

Policy

Pandemic Telemedicine Technology Response Plan and Technology Assessment Phase 2: Pandemic Action Plan Key Issues and Technology Solutions for Health Care Delivery Organizations in a Pandemic

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Abstract

Introduction: The Covid-19 pandemic created critical challenges for hospitals and healthcare providers. Suddenly clinics were forced to close; scheduled visits were cancelled; emergency rooms were overcrowded; hospital beds, equipment and personal protective equipment (PPE) was in short supply; and staff were faced with rapidly changing circumstances, care protocols, trauma and personal risk. In order to better address the ongoing the Covid-19 pandemic and prepare for future pandemics, the National Telemedicine Technology Assessment resource Center (TTAC) was asked to develop an Pandemic Response Action Plan that would allow its user to address critical issues with available telemedicine and related technologies. The project was constructed

into three phases: Phase 1. Develop a Pandemic Response Action Plan (this document) and a Policy document which identifies the regulatory challenges in the Pandemic Response as well as policy recommendations (published separately). Phase 2. Publish the plan and policy documents. Phase 3 Look at healthcare providers who used the approaches, tools and technology in the Pandemic Action Plan and document the results (to be published separately). TTAC will also assess selected technology and publish results as part of their normal course of services.

Materials and Methods: A multi-disciplinary team was created representing leadership expertise and key stakeholders in healthcare delivery during a pandemic (administration, infection control, physicians, nurses, public health, contingency planning, disaster response, information technology) as well as a facilitator. The group used structured brainstorming, current literature and iterative review to identify the most critical challenges facing healthcare providers during the current Covid 19 pandemic. The team then used structured brainstorming, professional experience and current literature to take a deeper look into these impacts, identify applicable solutions and develop a plan to address the critical challenges using telemedicine and related technologies.

Result: A Pandemic Action Response Plan that describes the critical challenges and then identifies approaches, tools and technology to address them as well as identifying samples of the technology.

Conclusions: The impact of the Covid 19 Pandemic was severe and identified multiple critical challenges and weaknesses in most healthcare providers. Applying the approaches, tools and technology in this Pandemic Action Plan will help providers address these challenges and increase the capabilities and resilience of their organizations in the provision of care during this and future pandemics

Keywords: pandemic, telemedicine, policy, assessment, Covid-19

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Introduction

This document examines 11 critical areas of need for health care delivery when operating in, and responding to, a pandemic. It is based on the experience of the 2020 COVID-19 pandemic from the perspective of public health, epidemiology, providers, hospital executive management, nursing, regulatory/policy, technology, and specifically telemedicine. The intent is to provide a Pandemic Technology Response Plan, which outlines the critical needs for health care providers and then provides solution ideas/tactics to address each of the 11 critical areas. The intent is to provide an “action plan” that any health care provider organization can use and apply.

Background

As one of the deliverables of the COVID-19 telehealth resource center’s funding for projects associated with response to COVID 19, the National Telehealth Technology Assessment Center (TTAC) developed a Pandemic Response Project Team or “Think Tank” to create an action plan to support rural and urban communities in a return or continuation of COVID-19—or a future pandemic—applying telemedicine capabilities and technologies. The “Think Tank” was assembled with multiple representatives from epidemiology/infection control, hospital CEOs, nursing, public health, technology, regulatory and policy, as well as representatives from TTAC. This team of experts (*Supplementary Appendix SA1* and *Table 1*) identified and explored, through structured brainstorming, critical issues facing health care delivery systems during a pandemic in three scenarios. (1) A remote hospital in Alaska, (2) a small urban hospital serving a primarily rural population, and (3) a medium-sized urban hospital that also serves a surrounding nonurban service area.

Each key issue was explored and discussed. The drivers, challenges, and potential solutions were explored. Additional research was done on all key issues to give examples and context.

