

# COVID-19 RECOVERY FOR THE AUSTIN HEALTHCARE ECOSYSTEM

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## **Executive Summary**

**Introduction:** This report provides a high-level roadmap of key challenges and opportunities for Austin Healthcare Council (AHC) members during the ongoing reopening period that can inform strategic planning around the COVID-19 pandemic. Our findings represent a collective scan of major trends and best practices synthesized from over 15 interviews with AHC members, Austin city leaders, and University of Texas at Austin (UT) faculty, as well as outside research. This project was a joint collaboration between AHC and Texas McCombs MBA Health Innovation Fellows (HIF).

**Key Themes:** Even before COVID-19, the U.S. healthcare system suffered from dysfunction, prompting the industry to lean away from fee-for-service towards more patient-centric delivery models. COVID-19 served as a shock to the system, highlighting flaws in the healthcare business model and triggering a hard reset for many stakeholders. The pandemic has also underscored key racial and socioeconomic disparities in health and access to healthcare. Austin healthcare leaders are responding by examining how COVID-19 can serve as a catalyst to accelerate health innovation, foster stakeholder collaboration, and improve value in healthcare delivery.

### **COVID-19 Crisis Recap**

Starting in mid-March, providers experienced overnight patient volume declines of 30 to 100 percent, driven by the halt on elective procedures and patients avoiding non-elective care due to fears of COVID-19. Declining patient volume created downstream market demand impacts for hospitals, physicians, payers, medical device manufacturers, and health tech companies, triggering significant reductions in monthly revenue for Austin healthcare organizations. Surging demand for personal protective equipment (PPE), medical equipment, and sanitation supplies has increased certain short-term costs up to tenfold, creating new daily challenges in managing supply chains. Austin healthcare organizations have responded to these new pressures through workforce reductions and reallocations, telehealth expansion, and creative approaches for sourcing and managing medical supplies. COVID-19 transmission fears, in conjunction with payer reimbursement flexibilities, have rapidly accelerated patient demand for and provider adoption of telehealth services, particularly in primary care and behavioral health specialties.

### **Near-Term Reopening Challenges**

We found several key challenges for Austin healthcare organizations to consider in the near-term while managing reopening, including costly new workplace safety practices, unmet healthcare needs, patient and consumer fears, supply chain disruptions, technology implementation concerns, and mental health risks. Implementing new safety practices to protect employees and consumers, ensuring adherence to public health guidelines, and managing liability risks will be costly, could reduce efficiency, and may result in interim operating losses. COVID-19 is contributing to growing displaced care from postponed surgeries and reduced chronic care management, potentially exacerbated over time by the rising uninsured population, veteran physician retirement, and independent practices closing. Austin healthcare organizations must reassure patients that they can safely seek medical care and restore consumer confidence to engage in business despite fears of COVID-19. Broadening PPE requirements from strictly clinical use to general use for businesses and consumers as the economy reopens may intensify supply chain struggles. Telehealth adoption may require new medical, regulatory, and security considerations; timely research for appropriate software vendors; workforce retraining and reallocation; and institution of new clinician procedures. Finally, providers have raised alarms about increasing behavioral health needs and healthcare employers are concerned about the growing risk of employee mental health burnout.

## Best Practices for Reopening

- **Public Health Compliance:** Adhere to and continually monitor the evolving [Texas Minimum Standard Health Protocols](#) and [Centers for Disease Control and Prevention \(CDC\) Businesses & Workplaces Guidelines](#) for reopening safely.
- **COVID-19 Processes & Patient-Centered Care:** Sequester COVID-19 patients at separate facilities; segment high-value services at specific times/locations (e.g., designate a specific half-day for wellness/immunization visits); and reassess patient scheduling and intake to implement touchless check-ins, screenings, and payments, as well as reduce or eliminate waiting room usage. More broadly, COVID-19 presents an opportunity to reevaluate care delivery and pivot towards more patient-centric care coordination and value-based care.
- **Safety Communication:** Over-communicate new safety protocols to build trust and credibility. Patients, consumers, and employees expect procedural/technological changes and seek to understand what is changing and why. Ensuring consumer and employee confidence while reopening businesses is critical for long-term performance.
- **Workforce Retention, Telework, & Behavioral Support:** Examine avenues to repurpose existing staff and utilize flexible hours/shifts to minimize further workforce reductions. Enhance workplace accommodations and technological capabilities for virtual/remote work (especially for employees struggling without childcare services). Increase behavioral health support and reinforce healthy cultural norms for employees to seek behavioral care.
- **Supply Chain Diversification:** Seek non-traditional vendors, build redundancies, and hold more inventory on-hand. Consider permanent changes to diversify long-term sourcing. Austin healthcare companies may also explore forming buying consortiums or utilize supply trading platforms to increase purchasing power and reduce prices.
- **Structured Telehealth Adoption:** Prioritize nimble software vendors willing to respond and evolve with feedback, ensure universal browser and device access (e.g., Android vs. Apple), coordinate implementation physician and operation team leads, identify “tech comfortable,” creative physicians to pilot programs, and utilize both messaging and video chat capabilities to meet patient preferences.
- **Service-Focused Innovations:** Target health tech/start-up innovations utilizing service components with recurring revenues that connect with specific provider needs, as these opportunities will be more appealing to investors concerned about market uncertainty.

## Longer-Term Strategic Outlook and Key Risks

Stakeholders should note numerous financial, regulatory, technology, and workforce risks over the long-term, as well as the increasing potential of a second COVID-19 surge during the summer and fall. We anticipate a gradual return over the next year to pre-COVID-19 patient volumes, and hospitalists, specialists, and proceduralists dependent on physician referrals may lag in volume recovery. Healthcare organizations must implement costly reopening processes, while managing public health uncertainty and responding to evolving Austin COVID-19 policies. Business and workforce flexibility will be key to pivot and plan for the emerging healthcare delivery environment. Stakeholders expanding telehealth face an uncertain regulatory and reimbursement landscape, and increased use of telehealth across diverse platforms may raise fraud and abuse, licensing, credentialing, privacy, and cybersecurity concerns. Regulatory changes could allow patients to choose physicians based outside the Austin area via telehealth, diverting business from the Austin market. Companies seeking to retain workforce and diversify supply chains may face new economic pressures limiting these efforts. Healthcare leaders are also universally concerned about the mental health of their workforce. Finally, the nationwide impacts of COVID-19 may prompt changes in the federal government’s spending and regulatory role in healthcare.

