

COVID-19 Healthcare Delivery Impacts

Updated April 12, 2021

Introduction

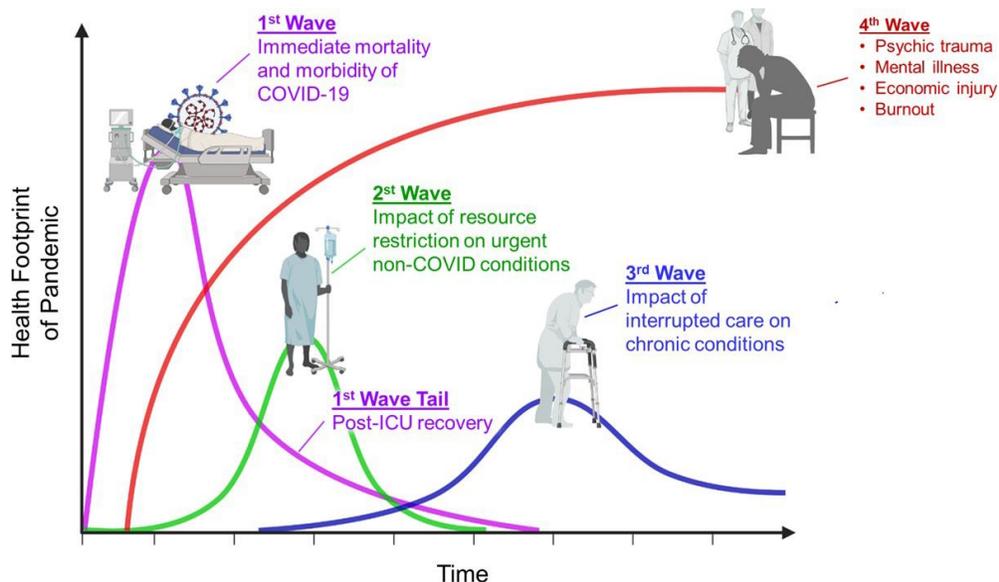
The COVID-19 pandemic and the associated community mitigation efforts enacted have altered the delivery of and access to healthcare across the U.S. For example, emergency department (ED) visits are down by an estimated 40% in many communities across the country^{1,2}; many in-person office visits have been either postponed by patient choice or changed to telehealth visits; elective procedures were delayed; and other types of healthcare delivery have been changed to accommodate social distancing and community mitigation measures.

Community mitigation actions, often driven by government orders and mandates, lead to a change in demand for traditional healthcare services. This tip sheet can help healthcare system planners understand and mitigate these potential healthcare delivery impacts.

NOTE: This document was originally published in 2020 and has been substantially updated and revised; information is current as of April 12, 2021.

Guiding Concept

This diagram was developed by Victor Tseng, MD, a pulmonology and critical care medicine fellow with the U.S. Department of Veterans Affairs. It depicts a potential series of impacts and events that may affect the healthcare system during subsequent waves of the COVID-19 pandemic and was a guiding concept in developing this document.



Source: Victor Tseng, MD <https://twitter.com/VectorSting/status/1244671755781898241>

Considerations

Behavior Changes Leading to Long-Term Health Problems

All disasters, including public health emergencies, can contribute to negative mental health effects, including stress. Behaviors that are used as coping mechanisms during times of increased stress may also have long-term impacts on health. Following the September 11th attacks, a study found an approximate 3% increase in alcohol consumption among those who already consumed alcohol, a 21% increase in smoking among existing smokers, and a 1% increase in new smokers.³ At the start of the COVID-19 outbreak, there was a slight increase (1%) in cigarette sales which fell over the subsequent weeks, possibly indicating stockpiling.⁴ Data reveals a 55% spike in alcohol sales for the week ending March 21, 2020 compared to previous weeks, again indicating possible stockpiling prior to staying at home. Additionally, online wine and liquor delivery sites reported an increase in orders; one company reported a 578% increase in new members with a 49.6% increase in week-over-week sales.^{5,6} Alcohol consumption appears to be leading to increased liver disease hospitalizations.^{7,8,9}

As more people stay home, their level of physical activity may decrease, possibly contributing to an increase in diagnosis and treatment of high blood pressure, type 2 diabetes, coronary heart disease, anxiety, and depression.¹⁰ Additionally, there is potential for an increase in childhood obesity as studies show children primarily gain weight during the summer months, when they are out of school.¹¹ One survey of adults found that more than 40% gained weight (average gain was 29 pounds) since the pandemic began.^{12,13}

People in recovery programs for substance abuse may experience relapse, as programs and meetings that took place before COVID-19 may not be available due to social distancing. Stay home orders may also contribute to a feeling of isolation, one risk factor of relapse.¹⁴ Similar to other applications, use of telehealth in treating addiction, such as for opioid use, has advanced quickly in response to COVID-19.¹⁵

Potential Mitigation Strategies

- Providers could consider patient education (e.g., email blasts, mailers, free media) about safe coping mechanisms during the pandemic.
- Providers should ensure they ask patients about these behaviors and provide patient education about safe coping mechanisms during patient visits held during COVID-19.

