16: 333. https://doi.org/10.3390/jrfm16070333

Academic Editor: Shigeyuki Hamori

Received: 16 April 2023
Revised: 18 May 2023
Accepted: 5 July 2023
Published: 13 July 2023

1. Introduction

With the advent of the COVID 19 pandemic in 2020, healthcare organizations were faced with a multitude of novel challenges across many different areas. Among these challenges were the early financial struggles experienced by care centers across the nation, with these centers losing an estimated USD 202,600,000,000 in revenue to the pandemic by 2021 (Kaye et al. 2021). A significant portion of this lost revenue could be attributed to the substantial reductions in procedures that these organizations conducted (Jacobs et al. 2020). The financial pressures were only added to due to the simultaneous rise in the cost of care for patients admitted to hospitals, which, in turn, triggered industry-wide workforce reductions (Blumenthal et al. 2020).

Unfortunately, as the pandemic progressed into late 2020 and early 2021, the turbulence experienced by healthcare institutions worsened. Disruptions in national and global supply chains greatly impeded the ability of frontline care teams to access needed protective and medical equipment, leaving them ill-equipped in the fight against the pandemic (Nikolopoulos et al. 2021). Coupled with this issue was the large distribution of misinformation amongst the public, leading to distrust of health centers which then contributed to the high rates of foregone care mentioned previously (Roozenbeek et al. 2020; Sharif and Amin 2021). Such rapid and drastic changes in the American healthcare environment called for legislative reform that sought to provide some stability to the operations of healthcare businesses during this time.

Each of these areas represent an aspect of the United States healthcare model whose study may allow us to better navigate the challenges that come with future health emergencies. Given this, this paper seeks to present a comprehensive review of the manner in which healthcare businesses were transformed during the COVID-19 pandemic. This fits in well with both the general literature and the literature of the journal (Blumenthal et al. 2020; Chang et al. 2020; Jacobs et al. 2020; Kaye et al. 2021; Loxton et al. 2020; McAleer 2020; Nikolopoulos et al. 2021; Roozenbeek et al. 2020; Sharif and Amin 2021; Vuković et al. 2022; Wang et al. 2020; Y. Zhong et al. 2021).

2. The Financial Impact of COVID-19

From the early stages of the COVID-19 pandemic in 2020, one of the most significant challenges healthcare organizations grappled with was responding to the wave of immense financial pressures brought on by the drastic changes in the American healthcare environment.

2.1. Reductions in Elective Services

Early on, government-driven isolation efforts and other protective measures were established; however, such actions placed significant financial stresses on healthcare institutions. Although healthcare is an industry that displays a relatively high degree of demand inelasticity, the confinement of the populace to their homes coupled with the reductions in provider personnel contributed to decreases in patient flows across the nation (Alsan et al. 2021). Specifically, healthcare providers saw drastic reductions in the volume of the elective, non-emergent medical procedures they administered (Bhandari et al. 2021). These services, however, are critical to healthcare businesses as they rely on such procedures to support less lucrative but more urgent care provisions, and as such, the financial viability of such institutions was jeopardized (Khullar et al. 2020). For instance, the American Hospital Administration reported an estimated USD 161,000,000,000 in financial losses attributable to the cessation of elective procedures during the first quarter of 2020 (Mehrabian et al. 2022).

2.2. Rising Cost of Critical Care

Accompanying the large loss in revenue, the US healthcare landscape saw dramatic increases in the costs of providing care. The rapid rise in the number of infected individuals led to a surge in patients in need of critical care, and as such, it necessitated even greater investments on the part of healthcare institutions to expand their inpatient capacities and provide the resources to support it. Estimates drawn from the Premier Healthcare Database found that the median cost of providing critical care for COVID-19-afflicted individuals between April and December 2020 varied from USD 13,443 to USD 41,510, depending on the severity of the affliction and the intensity of the treatment required (Ohsfeldt et al. 2021). Coupled with estimates from the AHA on the number of ICU beds across America, we found that the American healthcare system faced a cost of USD 1,500,000,000 or more during this period. When viewed alongside the estimated USD 2,400,000,000 in non-treatment costs incurred by hospitals from March to June 2020, we were able to gain a better appreciation of the plight of providers battling through the pandemic (American Hospital Association 2020).