**Summary Breakdown of COVID-19 Trends & Impacts by Healthcare Stakeholder**

Stakeholder	Challenges	Opportunities
<b>Hospitals</b>	<ul style="list-style-type: none"> <li>• Revenues decreased as elective procedures were halted.</li> <li>• Costs and difficulty obtaining PPE increased significantly.</li> <li>• Staff burnout and disengagement have become prominent concerns.</li> </ul>	<ul style="list-style-type: none"> <li>• Diversify the supply chain and consider PPE stockpiling to meet potential pandemic stresses.</li> <li>• Over-communicate new safety measures to staff and patients to promote trust and confidence.</li> </ul>
<b>Physicians</b>	<ul style="list-style-type: none"> <li>• Volumes decreased significantly, requiring many providers to make cost-saving staffing changes.</li> <li>• Telehealth requires new workforce training, medical protocols, and clinician operations.</li> <li>• Safely providing care requires changes in processes and workflows to adhere to public health guidelines.</li> </ul>	<ul style="list-style-type: none"> <li>• Reallocate workforce in response to changing care delivery model for PCPs with increased telehealth (e.g. more "home-based" patient-centered medical home model).</li> <li>• Optimize care protocols to limit physical contact with patients as much as possible.</li> </ul>
<b>Behavioral Health</b>	<ul style="list-style-type: none"> <li>• New stresses on already under-resourced mental health services—45 percent of U.S. adults report negative mental health impacts due to worry and stress regarding COVID-19.</li> </ul>	<ul style="list-style-type: none"> <li>• COVID-19 has prompted increased behavioral health awareness that may promote inclusion in primary care.</li> <li>• New reimbursement policies are needed for shorter and potentially cheaper telehealth encounters.</li> </ul>
<b>Payers</b>	<ul style="list-style-type: none"> <li>• Providers seek advance reimbursement, while employers press for deferred premiums.</li> <li>• Medical claims uncertainty as members avoid care or lose employer-sponsored insurance.</li> <li>• Shrinking commercial insurance market anticipated through 2020.</li> </ul>	<ul style="list-style-type: none"> <li>• New payment models for telehealth, mobile labs, and home-based care could help optimize patient care and meet employer cost-saving needs.</li> <li>• Declining and changing healthcare utilization could improve identification of necessary and unnecessary care.</li> </ul>
<b>Medical Device</b>	<ul style="list-style-type: none"> <li>• Cancellation of elective surgeries, clinical trials, and research reduced revenues significantly.</li> <li>• International supply chains are strained due to the pandemic.</li> </ul>	<ul style="list-style-type: none"> <li>• COVID-19 related products (e.g. testing, PPE, home care, etc.) could provide alternative revenue streams.</li> <li>• Innovations utilizing service components that connect to provider-needs may be in higher demand.</li> </ul>
<b>Health Technology</b>	<ul style="list-style-type: none"> <li>• Contact tracing requires a high volume of personnel for success and raises new cybersecurity concerns.</li> <li>• Data accuracy and patient matching is increasingly important as patients migrate to online services.</li> </ul>	<ul style="list-style-type: none"> <li>• New patient demand and physician adoption of telehealth and digital health platforms unlikely to go away.</li> <li>• Market for contact tracing, touchless front desk technologies, and patient identification tools will increase.</li> </ul>
<b>Non-Profits</b>	<ul style="list-style-type: none"> <li>• Event-centric funding opportunities were cancelled or postponed, removing a key source of funding.</li> </ul>	<ul style="list-style-type: none"> <li>• Consider alternative funding opportunities.</li> <li>• Streamline operations where possible.</li> </ul>

## **Introduction**

This report provides a high-level roadmap of key challenges and opportunities for Austin Healthcare Council (AHC) members during the ongoing reopening period that can inform strategic planning around the COVID-19 pandemic. While Austin healthcare stakeholders are currently focused on the daily challenges posed by the COVID-19 public health crisis, insight into key trends and areas of concern as Austin loosens stay-at-home restrictions are imperative for leaders to manage the near-term phase of reopening the economy. At the same time, national projections and recommendations do not specifically encompass the Austin healthcare ecosystem. This report was compiled to benefit AHC members by identifying tailored opportunities and threats as Austin exits peak COVID-19 restrictions.

Our findings represent a collective scan of major trends and best practices synthesized from over 15 interviews with AHC members, Austin city leaders, and University of Texas at Austin (UT) faculty, as well as outside research. This project represents a collaboration between AHC and Texas McCombs MBA Health Innovation Fellows (HIF).

### **Key Themes:**

- Even before COVID-19, the U.S. healthcare system suffered dysfunction, prompting the industry to lean away from fee-for-service towards more patient-centric delivery models.
- COVID-19 served as a shock to the system, highlighting flaws in the healthcare business model and triggering a hard reset for many stakeholders. The pandemic has also underscored key racial and socioeconomic disparities in health and access to healthcare.
- Austin healthcare leaders are responding by examining how COVID-19 can serve as a catalyst to accelerate health innovation, foster stakeholder collaboration, and improve value in healthcare delivery.
- During this turbulent period, Austin healthcare stakeholders have significant opportunities to evolve and revolutionize their organizations, but risk devolution if they do not capitalize on innovations to meet rapidly evolving market needs.

Presented first in the report are key COVID-19 tracking indicators and resources to monitor the spread of the virus in the Austin community. In the following sections, the report highlights the general impacts of the COVID-19 pandemic across several key categories, including workplace reopening practices, healthcare system utilization trends, financial management implications, workforce management, supply chain management, and telehealth and health technology. Within each section, as applicable, this report provides a recap of COVID-19 pandemic effects, near-term reopening challenges, best practices for reopening, and a longer-term strategic outlook including key risks. Finally, the Appendix includes a summary breakdown of COVID-19 trends and impacts by healthcare stakeholder.

## **Key COVID-19 Tracking Indicators and Resources**

Healthcare stakeholders should continue to monitor and prepare for the increasing potential of a second COVID-19 surge during the summer and fall. The following key tracking indicators and resources were repeatedly highlighted by Austin healthcare stakeholders.

### **Key COVID-19 Tracking Indicators**

- **New Daily Hospitalizations:** Monitoring the change in the number of new daily hospitalizations for COVID-19 remains the most accurate indicator for Austin’s growing exposure risk, particularly on a seven-day rolling average. However, the data will lag approximately three-to-four weeks from present day activity.
- **New Daily Cases:** As testing capacity has gradually increased in Austin, monitoring the change in the number of new daily cases of COVID-19 as well as the percentage of positive tests out of the overall number of tests can be informative, particularly on a seven-day rolling average. Note that the data will lag approximately two weeks from present day activity.