The project has three phases and three components:

Phases

1. The first was to complete a Draft Pandemic Action Plan in time to be of value for the 2020 COVID-19/flu season. This identified and explored key issues/challenges and identified technology solutions for each.
2. The second was to complete the final plan that will include everything in the draft plan plus a listing of samples of the technologies identified in the draft plan.
3. The third involved the team working with additional telemedicine resource centers (TRCs) to identify exam-

Table 1. List of Subject Matter Experts

NAME	ORGANIZATION
Doris T. Barta, MHA	National Telehealth Technology Assessment Center (TTAC)
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Tim Collins, MPH, MS	Alaska Native Epidemiology Center
Mike Dowdy, MS	Independent consultant
Ken Feiler, MHA	Velocity Healthcare consultants
Douglas L. Moore, MD, MPH	Independent consultant
Costi Sifri, MD	University of Virginia School of Medicine
Garret Spargo, MA	Alaska Native Tribal Health Consortium
Carl W. Taylor, JD	Independent consultant
Cara B. Towle, RN, MA, MSN	University of Washington
Mark Vanderwerf, FATA	Telehealth consultants

ples where telemedicine and related technologies were used and what types of technology were used in the current COVID-19 pandemic and then describe the results, challenges, updated recommendations, etc. Phase 3 will also include an assessment of selected sample technologies compiled by TTAC.

Components

1. *The Pandemic Action Plan and Technology Deep Dive*—This provides the action plan itself plus a listing of, and links to, samples of the technologies available to execute the issues and “Ideas/Tactics” in the Pandemic Action Plan. In Phases 1 and 2, this is a listing. In Phase 3, it will also include assessment of selected technologies by the National Telemedicine Technology Assessment Center (NTTAC). Specific examples of technology to support the ideas/tactics listed are included in this companion document: Pandemic Action Plan Technology Deep Dive. The Pandemic Action Plan Technology Deep Dive is a living document and can be accessed on the TTAC website.
2. *Pandemic Action Plan Policy and Regulatory Summary*—This gives an in-depth look at current policy and regulations affecting the solutions in the action plan as well as an executive summary recommendation for policy and regulatory changes to allow and encourage implementation of this plan and telemedicine in general.

This document represents the completion of Phase 2 (final plan). Phase 3 compilation is currently targeted for June 2021. Note: For purposes of this effort, telemedicine and telehealth are used interchangeably throughout all three documents.

Summary

The pandemic project team initially identified and explored 14 critical needs/challenge areas. All of these topics were deemed critical and were explored in detail. After discussion, two of the topic areas were determined to be beyond the scope of the project (supplies acquisition and data gathering/contact tracing) because the team could not identify telemedicine-related technology to properly address them. After further exploration, it was determined that two other topics should be combined because they had significant overlap in both requirements and potential solutions. This left 11 challenges—critical issues that are addressed by this document:

1. Keeping care protocols up to date
2. Keep the hospital open (operations, care delivery, quality, and revenue)
3. Divert the potentially infected before they arrive at the hospital
4. Replace/cover for infected staff, provide for critical care staff needs
5. COVID-19 containment in the hospital/clinic
6. Provide access to urgent care, ongoing care/follow-up care for current patients (hospital, private practitioners, rehabilitation, etc.)
7. Provide care at home, create ability to rotate patients out of the hospital to make room for monitoring more critical cases, (monitoring, remote patient management [RPM], chronic disease management [CDM], address technical issues, care support, monitoring, deal with issues of isolation, and quarantine/patient safety)
8. Support remote work for staff
9. Behavioral health, (support for patients, staff, community; address needs and fears of staff)
10. Transportation (replacement of current options that may no longer exist or be practical for people, patients, supplies, treatment equipment, and critical pharmaceuticals)
11. Public health (provide support for community communications, accurate information, and training to the community).

The Challenges—Critical Issues

The following is a detailed description of the critical challenges addressed for each of the 11 topic areas covered by this document. Please note again as you read the ideas

that specific examples of available technology for each idea are provided in the *Pandemic Action Plan Technology Deep Dive*.

#1. KEEPING TREATMENT PROTOCOLS UP TO DATE

A significant lesson learned from the current COVID-19 pandemic is that both complications of the disease and evolving treatments are being identified at a rapid pace and that these updated treatments have had a significant impact on outcomes, especially survivability. We found that this information is flowing in from a number of both credible and noncredible sources. Credible sources that were identified and in use include Centers for Disease Control (CDC), European CDC, World Health Organization (WHO), National Institutes of Health (NIH), and the Royal College of Medicine. Vetted up-to-date best practices must get into the hands of health care providers. Protocols must be updated accurately as the science evolves and that valid protocol/workflow changes must be implemented quickly and effectively.