2.3. Reductiosn in the Workforce and Associated Increased Costs

Indeed, the uptick in critical care requirements further strained the financial resources of hospitals across the United States, and it also contributed to a vast number of provider layoffs across the healthcare industry as organizations attempted to stay afloat (Fried et al. 2020). While the reductions in the numbers of providers that healthcare institutions retained did help them continue their operations, to some extent, they were not without consequences. As these frontline workers donned a more civilian role, the observed quality of life for these individuals plummeted as—in addition to the stress of having come into such frequent contact with the virus—these individuals now found themselves temporarily or permanently without work, and therefore, they became fearful for their ability to provide for themselves and their loved ones (Kandula and Wake 2021). Further, the performance and well-being of providers who retained their positions saw declines as well, given the increased workload pressures they now faced (Kandula and Wake 2021). In response, healthcare organizations found themselves confronted with an unforeseen but largely necessary cost of providing support for their workers, both past and present. Hospitals were estimated to have incurred USD 2,200,000,000 in support-related

costs by June 2020, a number which was sure to climb as the pandemic continued (American Hospital Association 2020).

The first year and a half of the COVID-19 pandemic saw healthcare institutions experience dramatic losses in revenues, considerable rises in the costs of care, and significant restructuring of their workforces. Taken individually, these issues would present significant financial stressors for any organization, but when viewed together and in the context of the COVID-19 pandemic, we saw the rather vicious cycle the constituents of the United States healthcare system found themselves in. The fear ushered in by the pandemic fostered doubt in regard to the safety of our care centers. The resulting reductions in patient volumes left these centers unable to effectively bear the costs of providing for the rising numbers of critically ill patients. With the rising costs came the need to initiate workforce reductions and reforms which, in turn, hampered the ability of these organizations to care for the populace. Throughout it all, COVID-19 cases continued to rise, and public apprehension and uncertainty grew.

3. The Disruptions to Supply Chains

As previously stated, healthcare organizations were thrown into a state of financial disarray due to the COVID-19 pandemic; however, in addition to the financial shocks, providers also experienced disruptions to both global and local supply chains. With the heavy trade and travel reforms put into place to prevent the spread of the virus came the closure of several vital supply chains, which had far-reaching impacts on several aspects of local, national, and global life and commerce (Magableh 2021). For the purposes of this paper, we will focus on how these disruptions hampered the ability of United States care centers to adequately treat and protect their patients and providers.

3.1. Drivers of Disruption

The use of highly specialized tools, medications, and equipment is an integral part of the United States care delivery system, but this is also what makes it highly reliant on global trade relationships for its proper functioning. As a result of government-driven lockdown policies, large worker layoffs, several key manufacturing plant closures, and the heavy restrictions in national and international transport systems, national and global supply chains were crippled (Iyengar et al. 2020). Among the distribution channels that were most severely affected were those pertaining to the supply of food and medical supplies (Cohen and Rodgers 2020; Magableh 2021). Given that the United States is the world's leading importer of protective personal equipment (PPE), this severely handicapped the ability of United States healthcare organizations to provide safe and effective care during a time when doing so was critical (Cohen and Rodgers 2020; Magableh 2021).

3.2. Provider and PPE Shortages

One of the main factors as to why the disruptions to healthcare supply chains—particularly, the supply of PPE—had such detrimental impacts on the viability of United States care institutions is that PPE was essential to ensuring that providers working on the frontlines did not contract the virus (Griswold et al. 2021). Given what we have previously discussed regarding the significant downsizing of provider teams, it follows that healthcare organizations sought to preserve the well-being of those who remained, and from this, we could appreciate just how vital PPE was to ensuring the continued functioning of these care centers.