### **Key COVID-19 Tracking Resources**

- **[Travis County COVID-19 Tracking Digital Dashboard:](#)** City of Austin’s daily COVID-19 surveillance dashboard, tracking new cases and hospitalizations by location, age, and ethnicity (*Key Indicators For Staging*, n.d.).
- **[Travis County Key Indicators for Staging Dashboard:](#)** City of Austin’s daily key indicators for staging dashboard, tracking Austin’s risk-based guidelines tied to new daily hospitalizations (*Key Indicators For Staging*, n.d.). [Mayor Adler](#) has noted a seven-day rolling average of 20 or more hospitalizations as a threshold for reviewing the reinstatement of “Stay Home, Work Safe” or other increased social distancing recommendations (*Mayor Adler on Twitter*, n.d.).
- **[Johns Hopkins University COVID-19 Status Report for Travis County:](#)** Johns Hopkins University’s daily COVID-19 infographic for Travis County, highlighting cases, hospitalizations, and population health demographics (*JHU COVID-19 Dashboard Infographic v2.4*, n.d.).

## **Reopening Workplaces for Business**

### **Near-Term Reopening Challenges**

Austin healthcare organizations must reassure employees to return to the workplace and restore consumer confidence to reengage in business amidst ongoing fears of COVID-19. Implementing new safety practices to protect employees and consumers, ensuring adherence to public health guidelines, and managing liability risks will be costly, likely reducing operating efficiency.

### **Best Practices for Reopening**

- **Public Health Compliance:** Adhere to and continually monitor evolving [Texas Minimum Standard Health Protocols](#) and [Centers for Disease Control and Prevention \(CDC\) Businesses & Workplaces Guidelines](#) for reopening safely (CDC, 2020) (Texas Health and Human Services, 2020).
  - **Four Key Pillars:** Hygiene, social distancing, screening, and masks (Gawande, n.d.):
    - Enhance workplace sanitation protocols. Require employees to sanitize hands every time they go into/out of a group environment. Disinfect high touch surfaces at least daily.
    - Implement visual signage and redesign workplace layouts (e.g. more spacing, use of plexiglass barriers) to facilitate social distancing.
    - Consider daily screenings of employees, patients, and visitors for symptoms of COVID-19. Promote cultural norms for employees to stay home if they are ill, and support employees with adequate sick leave policies.
    - Provide masks for employees and require masks for all consumers. Purchasing 3-ply masks is a small cost to pay to prevent employee productivity losses to COVID-19.
- **Liability Considerations:** Prepare for potential employee and customer liability concerns regarding COVID-19 transmission at the workplace. State and federal governments may expand business liability protections for COVID-19. Employers should develop contingency plans for employees exposed to or confirmed positive with COVID-19.
- **Safety Communication:** Over-communicate new safety protocols to build trust and credibility. Patients, consumers, and employees expect procedural/technological changes and seek to understand what is changing and why. Ensuring consumer and employee confidence while reopening businesses is critical for long-term performance. Consumer surveys can help gauge the most effective avenues for improving consumer confidence.
- **Digital/Contactless Processes:** Reassess consumer processes and strive to implement touchless check-ins, screenings, and payments. Reduce or eliminate waiting room usage. Minimize consumers' need to touch any surfaces while engaging in business.

### **Longer-Term Strategic Outlook and Key Risks**

Austin healthcare organizations must balance costly reopening processes with maintaining flexibility to address ongoing uncertainty regarding a potential resurgence in COVID-19 and/or a transition to more relaxed workplace environments if COVID-19 prevalence declines. Building trust and credibility with employees and consumers during reopening will solidify their loyalty and confidence, which is critical for business performance beyond the COVID-19 pandemic.

## **Healthcare System Utilization Trends**

### **COVID-19 Crisis Recap**

Starting in mid-March, providers experienced overnight patient volume declines of 30 to 100 percent, driven by both the halt on elective procedures and patients avoiding non-elective chronic care due to fears of COVID-19. Patient volume declines were concentrated in direct inpatient and outpatient services, physician services, medical labs, and diagnostic screenings, with downstream market demand impacts for hospitals, physicians, payers, medical device manufacturers, and health tech companies. Telehealth usage increased sharply due to loosened reimbursement restrictions as well as increased patient demand and provider adoption, especially for primary care providers (PCPs), but not enough to fully offset in-person patient volume declines.

### **Near-Term Reopening Challenges**

Growing unmet healthcare needs from postponed surgeries and reduced chronic care management may be exacerbated by the increasing loss of employer-sponsored insurance due to widespread unemployment, veteran physicians choosing to retire, and smaller practices closing under financial pressures. Deferred care can be further divided into two categories: “haircut care,” which requires one visit to catch up (e.g. PCP check-up) and displaced care, which requires one for one replacement procedures (e.g. surgeries). Behavioral health needs are at high risk of being unmet.

Austin healthcare organizations must also reassure patients that they can safely seek medical care in clinic and hospital settings, as patients continue to defer care despite loosened stay-at-home restrictions. Implementing reopening processes is costly and will likely reduce operating efficiency. Pre-COVID-19 volumes may not be attainable due to enhanced sterilization needs, revamped scheduling processes, and social distancing procedures.

### **Best Practices for Reopening**

- **COVID-19 Processes:** Sequester COVID-19 patients at separate facilities from non-COVID-19 patients. Segment high-value non-COVID-19 services at specific times/locations (e.g. designate a specific half-day for wellness/immunization visits). Implement visual signage and redesign workplace layouts (e.g. more spacing, use of plexiglass barriers) to facilitate social distancing. Provide masks for employees and require masks for all patients.
- **Streamline Patient Intake:** Reassess patient scheduling and intake processes, implement touchless check-ins, screenings, and payments, reduce or eliminate waiting room usage, and minimize patient need to touch any surfaces during visits.
- **Digital Health:** Emphasize telehealth and other forms of digital/online health interactions.
- **Safety Communication:** Over-communicate improved care standards and safety protocol changes to build trust and credibility. Patients expect procedural/technological changes and seek to understand what is changing and why. Small actions can dramatically impact patient comfort.