Concurrent or Secondary Disasters during the COVID-19 Pandemic

The mitigation measures necessary to protect the population from spread of COVID-19 make certain secondary disasters much more impactful on disaster affected communities. Disasters involving the need for evacuation and community or congregate sheltering, for instance, are much more significant and logistically challenging when physical distance is necessary to prevent disease spread. In the past year, wildfires, hurricanes, and winter storms impacted healthcare access and delivery during COVID. Winter storms disrupted mass vaccine efforts. Shelters struggled to maintain disease prevention

strategies as crowding increased amid winter temperatures. Wildfire smoke caused symptoms similar to COVID-19.

In addition, increased dependency on technology for telemedicine/telehealth and remote work during the pandemic have brought cybersecurity issues to the forefront of healthcare operations, impacting patient care and safety. Cyber attacks against healthcare facilities have increased by 9851% over the course of 2019 into 2020.¹⁶ Attacks increased throughout 2020, with a peak in the September and October timeframe, and over the course of 2020, over one million healthcare records were breached per month.¹⁷

Potential Mitigation Strategies

- Review guidance on shelter operations during COVID-19 and work with community leaders prior to bad weather to identify alternative housing in disaster prone areas. Begin planning for summer heat conditions and the 2021 hurricane season.
- Related ASPR TRACIE resources
 - [Secondary Disasters During COVID-19](#)
 - [Healthcare System Cybersecurity: Readiness and Response Considerations](#)

Continued Disruption of the Supply Chain

Even if COVID-19 transmission has been reduced in the community and facilities have the space and staffing to support additional patient care, supplies and resources may not be sufficient.^{18,19} The supply chains for personal protective equipment (PPE), some medications, medical supplies and equipment, and disinfection and hygiene products have been stressed by increased demand.²⁰ Due to the ongoing pandemic, some supply lines may continue to experience critical shortfalls. Social distancing guidelines, travel restrictions, and staffing shortages have further reduced or delayed the availability of some resources. Many ambulatory care providers donated their supplies to hospitals or long-term care facilities in the beginning of the pandemic and then needed to purchase new supplies before being able to reopen. The lack of a predictable supply chain for essential materiel may interfere with the ability of some providers to remain open or offer certain procedures and may remain a longer-term problem for healthcare facilities.

Additional complications arose over the past year, including:

- An increase in fraudulent medical products.^{21,22}
- A shortage in dry ice due to the unique cold storage requirements of some vaccines²³
- Fewer donations have contributed to critical shortages in the nation's blood supply.^{24,25}

Potential Mitigation Strategies

- Carefully track use of critical supplies.
- Switch away from just-in-time inventory. Pre-order and pre-purchase whenever possible.
- Collaborate with other healthcare facilities for larger purchase power.
- Implement conservation and optimization strategies. (e.g., understand utilization rates, establish par levels and distributions points).

- Utilize available federal funding to purchase supplies, where eligible.

Decreased ED Visits/Patients Delaying Emergency Care

While EDs across the country are treating COVID-19 or suspected COVID-19 patients, the number of patients seeking emergency care for other chief complaints has decreased.^{26,27,28} This trend is not new. A decrease in utilization of healthcare also occurred (in affected areas) during the 2003 Severe Acute Respiratory Syndrome outbreak, the 2014 West Africa Ebola outbreak, and the 2015 Middle Eastern Respiratory Syndrome (MERS-CoV) outbreak. For example, during the 2015 MERS-CoV outbreak in South Korea, ED visits decreased on average around 33% compared to visits in June 2014 and 2016. The number of low-acuity patients visiting EDs also decreased; visits for ear infections, for example, fell by 53%. High-acuity patient visits also decreased on a smaller scale with visits for heart attacks and strokes declining by 14% and 16.6% respectively, but in 2021, higher acuity patients are continuing to present to the ED.^{29,30,31} It should be noted that some of these decreases could also be attributed to use of telehealth or trained emergency medical services personnel to pre-screen patients before arriving at the ED.^{32,33}

Anecdotal evidence suggests that patients are also waiting to seek all types of treatment. From March 20 to April 5, 2019, rough data from the Fire Department of the City of New York found an average of 69 cardiac calls per day, with an average of 39% resulting in death. During the same 16-day period in 2020, there was an average of 195 cardiac calls per day, with around 66% resulting in death.^{34,35} While some cardiac arrests may be attributed to undiagnosed and untreated COVID-19 patients, it is possible that some are due to delays in seeking treatment for acute coronary syndromes. In fact, research by the American College of Cardiology found a 38% decrease in treatment of patients with ST-Elevation Myocardial Infarction from January 1, 2019 to March 31, 2020 across the nine largest cardiac catheterization labs in the U.S.³⁶

ED and urgent care visits for pediatric patients are down overall, but of those that are seeking care in these locations, there was a 23.7%-27.8% increase in visits for exacerbations of chronic conditions.³⁷

Potential Mitigation Strategies

- Medical practices, health systems, and health insurers can reach out directly to patients with chronic medical conditions to encourage them to seek care for emergent conditions and to keep up with their preventive or routine care.
- Public service campaigns can be useful to educate patients on where to seek care for what conditions.