However, the maldistribution of limited government resources coupled with the inability of local suppliers to meet PPE needs across the United States resulted in frequent and significant shortages, leaving frontline providers unprotected in their care duties (Cohen and Rodgers 2020; Goel et al. 2021). As cases rose, the demand for PPE rose with it, and providers were now faced with foregoing their needed quality standards in the pursuit of acquiring some degree of security. Many turned to crowdsourcing and volunteer support to compensate for the shortfalls, but they had limited success (Bishop and Leigh 2020).

3.3. Additional Effects of the Supply Chain Disruptions

The effects of the supply chain disruptions on United States healthcare institutions were amplified by the existing financial stressors we have previously reviewed. With organizations unable to sustain the revenues that they had seen prior to the pandemic, their ability to acquire available medical supplies and equipment was significantly reduced. This had a particularly strong impact on smaller hospitals and private provider practices as they could no longer sustain the increased costs of caring for critically ill patients, and as such, they were acquired by larger institutions (Fried et al. 2020; Goel et al. 2021). This, however, only added to the existing shortage of healthcare outlets as it decreased both the number and diversity of available care institutions (Goel et al. 2021). The disruptions to the medical supply chains severely handicapped the ability of United States healthcare organizations to continue to combat the COVID-19 pandemic, and they only added to the pressures they were already experiencing.

4. The Impact on Providers

When considering how key factors in our healthcare environment changed in response to the COVID-19 pandemic, it is paramount that we not overlook one of the—if not the most—important aspects of the United States healthcare delivery system: the frontline clinical teams. These individuals committed themselves to the service of others afflicted with the virus despite the risks that they encountered when doing so. By and large they were the unsung heroes of the pandemic, and without them, we would not have been able to make any headway through the pressures it placed on the nation.

4.1. Disruptions to Provider Well-Being

Despite their importance in supporting the nation's well-being, the COVID-19 pandemic had a particularly significant impact on healthcare providers. Perhaps one of the most marked trends observed in regard to frontline workers during the COVID-19 pandemic was the heavy downturn in their mental and physical well-being. Although the unfortunate nature of their profession requires them to endure a greater amount of mental, physical, and emotional strain than most others, the COVID-19 pandemic had intensified these stressors to an unprecedented degree (Sasangohar et al. 2020). The drivers behind these changes became clear when we examined the shifts occurring across the greater healthcare landscape. As previously noted, the reductions in the amount of clinical personnel retained by care centers, as well as the massive disruptions in the national and global supply of PPE, had significantly weakened the ability of organizations to securely provide sufficient care. These two factors, in particular, were also amongst the most prevalent degraders of healthcare worker well-being as the increased workloads, as well as the heightened risk of infection, greatly intensified the psychological and physical stress that providers experienced (Smallwood and Willis 2021). The toll that the pandemic had taken on the provider workforce was worsened by the fact that of the 2.4 million active registered nurses and physicians in United States hospital systems in 2020, 22% of them were at or over the age of 55, placing them at greater risk of suffering from more severe complications should they contract COVID-19 (Ehrlich et al. 2020). This, coupled with emerging evidence of higher mortality rates amongst older individuals suffering from COVID, instilled a great degree of fear and uncertainty in providers who were then confronted with choosing between carrying out their duties to their patients and ensuring their health as well as that of their loved ones (Sharif and Amin 2021).

4.2. Additional Effects

The emotional and psychological strains that providers experienced during the pandemic were evidenced through the rising rates of depression and anxiety within this population; however, they had also contributed to the heightened occurrence of provider burnout and fatigue resulting primarily from the reductions in workforce numbers (Sharif and Amin 2021; Smallwood and Willis 2021). The increased rates of physician burnout also

had the unintended consequence of promoting the rates of attrition in the healthcare space, worsening the plight of the healthcare space and its constituents. These factors formed a positive feedback loop.