### **Longer-Term Strategic Outlook and Key Risks**

We anticipate a gradual return over the next year to pre-COVID-19 patient volumes, dependent in part on development of definitive COVID-19 treatments or vaccination. Hospitals, specialists, and proceduralists dependent on PCP referrals may lag in volume recovery. COVID-19 can be viewed as an opportunity to reevaluate care delivery practices and pivot to more patient-centered care (e.g. minimized waiting times, increased home care, and better care coordination).

## **Financial Management Implications**

### **COVID-19 Crisis Recap**

Essential businesses that remained open still experienced significant reductions in monthly revenue averaging 30 to 50 percent, whereas closed businesses have endured a 100 percent elimination of revenue. Revenue impacts have varied widely based on the type of organization. Businesses have also seen significant increases in short-term costs, with PPE expenses increasing up to tenfold, and bonuses or increased overtime pay required for certain businesses (e.g. hospitals). Healthcare companies' financials tended to plummet in Q1, though there have been some partial rebounds in Q2. The American Hospital Association estimates that hospitals nationwide will have \$50.7 billion in losses per month from March to June 2020 due to COVID-19 (American Hospital Association, 2020).

### **Near-Term Reopening Challenges**

To manage the financial implications of reduced or eliminated revenue, organizations sought loans (e.g. disaster relief loans) and/or expense reductions (e.g. rent abatement) from landlords. Many businesses sought to reduce overhead by instituting (in increasing order of severity) hiring freezes, hours and/or salary reduction, redeployment of workforce to reduce overtime expenses, voluntary furloughs, and involuntary furlough or layoffs.

### **Best Practices for Reopening**

- **Financial Assistance:** Apply for [small business financial assistance relief for COVID-19](#), including the Paycheck Protection Program, EIDL Loan Advance, SBA Express Bridge Loans, and SBA Debt Relief, if eligible, to meet obligations (*Coronavirus Relief Options*, n.d.). Take advantage of Austin City Council's [late rent eviction ordinance](#) through August 24, 2020 (*Protections for Texas Renters: COVID-19*, n.d.).
- **Payment Flexibilities:** Consider incentives for cash payment plans or discounts for pre-payment as applicable for customers to increase cash receipts and cash on-hand.
- **Capital Expenditures:** Defer new and significant capital expenditures during this period of increased market uncertainty and decreased cash flow. Evaluate opportunities to reduce fixed costs.
- **Service Mix:** Transition product and service mix to favor healthcare services offering recurring revenue, if appropriate, as such avenues may be more stable in the current market environment.

### **Longer-Term Strategic Outlook and Key Risks**

To weather a potentially longer storm than initially anticipated, most organizations are increasing cash days on hand where possible. Leaders must manage stakeholder expectations regarding potential sustained operating losses due to decreased customer demand and increased operating costs required to reopen while adhering to public health guidelines. Opportunities exist in the long term regarding alternative lines of revenue, maintaining telehealth operations if reimbursement trends continue post-COVID-19, and taking advantage of more patient-centric models of care. The healthcare industry is shifting emphasis from growth to cost-centered management. The pandemic may accelerate the shift from volume (fee-for-service) to efficiency (value-based care). Increased collaboration between healthcare stakeholders is likely, particularly for a potential COVID-19 resurgence.

## **Workforce Management**

### **COVID-19 Crisis Recap**

Austin healthcare organizations have responded to declining patient volumes and revenues through workforce furloughs and layoffs, reduced hours and salaries, and reallocation of workforce roles (*Axios Vitals*, n.d.). Over 1.4 million healthcare jobs were lost nationwide in April, concentrated in dentist, physician, chiropractor, and other healthcare provider outpatient offices (e.g., technicians, billing clerks, and medical assistants), with lesser impacts noted for PCPs, hospitals, and nursing/residential care facilities (*The Employment Situation - April 2020.Pdf*, n.d.). National health care employment rebounded slightly (+312,000) in May, concentrated in dentist, physician, and other healthcare provider offices (*The Employment Situation - May 2020.Pdf*, n.d.). Healthcare employers are concerned about the growing risk of mental health burnout for their increasingly strained healthcare workforce (“The Hidden Covid-19 Crisis,” 2020).

### **Near-Term Reopening Challenges**

Employers need to manage employee retention, reallocation, and gradual return to the workplace. Full employee retention may not be realistic due to changes with long-term productivity implications (e.g., telehealth expansion), even as elective procedures resume.

### **Best Practices for Reopening**

- **Workforce Retention:** Examine avenues to repurpose existing staff and utilize flexible hours/shifts to minimize further workforce reductions. Consider voluntary furlough programs if necessary.
- **Telework:** Evaluate ways to enhance flexible workplace accommodations and technological capabilities for virtual/remote work, particularly for employees struggling without childcare services.
- **Behavioral Support:** Increase workplace behavioral health support for employees, disseminate key signs and symptoms of mental health challenges, and reinforce healthy cultural norms for employees to seek behavioral care when needed. Explore hardship funds for struggling employees and assess broader use of sick leave and flexible work hours.

### **Longer-Term Strategic Outlook and Key Risks**

Reevaluate workforce needs and roles to meet new potential modes of healthcare delivery. For example, increasing the relative use of telehealth care likely requires a different mix of physicians, nurses, and support staff than traditional in-person care. Business and workforce flexibility will be key to pivot and plan for the emerging healthcare delivery environment. Companies seeking to maximize workforce retention may face economic pressures that limit these efforts. The potential for workforce mental health burnout may continue to increase over time.

## **Supply Chain Management**

### **COVID-19 Crisis Recap**

As the pandemic spread, global demand for PPE, medical necessities, and sanitation supplies surged, resulting in a supply shortage for Austin healthcare organizations. Medical supplies that were historically “taken for granted” by healthcare leaders suddenly required daily calls to manage. Institutions faced restrictions on the amount of supplies they were able to order, depending upon the organization size. Smaller businesses and health clinics with decreased purchasing power struggled more to obtain PPE and in some cases were forced to close, increasing patient demand elsewhere within the healthcare system.

### **Near-Term Reopening Challenges**

Increased global demand for vital medical supplies resulted in skyrocketing prices. Pre-COVID-19 orders costs increased up to tenfold, creating further distress for healthcare companies. As a result, organizations were forced to seek suppliers from outside of their normal networks, using non-traditional vendors for vital materials.

### **Best Practices for Reopening**

- **Inventory Sourcing:** Seek non-traditional vendors for emergency supplies. Consider permanent changes to the supply chain to diversify long-term sourcing and protect against future inventory shortages. Explore forming buying consortiums to increase purchasing power and reduce supply prices, protecting smaller institutions. Utilize local supply trading platforms to exchange goods with local institutions.
- **Inventory Stockpiles:** Build inventory redundancies and grow inventory stockpiles to protect against future supply shortages.