Decreased Immunization Rates

Decreases in childhood immunization rates have been witnessed globally during past pandemics, due to overstretched healthcare systems, parents not bringing children to appointments, and breaks in the supply chain due to broader restrictions. The effect of missed immunizations can be daunting; during the last Ebola outbreak in the Democratic Republic of the Congo, twice as many children died of measles

than those that died of Ebola.³⁸ Decreases in vaccination rates during the COVID-19 pandemic could lead to subsequent outbreaks of communicable disease.

In the U.S., vaccinations during the first week of April 2020 dropped by 50% for measles, mumps, and rubella, 42% for diphtheria and whooping cough, and 73% for human papilloma virus compared to pre-COVID-19 vaccination rates.^{39,40} Pediatricians are reporting 50-70% drop in visits overall, including newborn and young child wellness visits that track growth and development. Populations that rely on community clinics for free or discounted vaccinations may feel more of an impact as clinics try to balance providing vaccinations against limited healthcare resources (e.g., in rural areas) and having patients risk exposure by taking public transportation to clinics.^{41,42} Orders of childhood vaccinations from the Centers for Disease Control and Prevention (CDC) have dropped by about 11 million doses in 2020 from previous yearly averages.⁴³

Adult vaccinations may be on the decline as well. Demand for the shingles vaccine has regularly outpaced supply; since the start of the pandemic, however, the number of total prescriptions for the shingles vaccine has dropped by 84%.⁴⁴ Ensuring patients receive the flu vaccination in the fall of 2021 will be important; identifying an effective outreach campaign now can ensure increased numbers of vaccinated residents in the flu season.

Potential Mitigation Strategies

- Consider offering drive-through vaccinations or sending mobile vaccination units into communities.
- Primary care practices can reach out to patients with upcoming vaccination or well child visits and explain safety procedures and encourage parents to keep appointments.
- Primary care practices must plan for a potential surge in demand for vaccinations prior to the start of the school year and should establish a [catch-up schedule](#) for parents to follow.

Delayed Dental Procedures and Eye Care

Dental offices in many states closed during the initial community mitigation measures enacted in the spring of 2020, with some exceptions for emergency dental procedures such as repairing tooth fractures, and treating abscesses, infections, or severe dental pain.⁴⁵ Delaying regular checkups may postpone the identification of cavities, causing development of more serious problems and more difficult procedures, such as root canals or abscesses.⁴⁶

A survey by the North American Dental Group found that 71% of participants were uncomfortable visiting the dentist for non-time sensitive procedures during the COVID-19 pandemic. Dental offices are now open for regular business, with increased recommendations for PPE, cleaning, and steps to reduce and control aerosols produced by some procedures.⁴⁷ As offices began to open, however, one study found a decreased volume of patients, as only 42% of those surveyed were confident in dentists' ability to prevent COVID-19 spread.⁴⁸ Despite this reluctance, dental offices have been associated with a lower than anticipated rate of COVID-19 infection and routine dental care is considered necessary during the ongoing response to the COVID-19 pandemic.⁴⁹

Ophthalmology has seen the greatest decline in surgical procedures, with an 81% decline in patient volume year-over-year comparing 2019 data to 2020. Cataract surgery was the most impacted with a 97% decline.⁵⁰

Potential Mitigation Strategies

- Dental and eye care offices should reach out to patients with lapsed annual appointments and provide education and information on COVID-19 safety and the importance of routine care.
- Providers should review the [CDC – Interim Infection Prevention and Control Guidance for Dental Setting During the Coronavirus Disease 2019 Pandemic](#)

Delayed “Elective” Procedures

To increase hospital bed capacity and maintain supplies of personal protective equipment, many hospitals and ambulatory surgical facilities postponed elective surgeries, many at the request and under the direction of government orders.⁵¹ As COVID-19 surged in different areas of the country throughout 2020 and into 2021, delaying elective procedures was still a patient surge management strategy. Doing so, however, can increase the difficulty of the procedure, the risk of infection, disease progression, and the length of recovery. Further, normal post-operative services may have limited availability. Also, the use of the term “elective” implies a patient can simply not have the procedure without any harm. Over the past year, many facilities have implemented some review procedure for determining timing for medically necessary, time sensitive procedures.^{52,53}

Depending on the delay, non-urgent procedures may become [urgent](#). [Postponing a surgery](#) may influence the type of procedure and recovery time. For example, while gallstones may be treated with pain medication and surgery to remove the gallbladder can be delayed, this could lead to an increased risk of infection and require a more invasive procedure with a longer hospital stay.^{54,55} Waiting to treat a joint injury may require shifting from a minimally invasive surgery to an open procedure requiring larger incision and extend recovery time.⁵⁶ Patients continue to suffer from chronic pain which can influence their ability to work, perform activities of daily living, increase use and reliance on pain medications, and have an overall decrease in quality of life.