A study conducted on the University of Utah Health system found that the strenuous work conditions of the pandemic prompted many clinical workers to consider distancing themselves from the healthcare workforce, a trend that was especially prevalent in women and minority respondents who were also tasked with a considerable degree of family involvement and care responsibilities (Delaney et al. 2021).

Despite the internal struggles providers faced in response to the novel stressors of the pandemic, many chose to continue to care for those afflicted with the virus, and for their displays of courage and their commitment to the nation's well-being, we are ever in their debt. The plight of healthcare workers during COVID-19 served to highlight two important aspects of the pandemic and the greater healthcare space. The first is that it reinforced the notion that the dramatic changes ushered in by the pandemic behaved in a cyclical fashion and built upon each other to amplify their effects. The second is that it highlights a crucial yet often overlooked issue that is prevalent in our healthcare system, and that is the lack of adequate support for the clinical teams that are essential players in care delivery. If we are to continue to pursue the goal of exceptional healthcare delivery here in the United States, we must first take action to ensure the security and stability of the providers, technicians, and supporting care teams who carry out that care delivery on a daily basis.

5. Patient Outcomes

Next, we shift our focus to those who were afflicted by the virus in an effort to understand how their care experiences were reformed by the pandemic.

5.1. Misinformation and Patient Perception

Whether it is a hospital, urgent care clinic, or a standard family practice, healthcare institutions have always held a significant and symbolic role within society. They represent places of safety, refuge, and, most importantly, hope. However, the COVID-19 pandemic has drastically altered that view for many individuals across the United States. The early stages of the pandemic in 2020 were marked by the extensive circulation of misinformation, conspiracies, and rumors regarding the nature of COVID-19 and its impact on global populations (Loxton et al. 2020; Sharif and Amin 2021; Vuković et al. 2022). The wide distribution of false information in regard to the pandemic brewed intense distrust and disbelief amongst patient populations, which subsequently led to increased rates of non-compliance with public health guidelines and fostered public animosity towards healthcare officials and institutions (Roozenbeek et al. 2020; Sharif and Amin 2021). Particularly in the United States, this state of public confusion was further aggravated by numerous reports from prominent political figures questioning the integrity of the information reported by established healthcare organizations, and they often cited those reports to be little more than dramatizations intended to damage the standing and image of current political leaders (Uscinski et al. 2020). This issue became so pronounced that the World Health Organization announced the emergence of an "infodemic" alongside the COVID-19 pandemic in 2020 (Evanega et al. 2020; Kim et al. 2020). The distrust between the public and their care centers and the denial of the severity of the virus that ensued contributed to the observed rise in cases. This, in turn, intensified the stressors already plaguing the healthcare space, including elevating the rates of provider depression and burnout, and it placed greater strains on the resources of care centers (Sharif and Amin 2021).

5.2. Prevalence of Forgone Care

However, as cases rose and more concrete evidence regarding the virus began to emerge, the denial and distrust held by the public soon turned to fear. In April of 2020, approximately 19% of an estimated 431,000 inpatients in United States hospitals had been afflicted with the virus, with the proportion of total inpatient admissions steadily increasing

as the nation progressed through 2020 (Sapiano et al. 2022). In our previous exploration of this time period, we noted that providers saw significant reductions in their patient volumes, which were attributable to government-driven isolation efforts as well as patient reluctance to seek care for fear of acquiring an infection; however, this issue had a significant impact on the patients themselves, as well. The fear and uncertainty brought on by the rapid surge in cases greatly increased the prevalence of forgone care among the United States patient population between March and July of 2020 (Anderson et al. 2021). At this point, patients were faced with the same dilemma that frontline providers faced as they had to choose between risking COVID infection by entering care centers and obtaining the medical services they needed. This problem was especially apparent in emergency departments and other urgent care centers as the volume of patient admissions in these centers dropped significantly (Nourazari et al. 2021). However, what was concerning was that of the patients who opted to defer their treatment in emergency departments, a significant proportion of them would have been admitted to an inpatient setting due to the nature and severity of their condition, and from this, we could reasonably infer that the associated quality of life of these individuals would have suffered (Nourazari et al. 2021).