Ideas/tactics

- Assign a point person from the institution to vet information sources.
- Focus broadly to include other pathogens. Example: guidance should be in place for viral hemorrhagic fevers. This may include reviewing, updating, and adapting existing national and state Ebola response plans (CDC supported) to reflect lessons learned during the COVID-19 pandemic.
- Use widely accepted scientifically credible sources such as:
 - CDC <https://www.cdc.gov/coronavirus/2019-ncov/>
 - European CDC <https://www.ecdc.europa.eu/en/covid-19-pandemic>
 - WHO <https://www.who.int/news-room/feature-stories/detail/a-guide-to-who-s-guidance>
 - NIH <https://www.covid19treatmentguidelines.nih.gov/>
- Use well accepted update services that draw from scientifically credible sources such as:
 - UpToDate
 - STAT News
- Consider “media monitoring” (taking daily news and reducing to a headline, three or four sentence excerpts). This reduces time demands and aids in getting key messages delivered quickly. This can be done manually or through available media monitoring services.
- Use technology to rapidly disseminate new treatments and protocols such as using:
 - Slack

- Microsoft teams
- SMS or app-based messaging that employees can opt into
- Emergency communications applications that can broadcast
- Messages and notifications to small pop-ups on desktop computers, and mobile devices, such as SnappComm and similar products.

#2. KEEP THE HOSPITAL OPEN (OPERATIONS, CARE DELIVERY, QUALITY, AND REVENUE)

The financial impact of COVID-19 and the restrictions that have resulted are severe. Average U.S. hospital revenues dropped 40% during 2020.¹ This has impacted all hospitals and health care systems. Especially critical are small rural hospitals that are now facing closure due to sharply reduced revenues. A key factor in cutting revenue was the directive to stop elective procedures across the country.² Elective procedures are a major source of revenue for hospitals, systems, and practices. While revenue dropped, expenses increased due to:

- increased cleaning and infection control,
- the cost and supply of personal protective equipment (PPE),
- additional staffing needs for critical COVID-19 patients,
- converting rooms to higher levels of monitoring and care,
- purchasing/supporting telemedicine solutions,
- plus the increased testing of both patients and staff.

In addition, continuity of care was interrupted for patients. Follow-up appointments and postprocedure care (rehabilitation, etc.) were not taking place and thus, these revenues were interrupted as well. One key factor is patient's fear that it is not safe to come into clinical sites for care. Patients do not want to come into waiting rooms. They know the risks and will avoid seeking care if sitting in a waiting room is part of the process. Yet, the impact of delayed care or no care can be detrimental both for patients (see increases in congestive heart failure [CHF] deaths during the COVID-19 pandemic³), and for the hospital, or clinic, and/or provider because it cuts into appointment revenues, provider appointment revenues, revenues generated by associated tests imaging, etc.⁴

The impact on staff has also been significant.⁵ Loss of staff due to infection, fear of infection, incapacity and death, excess stress, family and home schooling/education issues all put additional strain on staff and operations. Keeping staff healthy and productive physically and mentally is critical. Frequent infection testing of clinical and all other in-hospital

staff is an important first step. It is also critical to provide for the behavioral health needs of all staff. Clinical staff have been placed under significant stress providing care for patients, at times without proper PPE, risking infection of themselves and their families if not quarantined. If clinical staff are quarantined, they suffer from long-term separation from family and friends. In-hospital support staff (including, for example, food service, maintenance, infection control, and administration) are also under increased stress. A continuous management focus on moral and easy access to behavioral health support is critical for all personnel.⁶