There is a concern that patients may no longer be able to pay for rescheduled procedures due to loss of employment and loss of insurance.⁵⁷ A list of organizations providing guidance on surgical services was published in the article [Immediate and Long-term Impact of the COVID-19 Pandemic on Delivery of Surgical Services](#).⁵⁸

Potential Mitigation Strategies

- Providers should review the joint statement [Roadmap for Maintaining Essential Surgery during the COVID-19 Pandemic](#) for strategies for case prioritization and scheduling and managing other related logistics.

Delayed Organ Transplants

Like other surgical procedures, many organ transplants for patients who were considered stable were put on hold from March to May 2020. According to data from United Network for Organ Sharing, as of

April 27, 2020, there had been a cumulative 1,583 living donor organ transplants, compared to 2,237 on the same date in 2019. During that same period, there were fewer traffic fatalities compared to previous years, although they increased and ultimately returned to baseline for 2020. As stay at home orders were lifted, organ transplant numbers returned to baseline, actually increasing from 2019.⁵⁹ There was one confirmed case of COVID-19 transmission from infected lungs in 2020, resulting in the death of the organ recipient.⁶⁰

Potential Mitigation Strategies

- Follow guidance on [COVID-19 and solid organ transplant](#)
- Review information on [COVID-19 risks in organ transplantation](#)

Financial Impacts to the Healthcare System

The American Hospital Association estimated hospitals and health systems may have lost a total of \$202.6 billion over the four months between March and June 2020. This estimation does not include costs associated with drug shortages, increases in wages and labor, non-PPE medical supplies and equipment, and costs associated with COVID-19 response.⁶¹ Many hospitals reported experiencing financial instability because of increased expenses associated with responding to a pandemic and lower revenues from decreased use of other hospital services⁶². Rural hospitals may be at high risk for closure, as almost 50% of rural hospitals operate at a loss in general.⁶³ Healthcare systems may also experience an unreliable supply-chain for PPE and cleaning supplies that may continue for months. A [national survey](#) conducted by the Primary Care Collaborative found that only 34% of outpatient practices felt they had enough cash on hand to function for four weeks at the current COVID-19 related reduced visit rates. This puts ambulatory care practices at risk of financial solvency.⁶⁴ A Kaiser Family Foundation report stated that the median hospital has enough cash on hand for 53 days in 2018, but smaller or rural hospitals only had cash on hand for 8 days.⁶⁵ This will be exacerbated as the pandemic continues.

Potential Mitigation Strategies

- Healthcare entities experiencing financial impacts due to COVID-19 should review [financial programs associated with COVID-19 appropriations](#) for eligibility.

Increased Use of Telehealth

A March 31, 2020 poll of medical practice leaders conducted by the Medical Group Management Association found that 97% of the 1,553 respondents have expanded telehealth access since the start of COVID-19.⁶⁶ One study found a 154% increase in telehealth visits during the last week of March 2020 compared to the same period in 2019.⁶⁷ According to a CDC study of health center telehealth capability, in 2019 43% of health centers were capable of providing telemedicine compared to 95% of health centers reporting they were actively using telemedicine.⁶⁸ A review of insurance claim records by FAIR Health showed a 3,060% increase in telehealth claims compared to 0.18% of all claims in 2019.⁶⁹

In April 2020, the federal government launched telehealth.hhs.gov to assist patients and providers navigate the new telehealth landscape. The website provides information to help patients find telehealth providers, understand their telehealth coverage, and prepare for a telehealth appointment.

Providers can access resources to help implement telehealth in their practices, review a comprehensive list of policy changes for COVID-19, and review tips on how best to conduct telehealth appointments to ensure a quality visit with patients.

Telehealth is being used for patient triage and screening, pre- and post-operational care, and remote patient monitoring. Given that pandemic conditions are likely to continue for some time, providers need to plan for long-term telehealth delivery of healthcare services. Two significant challenges associated with telehealth delivery are lack of equal access to broadband internet services and lack of internet accessible devices. Many patients, especially people in lower income brackets and those who live in rural communities, may lack access to the technology needed to carry out these appointments. As telehealth becomes a major component of healthcare access in the future, many aspects of delivery of care for rural and at-risk/vulnerable populations must be addressed, including proper technical support for older Americans, cyber security of health data, and fraud and scam prevention.