5.3. Patient Mortality and Morbidity

As we saw in our previous analysis, the stressors affecting the greater healthcare space had acted in an additive manner to intensify their effects on the constituents of the nation's healthcare system. In the case of patients during COVID, factors such as the fragmented supply chain and the reductions in the numbers of active providers barred many patients from seeking the critical care they needed, and in some cases, these factors contributed to increased mortality rates, as well (Alsan et al. 2021; Tuczyńska et al. 2021). Government-driven isolation efforts resulted in large disruptions to several aspects of patient's daily lives, and the heightened levels of patient stress which such isolation generated were accompanied by increased occurrences of substance abuse as patients struggled to cope (Alsan et al. 2021). These trends demonstrated some of the avenues through which COVID-19 had compromised the well-being of patients, and the amalgamation of these channels was attributed to the increased patient mortality rates seen through the pandemic, as well (Alsan et al. 2021). Additionally, it is worth noting that the differences in socioeconomic standing, race, sex, and other demographic factors of patients had led to a disproportionate distribution of infection rates and, subsequently, mortality rates, with older patients of disadvantaged and minority backgrounds being more severely affected by the pandemic than others (Alsan et al. 2021; Chen et al. 2021).

Overall, the pandemic detrimentally impacted the manner in which patients interacted with the nation's healthcare institutions. During the COVID-19 pandemic, they came to be viewed as centers of uncertainty and disorder rather than places of security and healing. Unfortunately, that sentiment is still evident today, and it will take time to shift that thinking once more.

6. Changes to Government and Policy

The substantial changes in United States healthcare delivery systems brought on by the pandemic elicited heavy government intervention and legislative reforms, the intent of which was to provide providers and patients with a robust framework in which they could continue to deliver and receive care given the unusual circumstances of the pandemic. Here, we will analyze two of the most impactful intervention strategies implemented by state and national governments in response to the stressors of the COVID-19 pandemic.

6.1. Mobilization of Funds

Providers across the healthcare space struggled to provide care under the immense financial strain the pandemic placed on their operations. As such, one of the primary aims of government reform initiatives was to provide financial relief and support for these institutions. The most significant source of funding was secured through the Coronavirus Aid,

Relief, and Economic Security (CARES) Act of 2020, which established a Provider Relief Fund (PRF) of USD 178,000,000,000 (US Department of Health and Human Services 2022). The PRF was established with the intent of compensating providers for revenue losses and excessive costs incurred in the provision of care for COVID patients, as well as to alleviate losses relating to the recruitment and maintenance of their provider workforces (US Department of Health and Human Services 2022). Of these funds, USD 20,000,000,000 were allocated specifically to support hospitals with the highest incidences of COVID patients, as well as those operating in rural areas, in an effort to provide relief where it was needed the most (Kullar et al. 2020). However, it soon became apparent that the ineffective management and distribution of these funds instead contributed to the disparities in care provided to certain patient populations, indirectly worsening the care outcomes of vulnerable populations and generating inequity (Cantor et al. 2021; Grogan et al. 2021; Khullar et al. 2020). Other sources of funding were secured for more targeted purposes, including the provision of USD 7,750,000,000 for the Substance Abuse and Mental Health Services Administration (SAMHSA), which was used to combat the rising rates of psychological stress and substance abuse among patients and providers (US Department of Health and Human Services 2022). Efforts to compensate for the diminished provider workforce included mobilization of the National Medical System (NMDS), which deployed federal health and emergency response professionals to engage in disaster relief planning, population care coordination, and supporting the existing providers in their efforts (Dawson 2020; US Department of Health and Human Services 2022).