### **Longer-Term Strategic Outlook and Key Risks**

Despite recent improvements to the PPE supply chain, the threat of insufficient supplies looms as states continue reopening, PPE requirements shift from strictly clinical use to general use for both businesses and consumers, and healthcare stakeholders increase PPE stock in preparation for a potential resurgence of COVID-19. Increasing stockpiles of supplies on hand creates additional storage costs. After becoming accustomed to reusing PPE that was traditionally discarded after a single patient interaction, practitioners wonder if PPE can be used less strictly without increasing risk to providers or patients in the post-COVID-19 world. Previous highly conservative protocols requiring frequent mask changes, for example, may potentially change to reduce waste or to focus on more innovative, safely reusable equipment. Industry leaders must also consider regulatory updates that may require permanent changes to business supply chains. New regulations or tax incentives may guide American companies to “re-shore” supply chains and/or diversify locations through redundancies to reduce reliance on other countries, such as China and India, for critical medical supplies (O’Neil, 2020). Additionally, supply chain stress tests may become more widely used or required for companies supplying or demanding critical goods and services. Stress tests could be conceptually similar to those mandated for financial institutions after the 2008-2009 Great Recession (Simchi-Levi & Simchi-Levi, 2020).

## **Telehealth and Health Technology**

### **COVID-19 Crisis Recap**

Most healthcare providers had some form of telehealth in place prior to the COVID-19 pandemic, but usage remained limited. Many telehealth technology solutions were clunky and difficult to use, creating user issues for patients. Telehealth adoption did not rise significantly until the public health crisis rendered it a necessity for healthcare practices to continue safely providing care and payers loosened reimbursement restrictions. According to one survey, 25 percent of consumer respondents had used telehealth prior to the current COVID-19 pandemic, 59 percent reported they are more likely to use telehealth services now than previously, and 33 percent would leave their current physician for a provider offering telehealth access (Sage Growth/Blackbook Research: COVID-19 Market Pulse, n.d.). In response to growing patient demand, an overwhelming majority of employers waived cost-sharing for telehealth appointments.

### **Near-Term Reopening Challenges**

Rapid telehealth adoption has forced health stakeholders to evaluate new medical, regulatory, and security considerations; assess workforce retraining and reallocation; and institute new clinician operations. Providers also faced scaling challenges as demand surged. As payer reimbursement restrictions loosened for telehealth services, providers were allowed to use smartphones with audio or FaceTime to provide care—circumventing the need for a formal, pricier telehealth platform that was previously required to provide telehealth appointments. However, providers face ongoing reimbursement and regulatory uncertainty regarding whether these interim telehealth flexibilities will persist. Stakeholders are cautiously optimistic at the prospect of continued expanded telehealth reimbursement policies post-COVID-19.

### **Best Practices for Reopening**

- **Physician Selection & Training:** Devise criteria to select physicians best suited for providing telehealth, including comfort with technology, excellent communication skills, strong pattern of adherence to clinical guidelines, and receptivity to continuous feedback. In addition, patients can have pre-conceived notions about expected outcomes of a telehealth encounter, necessitating training for physicians to feel comfortable adhering to appropriate care guidelines (e.g. avoiding antibiotic over-use) while still providing patients with value (*Antibiotics Prescribed More Often during Telemedicine Visits, 2019*).
- **Platform Selection:** Seek third-party telehealth providers willing to accommodate specific and evolving needs, as developing a robust telehealth platform is usually an iterative process. Focus on identifying the must-haves in a platform for particular organization needs. Ensure universal access for patients regardless of the type of device or internet browser utilized. While helpful to contract with stable counterparties to ensure longevity of the platform, remember that there are always alternative options if a particular platform does not work out effectively in practice.
- **Integrated Implementation:** Coordinate implementation and on-call support between clinicians and operations management, including designating team leads and points-of-contact within each department.
- **Messaging Capabilities:** Enable messaging capabilities for patients to connect with physicians. Organizations with longstanding telehealth experience report that patients prefer and seek out text messaging interactions with physicians. Messaging can be effective as a component, but not a replacement, to video evaluation.
- **Telehealth as a Tool:** Ensure that telehealth never compromises care quality and is considered primarily as another clinical tool. Telehealth is only as impactful as the team and clinical care infrastructure behind it.

- **Service-Focused Innovations:** Target health tech/start-up innovations utilizing service components with recurring revenues that connect with specific provider needs, as these opportunities will be more appealing to investors concerned about market uncertainty.

### **Longer-Term Strategic Outlook and Key Risks for Telehealth**

While heightened demand for telehealth services is expected to continue, sustained coverage by payers remains uncertain. Reimbursement may become increasingly complex and loosened restrictions may not last. The Centers for Medicare and Medicaid Services (CMS) is expected to re-evaluate telehealth regulations in July, which may lead to significant changes in strategy. Commercial payers may continue to prefer contracting standalone telehealth services versus reimbursing physicians at parity to in-person visits. Telehealth profitability may be reassessed by providers as an opportunity to redeploy fixed costs and adjust workforce allocation though cost of adoption and time spent retraining workforce must be considered. Proper workforce selection and training will be paramount as telehealth can lead to an over-prescription of antibiotics versus traditional primary care visits (Uscher-Pines et al., 2015). Standalone telehealth companies may face challenges as patients take advantage of new, identical services from their regular healthcare clinics. Studies have shown that including telehealth within previous service models improves efficiency and appeals to a growing consumer base (Hollander & Carr, 2020). Telehealth can continue to revolutionize healthcare delivery and expand the health tech ecosystem by connecting with direct to consumer (D2C) products such as remote patient monitoring tools and at-home lab-testing. However, as with all technology adoption, telehealth faces significant cybersecurity risk as well as licensing, credentialing, fraud, and abuse. In addition, the potential for loosened physician interstate licensing requirements for telehealth may pose a risk to Austin-based providers.