The ASPR TRACIE [COVID-19 and Telehealth tip sheet](#) provides more detail on current uses, challenges, and the potential long term and future uses of telehealth.

Potential Mitigation Strategies

- Plan to continue telehealth services as part of long-term (possibly permanent) healthcare delivery strategy.
- Determine what technology investments may be necessary to improve telehealth delivery.

Interrupted Clinical Research and Clinical Trials

According to the National Institutes of Medicine, roughly 80% of non-COVID-19 clinical trials were stopped or interrupted.⁷⁰ A 2020 National Public Radio [survey](#) identified 440 clinical trials on hold due to COVID-19. Another [survey](#) conducted in 2020 by Clinical Research IO found nearly 25% of respondents stopped enrolling new patients and an additional 37% were considering halting trials. Those trials that are still operational are also experiencing interruptions, such as difficulty in recruiting patients, delaying needed tests and procedures, and other disruptions. More than 400 clinical trials involving more than 200,000 cancer patients were put on hold due to the pandemic.⁷¹

Funding for non-COVID-19 medical research may be reduced or eliminated in the coming months and years due to redirection to COVID-19 related research or simply due to a reduction or lack of available funding.⁷²

Potential Mitigation Strategies

- Consider ways to adjust protocols to minimize the amount of in-person contact needed to complete a study and utilize telehealth options where possible.^{73,74}
- The U.S. Food & Drug Administration (FDA) released guidance on [how to potentially continue clinical trials during COVID-19](#).
- Engage Institutional Review Boards to review studies in progress and recommend what to resume and what “triggers” would be needed to resume the remaining.

Interrupted Medical Treatments and Suboptimal Management of Chronic Disease

Researchers at Harvard University and Phreesia reviewed their 50,000 clients' outpatient data following community mitigation measures and showed visits to ambulatory practices were down by 60% in March and April 2020.⁷⁵ Overall preventative visits are down,⁷⁶ including those for infants and children, which could delay the identification of underlying medical conditions. Delays in preventative screening procedures, (e.g., colonoscopies, mammograms, and routine laboratory tests for the management of chronic conditions) could also result in exacerbation of existing conditions. Overall reduction in vaccination rates among children, routine medical care in adults, and reduced access to home healthcare for the elderly will likely result in several long-term adverse social and medical effects.

A study by the American Cancer Society found that radiotherapy patients whose treatments were interrupted by hurricanes required longer treatment cycles and had poorer outcomes.⁷⁷ A March 25, 2020 survey by the American Cancer Society Cancer Action Network found 27% of cancer patients currently in active treatment have experienced some delay in treatment associated with COVID-19. The survey also found that 38% of cancer patients and survivors are concerned about financial difficulties during the pandemic affecting their ability to pay for care.⁷⁸

A CDC report identified roughly 300,000 excess deaths in the U.S. from January 26 through October 3, 2020. They conclude that while possibly up to 60% of those deaths could be directly related to COVID-19, the remaining deaths may be somewhat attributed to COVID-19 through delayed medical care and exacerbation of underlying health conditions.^{79,80}

Potential Mitigation Strategies

- Outpatient practices can reach out to patients with upcoming preventative procedures or appointments and those with chronic conditions that need routine management and explain safety procedures and encourage them to keep appointments, shift in-person visits to telehealth visits, and collect lab specimens by home health visit.
- Offering separate clinic appointments or times for patients in COVID-19 high risk groups may provide some comfort to nervous patients.
- Encourage patients to receive the COVID-19 vaccine.
- Practices must plan for a potential surge in demand for services later in 2021 as a result of delays and interruptions.

Later-Stage Cancer Diagnosis

Past disasters that interrupted regular screening for cancers have had long lasting results both in delayed future screening and increased late diagnosis of cancer. Prior to the 2011 Great East Japan earthquake, tsunami, and Fukushima Daiichi Nuclear Power Plant disaster, an estimated 18.0% of women typically delayed seeking diagnosis for breast cancer symptoms for greater than three months. After the disaster, a study found 29.9% of women in the region impacted by the disaster waited three months or more to seek diagnosis. Contributing factors included social isolation and stress related to work and/or caring for loved ones.⁸¹

A study done by University College London estimated a 20% increase in cancer-related deaths in the United Kingdom in 2020 due to COVID-19. Since COVID-19 started, there has been a 76% decrease in urgent referrals from general practitioners to major cancer centers for suspected cancer. The study also estimated 33,890 additional deaths in newly diagnosed patients in the U.S.⁸²

Potential Mitigation Strategies

- Providers should reach out to patients with scheduled preventative or routine screenings to encourage them to keep or promptly reschedule appointments.
- For future pandemic waves, healthcare facilities should determine if any mitigation practices can be put into place to allow continued delivery of cancer related therapies.