6.2. Telemedicine Reform

In addition to the extensive government financing of COVID relief efforts, there were several significant changes that affected the delivery of care itself during the pandemic. However, among the most drastic changes were those relating to the widespread adoption of telemedicine services. Prior to 2020, telehealth services were subject to stringent privacy, licensure, and equipment regulations that barred many from implementing these services in their practices (Kwong et al. 2014). However, in an effort to preserve the health of the United States population while abiding by isolation and distancing guidelines, the United States Department of Health and Human Services (HHS) implemented several changes in its telehealth regulatory policies, allowing for greater provider–patient interactions during the pandemic (Gadzinski et al. 2020). Among the most significant reforms was the loosening of HIPAA regulations regarding the modes of communication services used, as well as the implementation of a state licensure waiver form to provide physicians with greater flexibility in terms of the patient populations they could see (Gadzinski et al. 2020; Terry 2022). Patients could now contact providers from differing states from the safety of their homes through user-friendly telecommunication platforms such as FaceTime and Skype (Terry 2022). To support these revolutionary care delivery changes, the Centers for Medicare and Medicaid Services (CMS) expanded their reimbursement policies to compensate physicians for Medicare visits conducted through telehealth platforms (Gadzinski et al. 2020; Terry 2022). The effect of these changes was profound as they provided patients with a way to receive the care they needed without putting themselves or their loved ones at greater risk from acquiring COVID-19.

These changes required immense amounts of effort and coordination between legislative bodies, care teams, and the patient populations themselves; however, they were largely successful in achieving their goal of facilitating the continued delivery of secure care throughout the pandemic.

7. Conclusions

Since March of 2020, COVID-19 has dramatically transformed the American healthcare environment, as well as the organizations that participate in it. Financially, healthcare businesses were subject to heavy strains primarily attributable to the reductions in elective services coupled with rising critical care costs. As the current United States healthcare

reimbursement model favors these elective procedures, the shift in volumes rendered many centers unable to meet their bottom line, with a net cost to the nation's healthcare system approximating USD 3,900,000,000 (American Hospital Association 2020; Ohsfeldt et al. 2021). Nationwide social distancing and self-isolation policies contributed to the decreases in patient volumes, further jeopardizing the ability of United States care centers to bear the cost of caring for the critically ill.

The United States, being the world's leading importer of medical equipment, was compromised in its ability to safeguard the work of its providers due to the breakdown of global supply chain networks (Cohen and Rodgers 2020; Magableh 2021). The resulting scarcity of PPE and medical equipment left providers vulnerable in their efforts to care for the population. Additionally, given that 22% of the provider workforce was at greater risk of developing age-related complications due to COVID-19, healthcare centers witnessed high rates of attrition as physicians and nurses became concerned for their well-being. Those who remained experienced significant upticks in the rates of provider burnout, fatigue, and depression given the additional workload, and as such, health centers entered into a detrimental cycle (Ehrlich et al. 2020).

The patient population of the United States experienced notable downturns in their quality of life attributable to both the long bouts of isolation they found themselves in and the copious amounts of misinformation that had been circulating in the public space (Alsan et al. 2021; Sharif and Amin 2021). The dissemination of false information regarding the virus cast doubt upon health centers and their safety, and as such, the nation experienced significant increases in the numbers of infected individuals, as well as increased rates of foregone care for needed—but not emergent—procedures (Evanega et al. 2020; Nourazari et al. 2021; Sharif and Amin 2021).

Throughout this all, government authorities and legislators initiated drastic reforms in an effort to combat the stressors of the pandemic. Initiatives such as the Provider Relief Fund and the controlled de-regulation of telehealth practices offered the nation's healthcare institutions opportunities to continue to deliver quality care despite the strenuous circumstances of the pandemic. However, we must note that the insular nature of many of these legislative reforms disparately impacted the very healthcare businesses they sought to aid, diminishing their effectiveness.