### **Longer-Term Strategic Outlook and Key Risks for Other Health Technology**

Other technological opportunities include the development of a holistic tool for contact tracing. Considerations have been given to use of phone data (though there exists a data lag, as well as privacy concerns), use of COVID-19 diagnostic code from healthcare touchpoints, and leveraging other existing technology tools (*Contact Tracing | COVID-19*, n.d.). Predictive technology for COVID-19 “hotspots” using artificial intelligence and machine learning offers another area of growth. In addition, there are opportunities for electronic health records (EHRs), or existing alternatives, to create a touchless front desk experience (e.g. patient portal, pre-check-in, co-pays online, etc.), though businesses must centralize and clean their data for these endeavors. Healthcare technology firms can assist in the care delivery process via workflow optimization, triage, and prescreening (Hollander & Carr, 2020). Text, e-mail, and mobile phone applications can all create additional touchpoints with patients and interact with wearables that track critical patient health data (Keesara et al., 2020).

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## **Appendix: COVID-19 Trends & Impacts by Healthcare Stakeholder**

### **Healthcare Providers**

<b>Situation</b>	<b>Challenges</b>	<b>Opportunities</b>
<b>Healthcare System Utilization Trends</b>	<ul style="list-style-type: none"> <li>• Patient volumes decreased by 30-70 percent as elective procedures were halted and patients postponed care.</li> <li>• Chronic care specialties must determine how to provide high-value care in a new environment.</li> <li>• Skilled nursing facilities (SNFs) experienced significant COVID-19 outbreaks.</li> <li>• Telehealth requires new workforce training, medical protocols, and clinician operations.</li> </ul>	<ul style="list-style-type: none"> <li>• Improvements in patient volume will continue gradually and accelerate following improved control of COVID-19.</li> <li>• Enhance communication regarding safety measures to instill confidence in patients.</li> <li>• Optimize protocols to ensure the fewest possible direct patient interactions (e.g. engage physicians in patient triage to reduce unnecessary system utilization, use telehealth, sequester patients with respiratory complaints).</li> <li>• Focus on SNF protocols to reduce risks of outbreaks and anticipate increased regulatory oversight.</li> </ul>
<b>Workforce Management</b>	<ul style="list-style-type: none"> <li>• Patient volume decreases and utilization of telehealth required many providers to make cost-saving staffing cuts.</li> <li>• The threat of a COVID-19 resurgence, which would require maximum workforce capacity, still looms.</li> </ul>	<ul style="list-style-type: none"> <li>• Attempt to reduce hours or use temporary/voluntary furloughs rather than layoffs. Some staff are open to reduced hours/ furloughs due to childcare needs.</li> <li>• Reallocate workforce in response to changing care delivery model for PCPs with increased telehealth (e.g. more “home-based” patient-centered medical home model).</li> <li>• Implement “re-deployment” offices to redistribute/re-train workforce to fit current demand.</li> </ul>
<b>Workforce Burnout</b>	<ul style="list-style-type: none"> <li>• Medical staff feel helpless against COVID-19 as a new, poorly understood disease process.</li> <li>• Medical staff often fail to take advantage of mental health resources.</li> <li>• Mental health concerns are exacerbated by the lack of childcare services.</li> </ul>	<ul style="list-style-type: none"> <li>• Continue open conversations with front-line staff regarding health and wellness. Reinforce healthy cultural norms for seeking behavioral care when needed.</li> <li>• Ensure mental health resources are readily available to providers, and that providers are aware of how to access these services in a confidential manner.</li> <li>• Explore methods of finding front-line workers time off-duty to reduce risk of burnout.</li> </ul>

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Situation	Challenges	Opportunities
<b>Supply Chain Management</b>	<ul style="list-style-type: none"> <li>• Unable to provide providers traditional amounts of PPE required per patient, likely contributing to some providers contracting COVID-19.</li> <li>• PPE shortages are anticipated to worsen as non-essential businesses reopen.</li> </ul>	<ul style="list-style-type: none"> <li>• Renegotiate vendor contracts.</li> <li>• Diversify supply chain for emergencies.</li> <li>• Implement supply chain stress tests.</li> <li>• Increase stockpiling of PPE to meet future stresses.</li> <li>• Reduce waste through new approval to utilize one mask per patient care day.</li> </ul>
<b>Patient and Employee Confidence</b>	<ul style="list-style-type: none"> <li>• Publicizing COVID-19 cases could deter non-COVID-19 related patient visits to a specific hospital or healthcare system.</li> <li>• Increasing public doubts about U.S. healthcare system (e.g., PPE shortages, racial disparities, lack of universal access).</li> </ul>	<ul style="list-style-type: none"> <li>• Take every opportunity to communicate about new safety protocols to combat COVID-19.</li> <li>• Publicize collaboration with other healthcare systems.</li> <li>• Institute daily “Data/Flash” reports to streamline up-to-date COVID-19 information in a particular facility to all employees, using clear, concise data.</li> </ul>
<b>Outpatient Practices</b>	<ul style="list-style-type: none"> <li>• CARES government funding went mainly to large hospitals, not smaller independent outpatient practices.</li> <li>• Smaller practices were often forced to close due to inability to purchase PPE. Some may file for bankruptcy or face increased pressure to consolidate.</li> <li>• Physicians nearing retirement may use COVID-19 to leave practice permanently.</li> </ul>	<ul style="list-style-type: none"> <li>• Smaller practices may become a target for private equity firms.</li> <li>• To meet a possible physician shortage if independent practices are unable to reopen, open practices need to consider potentially accommodating larger local patient populations in the medium-term.</li> <li>• Innovating new service mixes (e.g. with telehealth and more patient-centered services) may help meet new needs.</li> </ul>
<b>Mental Health Providers</b>	<ul style="list-style-type: none"> <li>• 45 percent of U.S. adults report their mental health has been negatively impacted due to worry/stress over COVID-19 (Panchal et al., 2020). May see increase in PTSD patients (National Center for PTSD, n.d.).</li> <li>• Telehealth was readily implemented, but providers are concerned regarding reimbursement for shorter, yet equally effective, encounters.</li> <li>• Behavioral telehealth apps may lead to more provider visits outside of Austin.</li> </ul>	<ul style="list-style-type: none"> <li>• COVID-19 has prompted increased behavioral health awareness that may promote increased inclusion in primary care services.</li> <li>• Anticipate increased demand for mental health services, particularly via telehealth. Initial patient response to telehealth has been overwhelmingly positive.</li> <li>• Sustaining and renegotiating telehealth reimbursements to better reflect the value of care delivered in this sector will be particularly important. Ensure partnerships with larger professional organizations and participate in regular surveys to voice concerns regarding the future of mental healthcare delivery.</li> </ul>

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**Non-Provider Healthcare Stakeholders**