Mental and Behavioral Health Effects

Already strained mental health services have seen the number of people seeking appointments with mental health professionals rise since the COVID-19 pandemic started.⁸³ One benefits manager reported a 50% increase in the use of their mental health services application and 50% increase in virtual sessions since the beginning of February 2020.⁸⁴

In an analysis conducted by a pharmacy benefit manager, prescriptions filled to treat anxiety, depression, and insomnia have grown by 21%, with 78% of the prescriptions being first time prescriptions. This is in contrast with the steady decline in prescriptions related to anxiety and insomnia, which had decreased by 12.1% and 11.3% respectively from 2015 to 2019.⁸⁵

A November 2020 poll of nearly 1800 psychologists by the America Psychological Association revealed a 74% increase in anxiety disorder diagnoses, and a 60% increase in depressive disorder diagnoses. More than a third of respondents reported having more patients overall compared with before the pandemic.

In April 2020, the [Disaster Distress Hotline](#) reported a near 1000% increase in outreach compared to April 2019.⁸⁶ Social distancing, economic stress caused by unemployment, reduced access to mental health, the 24 hour news cycle, loss of loved ones, domestic abuse, and other factors may contribute to increases in anxiety, depression, and the suicide rate.⁸⁷ In December of 2020 the CDC released a Health Advisory for the increase in fatal drug overdoses across the U.S. driven by synthetic opioids before and during the COVID-19 pandemic. The number of overdose deaths increased 18.2% from the 12-months ending in June 2019 to the 12-months ending in May 2020.⁸⁸

Healthcare workers responding to COVID-19 need ongoing and future mental health support to manage the stress and strain of the long-term response to this pandemic. A study completed on over 3,000 responders to the September 11th attacks found one-fifth still suffered from PTSD 11-13 years following the attack.⁸⁹ Healthcare workers in China that treated COVID-19 patients have experienced depression, anxiety, and insomnia and there have been a significant number of frontline healthcare worker suicides in the last two months.⁹⁰ Several hotlines have noted increased call volume from frontline workers and new hotlines have been created to specifically provide those employees access to crisis counseling, such as [For the Frontlines](#).⁹⁰ A 2020 survey of U.S. healthcare workers found: 93% of health care workers were experiencing stress, 86% reported experiencing anxiety, 77% reported frustration, 76% reported

exhaustion and burnout, and 75% said they were overwhelmed. Respondents reported worry about exposing loved ones to the virus and emotional and physical exhaustion.⁹¹

Potential Mitigation Strategies

- Review the [ASPR TRACIE Exchange: Issue 12: COVID-19 and Healthcare Professional Stress and Resilience](#).
- Healthcare employers should ensure all personnel have access to employee assistance programs, information on self-care, and should encourage peer-to-peer and more structured counseling and support as necessary.
- Mental health providers should reach out to their high-risk patients to encourage continued appointments (e.g., through telehealth), and support continued substance abuse treatment programs.
- Expand the use of naloxone and overdose prevention education.
- Work with local behavioral healthcare providers to identify and publicize mental health resources.

Mid to Long-Term Morbidity and Mortality for COVID-19 Patients

A little over one year after COVID-19 emerged, there is growing data on mid- to long-term health effects of COVID-19 infections. There is an approximately 9% readmission rate of those diagnosed with COVID-19 within a median of 5 days from discharge, most for respiratory distress or thrombotic episodes.^{92,93} Clinicians should monitor and be aware of this readmission rate.

Additional mid- to long-term health effects are generally referred to as “long-haul” COVID-19 or Post-Acute Sequelae of SARS-CoV-2 (PASC). A recent study provides a wide estimate of between 13%-87% of COVID-19 infected individuals may experience PASC.⁹⁴ Healthcare providers will need to monitor COVID-19 patients long after discharge and symptom relief. There may be additional or long-term health needs for COVID-19 patients that the healthcare system will need to account for and consider in determining ongoing funding for the healthcare system recovery. Specialized COVID-19 rehabilitation programs are being developed across the country, with specialists in multiple disciplines including, but not limited to pulmonology, cardiology, nephrology, neurology, psychiatry and psychology, physical therapy and rehabilitative medicine, and many others.

The CDC and National Academy of Sciences estimates that US life expectancy dropped by one full year for all Americans overall and for non-Hispanic blacks and Hispanic populations, the rate is 3-4 times that estimate^{95,96}.