It is clear that the COVID-19 pandemic represents one of the largest challenges that United States healthcare businesses have faced in recent decades, but it also represents perhaps one of the industry's most valuable learning periods. It has well and truly elucidated both the pitfalls and successes of the United States healthcare model, and from this, we can find opportunities for future growth. Only by exploring these areas will impactful change arise within this healthcare model, and that change will be accompanied by the potential to better weather future times of crisis and instability.

8. Areas of Future Research

This review of the impact of COVID-19 on the healthcare business landscape has yielded several promising areas for further investigation.

In the initial examination of the financial struggles of care centers during the pandemic, it was evident that the large losses in revenue thwarted the ability of care centers to withstand the pressures of the rising costs of care (Huynh et al. 2013; Talmor et al. 2006). It may therefore be of use to conduct further study into the revision of existing reimbursement models used by hospitals and other healthcare centers to increase the feasibility of conducting urgent and critical care procedures. Such a study would do well to focus on government-funded reimbursement reforms so as to prevent significant increases in the patient costs of obtaining urgent care as this would bar many patients from accessing the care they need.

As detailed previously, the widespread circulation of inaccurate information was a major contributor to the rapid spread of the virus during the initial phases of the pandemic (Tasnim et al. 2020). Therefore, further inquiry must be made as to how reputable healthcare

organizations can educate the public on how to discern between reliable and unreliable sources of data. The intent of such work would be to curtail the effects of misinformation on public behavior to keep the nation's patient populations safe should a similar future health threat arise. However, it is important to note that the management of misinformation is a nuanced topic that involves several factors including, but not limited to, legislation regarding free and public speech, social media usage, and media presence. These must be considered if and when such studies are conducted in order for any resulting proposals to be feasible.

As we have seen, the United States healthcare system operates at the mercy of global supply networks as it has abandoned its investments into local distributors in the name of cost efficiencies and leaner thinking (Iyengar et al. 2020). This caused immense problems for United States care institutions during the pandemic, and as such, it warrants revisions to the manner in which the nation structures its goods acquisition channels. One possible avenue of future research would be to assess the impact digital supply chains have had on allowing nations to acquire data and information pertaining to the flow of their needed materials and goods, which, in turn, would enable analyses resulting in the educated management of those supply channels (Ageron et al. 2020; Iyengar et al. 2020). Accompanying this could be research into contingency protocols that United States healthcare organizations may implement in order to offer a more proactive response to any potential disruptions in the national supply of medical equipment (De Matta 2017). Such work would do well to consider methodologies for risk management, disaster recovery protocol development, and reserve capacity structuring given that these areas would provide a high degree of security for healthcare businesses should a future national supply chain disruption arise (De Matta 2017).

To further safeguard against future supply chain disruptions, conducting research into the utilization and subsequent depletion rates of specific goods would be of use in determining which stores to improve as these can be reasonably viewed as among the most essential for the functioning of our nation (Goel et al. 2021). For instance, if such work was conducted prior to the pandemic and with respect to the healthcare environment, specifically, we may have been able to better predict and prepare for the heavy usage of PPE and other supplies that the nation experienced during the COVID-19 pandemic.

The COVID-19 pandemic has also had a deleterious impact on the mental and physical stability of both our healthcare providers and the patients who seek their care (Sharif and Amin 2021). It is therefore imperative that further study is taken to assess the effects that such declines in psychological and physical well-being had on both the quality of care providers distributed and the outcomes patients saw after its reception (Tawfik et al. 2019). Subsequently, research must be conducted to evaluate how healthcare organizations have attempted to safeguard the mental and physical well-being of providers and patients both before and during the pandemic. This can be further augmented by additional inquiry into what actions these institutions can implement to elevate the well-being of patients and providers as we transition out of the pandemic. It may be fruitful for such work to focus on methods to reduce conditions such as burnout, fatigue, depression, and anxiety as these were very prevalent during the pandemic (Sasangohar et al. 2020; Sharif and Amin 2021; Y. Zhong et al. 2021).