Stakeholder	Challenges	Opportunities
<b>Payers</b>	<ul style="list-style-type: none"> <li>• New requests for payment flexibilities from partners. Due to COVID-19 economic pressures, providers seek advance reimbursement, while employers press for deferred premiums.</li> <li>• Managing medical claims uncertainty, as medical claims will likely continue to vary significantly throughout 2020 from previous projections. Some payers do not expect pre-COVID-19 medical claims volumes to return until 2021, whereas others may see faster returns.</li> <li>• Shrinking commercial insurance market, as an estimated 1.2 million Texans have lost employer coverage due to COVID-19, which could grow as UI/COBRA benefits expire (Episcopal Health Foundation, 2020) (Claxton et al., 2020).</li> <li>• Employer cost sharing concerns exist regarding frequency of COVID-19 testing, antibody test accuracy, and coverage of unproven treatments.</li> </ul>	<ul style="list-style-type: none"> <li>• Many employers will push for increased health benefits cost savings, which could incentivize the commercial market to prioritize new value-based care collaborations.</li> <li>• Adoption of new, flexible payment arrangements for telehealth, mobile labs, and home-based care expansion within updated care delivery models could lead to optimized patient care and increased provider satisfaction.</li> <li>• Demand for increased inclusion of behavioral health benefits within primary care, as well as mental telehealth, could lead to benefit incorporation under broader adoption of prospective/capitated payments.</li> <li>• Increased telehealth adoption could lead telehealth to substitute for costlier in-person care.</li> <li>• The declining and changing healthcare utilization could help payers better identify necessary versus unnecessary care.</li> </ul>
<b>Medical Device Companies</b>	<ul style="list-style-type: none"> <li>• Revenues decreased substantially due to elective surgery cancellations.</li> <li>• Clinical trials and research have been delayed significantly.</li> <li>• Companies should be prepared to assess high-priority projects and drop low-priority devices due to revenue and demand constraints.</li> <li>• Top 10 countries affected by COVID-19 accounted for 65 percent of all medical device sales (<i>Impact of COVID-19 On The Medical Devices Market Forecast, 2024</i>, n.d.).</li> </ul>	<ul style="list-style-type: none"> <li>• Virtual device trainings could reduce expenses in the long-term.</li> <li>• Manufacturers should analyze any potential pain points or efficiencies that can be implemented in manufacturing to enable supply of PPE and other COVID-19 related equipment Businesses should fast-track any remote monitoring or remote health devices that would be in high demand during COVID-19 pandemic (<i>Reimagining Medtech for a COVID-19 World</i>   McKinsey, n.d.).</li> </ul>

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Stakeholder	Challenges	Opportunities
<b>Health Tech</b>	<ul style="list-style-type: none"> <li>• Contact tracing requires a high volume of personnel for success and raises new privacy concerns.</li> <li>• Data accuracy and patient matching become increasingly important as patients migrate to online services.</li> <li>• Cybersecurity will become an increasing concern as more businesses digitize and telehealth becomes more integrated with other data collection.</li> </ul>	<ul style="list-style-type: none"> <li>• New patient demand and physician adoption of telehealth and digital health platforms unlikely to go away. The burgeoning market for effective contact tracing, telehealth, and home monitoring platforms could be captured by entrepreneurs willing to meet the specific needs of various healthcare organizations—including an increasing desire for practices to own their digital health services data and platform.</li> <li>• Cybersecurity and data protection demand will grow with health tech adoption.</li> <li>• Advances in technology and data analysis will allow companies to make more holistic health recommendations for the future and provide more opportunities for preventative care.</li> </ul>
<b>Non-Profits</b>	<ul style="list-style-type: none"> <li>• Non-profits with event-centric funding models were canceled or postponed, removing a key source of funding.</li> <li>• Many non-profits are relying on grant funding in the short-term and are at a high risk for severe financial deficits, depending on the duration of the economic downturn.</li> </ul>	<ul style="list-style-type: none"> <li>• Alternative fundraising models must be evaluated with more innovative approaches considered.</li> <li>• Consideration of partnerships with similar local organizations may enhance abilities to meet current needs.</li> </ul>

## **Acknowledgements**

### **Austin Healthcare Council**

[Website](#) | [LinkedIn](#) | [Email](#)

We offer our sincerest gratitude to Gus Cardenas, President of the Austin Healthcare Council (AHC), for making this joint project possible in alignment with AHC's mission to improve the health of the Austin community through collaboration, leadership, and innovation. AHC is a non-profit organization created by healthcare industry leaders working together to further establish Austin's position as a global center of healthcare innovation.

We are also immensely grateful to AHC's members who provided invaluable input to enable our identification of challenges and best practices for reopening as Austin exits peak COVID-19 restrictions. AHC works through education, mentoring, networking, and international programs to foster a supportive environment for healthcare and brings together a wide spectrum of healthcare stakeholders, including:

- Hospitals
- Physicians
- Outpatient Services
- Pharmaceuticals
- Medical Technology
- Digital Health
- Device Manufacturers
- Academia
- Professional Service Providers
- Government Agencies

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### **Texas McCombs MBA Health Innovation Fellows**

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Founded in 2015, the Texas McCombs MBA Health Innovation Fellows (HIF) seek to help Texas MBAs discover opportunities to positively impact the future of healthcare. We engage with leaders and innovators across the healthcare spectrum, including pharma, health tech, payers, providers, start-ups, and more. Together, we discover and create opportunities to improve healthcare in America. HIF's mission is to promote the McCombs School of Business as a program producing leaders with the ability to impact the healthcare industry through innovation and leadership. HIF provides an avenue for students to engage with groundbreaking healthcare leaders and gain hands-on experience bringing innovative ideas to the market.

*In partnership with healthcare industry stakeholders, HIF aims to:*

- Develop increased healthcare recruiting interest in Texas McCombs MBA students for both large, established members of the industry as well as the burgeoning health tech, start-up, and life sciences ecosystem in Austin.
- Demonstrate dedication and achieve results towards furthering healthcare innovation and entrepreneurship.
- Attract the best and brightest future Texas MBA students interested in healthcare.
- Leverage the program's accomplishments to elevate the overall industry and academic strength of Texas McCombs in healthcare.