Potential Mitigation Strategies

- Continue longitudinal studies of recovered COVID-19 patients.
- Providers treating recovered COVID-19 patients should conduct ongoing follow-up appointments to monitor continued recovery.
- Review the ASPR TRACIE resource: [Post-acute Sequelae of SARS-CoV-2 Infection](#)

Possible Decrease in Seasonal Communicable Disease Transmission, Injury, and Environmental Illness

One benefit of the transmission control methods in place in response to COVID-19 is the decrease in the spread of other communicable diseases, such as influenza and other commonly occurring diseases, if community mitigation measures continue across the U.S.⁹⁷ A study in Taiwan found a decrease in influenza cases during the first 12 weeks of 2020 compared to the same time in 2019.⁹⁸ For the 2020-2021 US flu season, the current influenza hospitalization rate is one-eighth the rate for this time period in previous years.⁹⁹

Despite an initial decrease in traumatic injuries in the first and early second quarter of 2020, the overall injury rates—specifically traffic fatality rates—actually rose in 2020. The National Safety Council and National Highway Traffic Safety Administration both estimate fatality rates increased roughly 8% in 2020, despite fewer cars being on the road. Causal factors have not been completely determined, but experts suggest fewer cars on the road led to riskier behavior, specifically increased speed and more aggressive behaviors.^{100, 101}

An additional benefit to the stay-at-home orders and limited public gatherings across the globe is an improvement in air quality and decrease in pollution.

Potential Mitigation Strategies

- Continue to encourage social and physical distancing practices.
- Continue to encourage vaccination programs.

Reproductive and Maternal Health

As mentioned previously, disasters are related to the affected population's access to and willingness to seek all types of healthcare. In the five years following the 2011 combined disaster in Japan, the four coastal areas impacted by the tsunami saw an average decrease of 3% in cervical cancer screening, with the city of Onagawa experiencing a 7% drop in screening compared to pre-disaster rates.¹⁰²

Ebola had detrimental effects on the public health and health care systems in the West African countries affected by the 2014 outbreak. One study found lack of utilization of maternal health services could conservatively account for 3,600 maternal, neonatal and stillbirth deaths in Sierra Leone from 2014 to 2015.¹⁰³ Review of health facility data from one district of Guinea noted decreases in visits for family planning (51%), prenatal care (41%), and institutional deliveries (62%) during the same time period. After that Ebola outbreak, some service rates never recovered to pre-Ebola numbers, if at all.¹⁰⁴

Pregnant patients with COVID-19 may experience more adverse outcomes compared to non-pregnant patients.¹⁰⁵ Neonates of mothers with COVID-19 are at increased risk for preterm birth before 37 weeks compared to those without COVID-19.^{87,106} Evidence suggests that while breastfeeding is recommended and likely not a source of transmission, rates of infection are greater when a baby is breastfed. Precautions to avoid the spread of COVID-19 to the infant should be taken.⁸⁸⁻⁸⁹ There is growing

evidence to suggest antibodies from the COVID-19 vaccine may pass to both babies in utero and through breastmilk.¹⁰⁷

Some healthcare clinics have been able to switch to telehealth visits for prenatal care; many of the patients they serve, however, do not have access to computers, smart devices, or the broadband internet that connects them.^{108,109}

The Society of Breast Imaging is recommending altering mammogram screening schedules to address lymph node swelling resulting from the COVID-19 vaccine. The Society, along with other professional associations, is recommending either scheduling a mammogram prior to a COVID-19 vaccination or delaying it until 4-6 weeks following the second/final dose of a COVID-19 vaccination.¹¹⁰

Potential Mitigation Strategies

- Providers should continue telehealth visits where feasible.
 - Consider partnerships with local businesses offering access to internet connections.
- Identify at-risk populations and establish an outreach program to ensure continuity of care.
- Counsel pregnant and breastfeeding patients on the COVID-19 vaccine.

School Health and Childhood Wellness

Schools provide a wide range of health services including screenings for vision and hearing, dental and physical examinations, preventive healthcare services, and behavioral health therapy and interventions.¹¹¹ Studies have shown 22-30% of children fail in-school vision screenings and 1% of children entering school have a hearing loss.¹¹² With schools across the U.S. in varied states of reopening, virtual, hybrid and in-person learning, initial diagnoses of select health problems may be delayed. If schools do not reopen fully in the fall of 2021, other preventative services, such as providing flu vaccines, may be delayed or cancelled. If parents have delayed vaccination during COVID-19, this delay may lead to a late summer surge in demand for vaccination services to ensure children are up to date when school does resume. Decreased access to healthy foods and decreased access to outlets for physical activity such as team sports and other recreational activities may lead to an increase in childhood obesity and depression and anxiety among children.