Additionally, a common trend observed during the pandemic was the widespread act of forgoing care among patients due to their fear of contracting the virus (Czeisler et al. 2020). As such, it is of vital importance that we study the proportion of patients who have sought out those same procedures post-pandemic so that healthcare institutions may be able to prepare themselves to serve those needs in an effort to prevent further patient suffering.

The spread of the virus, as well as the severity of its impact on local healthcare centers, varied depending on geographic and economic factors, with rural and underserved areas being the most severely impacted (Cuadros et al. 2021). This calls for research into how policy reform can better cater to those varying factors, with the intention being to produce

local and state legislation that better supports these areas in maintaining the health of their constituents.

During the pandemic, we witnessed the United States government trigger temporary relief funds and policies to support their institutions; however, we have not yet explored the influence of the timing of such aid. It has been noted that in the United States, local, state, and national public health institutions have suffered greatly from financial mismanagement and inadequate government funding, dating back to before the pandemic's start in 2020 (Gaffney et al. 2020). Given this, it therefore seems reasonable to explore alternative funding models and assess how they may allow for the more sustained and effective financing of health centers, and therefore better enable health centers to respond to future health disasters.

The United States boasts one of the most advanced and complex healthcare systems in the world. This system is defined as a multi-payer system in that there are several entities involved in its financing and, therefore, the management of healthcare services available to its constituents (Ridic et al. 2012). However, despite this robust model, the United States succumbed to the financial stressors of the pandemic, and this begs the question of whether the systems of other nations fared any better. Therefore, it is advisable to look into the efficacy of single-payer and other health system models in withstanding the drastic financial changes brought on by the pandemic, and from there, we can draw insights as to what reforms may be initiated in the United States system or vice versa.

In conjunction with the aforementioned area of future study, it would be useful to evaluate the experiences of other countries during the COVID-19 pandemic relative to the United States. The value of such an undertaking lies in its primary consideration: the healthcare systems of other countries are fundamentally different from that of the United States. For instance, the reductions in elective service volumes seen in the United States were also apparent in countries such as the United Kingdom, which experienced a 91% decrease in ophthalmic procedures during the pandemic (Friebel et al. 2022; J. Zhong et al. 2021). However, we must note that the UK has a single-payer, government-based healthcare system, which contrasts with the multi-payer commercialized system of the United States. Given these and many other differences, a common set of metrics must be established to form a basis of common analysis. A comparison of the yielded results may then provide insight into areas of success or those in need of reform within each healthcare model.

Complementing the previously proposed work would be further study into the key policy initiatives present within the current United States healthcare system to identify any particular areas that would benefit from such policy reform (Blumenthal et al. 2020).

Finally, it would be prudent to further explore the effect that the observed easing of telemedicine policies and practices has had on the quality of life of the patients who utilized it them, well as the views of providers regarding their utility. Such research holds value as the policies implemented during the pandemic allowed for significant but temporary changes, and if they yielded positive outcomes, we may consider making those changes more permanent to improve care delivery moving forward (Greiwe 2022).

Funding: This research received no external funding.

Data Availability Statement: No new data were created or analyzed in this study. Data sharing is not applicable to this article.

Acknowledgments: I would like to thank Shawn Carraher, and Sean Haas. I am sincerely grateful for all of the guidance, support, and advice you have provided me with throughout the life of this project; without it, this work would be incomplete. I also offer my gratitude to the MDPI anonymous peer review team for their diligent review of the work presented in this paper. Your efforts and insights played a key role in shaping this project.

Conflicts of Interest: The author declares no conflict of interest.

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