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## References

- American Hospital Association. (2020, May). *Hospitals and Health Systems Face Unprecedented Financial Pressures Due to COVID-19 | AHA*. <https://www.aha.org/guidesreports/2020-05-05-hospitals-and-health-systems-face-unprecedented-financial-pressures-due>
- Antibiotics prescribed more often during telemedicine visits*. (2019, April 22). National Institutes of Health (NIH). <https://www.nih.gov/news-events/nih-research-matters/antibiotics-prescribed-more-often-during-telemedicine-visits>
- Axios Vitals*. (n.d.). Retrieved May 27, 2020, from [https://www.axios.com/newsletters/axios-vitals-cacbbdf4-4694-4db3-9299-5a7e29ebee7e.html?chunk=1&utm\\_term=emshare#story1](https://www.axios.com/newsletters/axios-vitals-cacbbdf4-4694-4db3-9299-5a7e29ebee7e.html?chunk=1&utm_term=emshare#story1)
- CDC. (2020, April 30). *Communities, Schools, Workplaces, & Events*. Centers for Disease Control and Prevention. <https://www.cdc.gov/coronavirus/2019-ncov/community/office-buildings.html>
- Claxton, G., Damico, A., & 2020. (2020, May 13). Eligibility for ACA Health Coverage Following Job Loss. *KFF*. <https://www.kff.org/coronavirus-covid-19/issue-brief/eligibility-for-aca-health-coverage-following-job-loss/>
- Contact Tracing | COVID-19*. (n.d.). Retrieved May 27, 2020, from <https://www.dshs.state.tx.us/coronavirus/tracing.aspx>
- Coronavirus Relief Options*. (n.d.). Coronavirus Relief Options. Retrieved June 1, 2020, from <https://www.sba.gov/funding-programs/loans/coronavirus-relief-options>
- Episcopal Health Foundation. (2020, May 19). New EHF report shows looming health insurance crisis coming to Texas after COVID-19. *Episcopal Health Foundation*. <https://www.episcopalhealth.org/articles/new-ehf-report-shows-looming-health-insurance-crisis-coming-to-texas-after-covid-19/>
- Gawande, A. (n.d.). *Amid the Coronavirus Crisis, a Regimen for Reentry*. The New Yorker. Retrieved May 28, 2020, from <https://www.newyorker.com/science/medical-dispatch/amid-the-coronavirus-crisis-a-regimen-for-reentry>
- Hollander, J. E., & Carr, B. G. (2020). Virtually Perfect? Telemedicine for Covid-19. *New England Journal of Medicine*, 382(18), 1679–1681. <https://doi.org/10.1056/NEJMp2003539>
- Impact of COVID-19 On The Medical Devices Market Forecast, 2024*. (n.d.). Retrieved June 1, 2020, from <https://www.fortunebusinessinsights.com/covid-19-impact-medical-devices-market-102629>
- JHU COVID-19 Dashboard Infographic v2.4*. (n.d.). Retrieved June 4, 2020, from <https://bao.arcgis.com/covid-19/jhu/county/48453.html>
- Keesara, S., Jonas, A., & Schulman, K. (2020). Covid-19 and Health Care's Digital Revolution. *New England Journal of Medicine*, 0(0), null. <https://doi.org/10.1056/NEJMp2005835>
- Key Indicators For Staging*. (n.d.). Retrieved June 4, 2020, from <https://austin.maps.arcgis.com/apps/opsdashboard/index.html#/0ad7fa50ba504e73be9945ec2a7841cb>

- Mayor Adler on Twitter: “#Covid19 update - the latest 7-day daily average of new hospitalizations is 11. Keeping this number under 20 is key – it increases chances we can continue to reopen while preventing our hospitals from experiencing an overwhelming surge in admissions (1/5) <https://t.co/5R8DMEkr62>” / Twitter. (n.d.). Twitter. Retrieved June 4, 2020, from <https://twitter.com/mayoradler/status/1268338071998812162>
- National Center for PTSD. (n.d.). *For Mental Health Providers: Working with Patients Affected by the Coronavirus (COVID-19) Outbreak*. 6.
- O’Neil, S. K. (2020, May 7). *How to Pandemic-Proof Globalization*. <https://www.foreignaffairs.com/articles/2020-04-01/how-pandemic-proof-globalization>
- Panchal, N., Kamal, R., Orgera, K., Muñana, C., Apr 21, P. C. P., & 2020. (2020, April 21). The Implications of COVID-19 for Mental Health and Substance Use. *KFF*. <https://www.kff.org/coronavirus-covid-19/issue-brief/the-implications-of-covid-19-for-mental-health-and-substance-use/>
- Protections for Texas Renters: COVID-19*. (n.d.). Retrieved June 4, 2020, from <https://sites.utexas.edu/covid19relief/tenant-protections/>
- Reimagining medtech for a COVID-19 world | McKinsey*. (n.d.). Retrieved June 1, 2020, from <https://www.mckinsey.com/industries/pharmaceuticals-and-medical-products/our-insights/reimagining-medtech-for-a-covid-19-world>
- Sage Growth/Blackbook Research: COVID-19 Market Pulse*. (n.d.). Retrieved May 27, 2020, from [https://blackbookmarketresearch.com/administrator/img/0188\\_SGP\\_COVID-19%20Market%20Pulse\\_r2.pdf](https://blackbookmarketresearch.com/administrator/img/0188_SGP_COVID-19%20Market%20Pulse_r2.pdf)
- Simchi-Levi, D., & Simchi-Levi, E. (2020, April 28). We Need a Stress Test for Critical Supply Chains. *Harvard Business Review*. <https://hbr.org/2020/04/we-need-a-stress-test-for-critical-supply-chains>
- Texas Health and Human Services. (2020, May 27). *Opening the State of Texas | COVID-19*. Texas Department of State Health Services. <https://www.dshs.state.tx.us/coronavirus/opentexas.aspx>
- The Employment Situation—April 2020.pdf*. (n.d.). Retrieved May 27, 2020, from [https://www.bls.gov/news.release/archives/empsit\\_05082020.pdf](https://www.bls.gov/news.release/archives/empsit_05082020.pdf)
- The Employment Situation—May 2020.pdf*. (n.d.). Retrieved June 5, 2020, from <https://www.bls.gov/news.release/pdf/empsit.pdf>
- The hidden Covid-19 crisis: Health care workers’ mental health. (2020, April 3). *STAT*. <https://www.statnews.com/2020/04/03/the-covid-19-crisis-too-few-are-talking-about-health-care-workers-mental-health/>
- Uscher-Pines, L., Mulcahy, A., Cowling, D., Hunter, G., Burns, R., & Mehrotra, A. (2015). Antibiotic Prescribing for Acute Respiratory Infections in Direct-to-Consumer Telemedicine Visits. *JAMA Internal Medicine*, 175(7), 1234–1235. <https://doi.org/10.1001/jamainternmed.2015.2024>