Children may miss meals without schools providing food through the National School Lunch Program, the School Breakfast Program, the Child and Adult Care Food Program, and other programs.¹¹³ Many organizations have stepped in to offer programs and the U.S. Department of Agriculture (USDA) has updated guidance so that programs can adapt to operating during the COVID-19 pandemic.¹¹⁴

Homes may not be safe for some children. Stay-at-home orders have caused an uptick in domestic violence calls, however, there has been a drop in reports of child abuse and neglect.^{115,116} Without school-based mandated reporting, many suspected incidents of child abuse and neglect may go unreported as 19% of reports come from education personnel.¹¹⁷ Some hospitals are reporting an increase in the severity of the child abuse cases that present to the ED.¹¹⁸

Potential Mitigation Strategies

- Review the ASPR TRACIE Webinar Series [Hidden Consequences: How the COVID Pandemic is Impacting Children](#).
- Healthcare providers and school officials should continue to perform their duties as mandated reporters even during a pandemic and should continue to watch for signs of abuse and neglect.
- Schools should continue to support feeding programs, disability services, healthcare services, and other supportive services in addition to educational services.
- Schools will need to balance reopening schools for in person learning in the fall of 2021 with the continued presence of COVID-19 and the likelihood that children under the age of 12 will not be vaccinated.

Shortage of Healthcare Professionals

Even before the COVID-19 pandemic started, the U.S. was facing a potential shortage of healthcare professionals.¹¹⁹ A (pre-pandemic) 2019 report by the American Medical Colleges projected a shortage of between 29,000 and 42,900 physicians in 2020.¹²⁰ In order to keep hospital resources available for treatment of COVID-19 patients, hospitals across the country deferred elective procedures to free up personnel, hospital beds, and PPE. With less income generated by elective procedures, the list of hospitals that have furloughed, laid off, or reduced hours for doctors, nurses, and other support staff has expanded daily since the end of March 2020, contributing to the staff shortage.^{121,122} Some of these positions may not be able to be re-instated once facilities reopen. Hospitals reported to the HHS Office of the Inspector General that the quality of care has suffered as a result of losing nursing staff and increased nurse to patient ratios necessitated by the pandemic surges.¹²³

Additionally, some healthcare workers may not return. Fear of not having proper PPE or fear of spreading coronavirus to their family have been cited as reasons for quitting during the pandemic. Workplace policies that do not support pay for healthcare workers while quarantined, isolated, or sick due to workplace exposure have also been cited as reasons for leaving healthcare positions. Additionally, stress and burn out do contribute to healthcare workers leaving the field. Holliblu, an online community for nurses, conducted a survey of over 1,000 participants and found 62% of nurses are planning to quit their job or profession.¹²⁴

Potential Mitigation Strategies

- Healthcare systems and potential healthcare employers should investigate partnerships with colleges and universities graduating medical professionals to establish existing relationships and internships.
- Pay attention to employee wellness and mental health needs to prevent and mitigate burn out.
- Review pay and benefits to compare with industry averages.
- Consider team nursing approach to patient management in inpatient units.
- Establish a reliable PPE supply chain.
- Review CDC – [Strategies to Mitigate Healthcare Personnel Staffing Shortages](#)

Surge in Out-of-Hospital Care

There may be a strain on home health, rehabilitation services, and long-term care facilities to manage the surge of COVID-19 patients being discharged from acute care facilities in areas hardest hit by outbreaks. The nation's federally qualified health centers reported a 26% decline in patient visits between April and December 2020, seriously jeopardizing their financial viability.¹²⁵ Urgent care centers have noted a surge in demand for care, especially for patients seeking rapid COVID-19 testing.¹²⁶

Long-term care facilities have also been severely affected in many communities, becoming loci for community outbreaks, although focused vaccination campaigns and [monoclonal antibody infusion](#) efforts have reduced those outbreaks. Hospital discharge planners should be working with these community-based healthcare providers on an ongoing basis to understand the capacity and capability to care for all discharged patients.

Potential Mitigation Strategies

- Healthcare systems and communities should review the need for long-term acute care hospitals and hospital bed capacity as well as ongoing care for PASC.
- Long-term care facilities should review their internal infection control plans along with best practices for future pandemic waves and make any changes to their plans and operations to protect patients and residents, including arrangements for monoclonal antibody therapy and vaccinations for staff and residents/patients.
- Home health agencies should work with the referring physicians and hospitals in their community to discuss any lessons learned from this first COVID-19 wave and implement changes.

Conclusion

The secondary and extended effects of COVID-19 on the healthcare system are being felt across the board, from large hospitals to small practices. Some effects were transient and others could affect the healthcare system for years to come. Healthcare systems need to adapt planning efforts to prepare for secondary impacts, while preparing for continued and subsequent waves of COVID-19 infection in communities. The earlier the potential effects are identified, the more resilient the healthcare system can be in responding to them.

¹ <https://www.npr.org/2020/05/06/851173949/covid-19-fears-may-be-causing-people-to-ignore-medical-emergencies>

² <https://www.fiercehealthcare.com/hospitals-health-systems/ers-have-been-quiet-during-covid-19-what-happens-when-patients-come-back>

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