Ideas/tactics

- Keep infection risks to a minimum.
- Divert potentially infected before they arrive at the hospital or clinic (see #3 below).
- Conduct standard and appropriate specialty appointments with telemedicine and bill for encounters where possible (see the *Pandemic Action Plan Policy and Regulatory Summary*).
- Allow and enable staff to work from home whenever possible, reducing their exposure and the risk of carrying infection into the hospital. This will also allow staff who have been exposed to COVID-19 or are infected, but not seriously ill, to continue to fill at least a portion of their operational role.
- Assure connectivity to the home especially in rural areas.
- Conduct a connectivity survey of all employees who can potentially work from home. Know the connectivity capabilities and gaps in advance. Update every year.
- Close down/get rid of physical waiting rooms and create virtual or drive-up waiting rooms. This is an essential step to prevent spread of the virus to patients and staff; moreover, it is also an essential service move for patients. Keep infected people out of the facility wherever possible. (see #3 below)
- Apply queueing software to eliminate waiting rooms.
- Self-scheduling for appointments (queueing) is essential to eliminate waiting rooms and for scheduling and queueing for vaccine application.
- Apply COVID-19 screening tools to registration (widely available in almost all telemedicine and other self-scheduling and registration systems).
- Protect providers by reducing the need to enter infected rooms with infection risk—(See Pad on a Pole below).⁷
- Consider robotics to avoid in-room contact with patients, delivery of food, medications and supplies, removal of soiled linens.

- Use simple “Pad on a Pole” or similar technologies to reduce isolation, infection exposure of staff, and demand for PPE. Allowing patients to interact with staff and allowing the staff to visit the patient in their room virtually reduces the need to physically enter the room, exposure risk, and change PPE. This application has shown a dramatic reduction in the demand for and cost of PPE. Video robots can also be considered and are widely available.
- Use Pad on a Pole or similar technologies to allow patients to interact with family, reducing both isolation and infection risk. These also reduces PPE demand by visitors.
- Relieve workload on key providers who have additional demands placed on them especially in dealing with public and patient inquiries.
- Provide call management/alternatives to answer questions (reduce demand on) critical resources.
- Employ call center resources or chatbots to answer basic calls, inform and direct patients.
- Assess the condition of your staff. Use surveys and other tools. Assure effective management interaction with staff.
- Inform your patients and community of the actions and procedures the organization has made for their safety to give them confidence to use care services.
- Implement a coordinated care plan with public health at the local level.
- Implement a communication plan and budget for patient outreach and communication. Attempt to coordinate at state and local levels with health departments but also use local communication (see #11 below).
- Consider implementing an SMS push communication system to patients and families using SMS notifications through cell phone text during pandemics or other emergencies (with approval from patients). This will provide a fast and efficient means of communication for a broad segment of your patient population. You will have a list of patients that you can send important information or guidance messages to their cell phone by text when urgent needs arise. Do not overuse. The purpose of this system is to provide critical information and guidance. As important, it is a tool to establish yourself as a credible information source.

#3. DIVERT THE POTENTIALLY INFECTED BEFORE THEY ARRIVE AT THE HOSPITAL OR CLINIC

It is critical to protect staff, patients, and the facility from infection exposure while still continuing operations and quality care delivery. The best way to do this is to divert potentially infected people before they arrive at the hospital or

clinic. The CDC suggests that providers first evaluate patients with suspected cases of the virus remotely instead of having them come to the hospital. Some clinicians, hospitals, and health care insurers are telling patients with mild symptoms to conduct their initial doctors’ visits through phone, video, and secure messaging. Diverting potentially infected people can be accomplished in many ways.

Ideas/tactics. For staff and facility workers:

- Conduct frequent testing.
- Screen on arrival outside the hospital—create pre-entry rooms (tents, trailers, secure areas in the entryway) if possible. Screen every person for temperature and pulse ox and other symptoms before they enter the facility.
- Use telemedicine during the process to address needs of infected emergency department (ED) arrivals while reducing need for interaction with staff (and reduce need for PPE).⁸
- Allow and enable staff to work from home whenever possible, reducing their exposure and the risk of spreading the virus infection in the hospital.

For patients:

- Close down (empty) the waiting room by creating virtual or drive up waiting rooms (see #5 below).
- Encourage use of on-demand direct-to-consumer telemedicine platforms to answer basic health questions and triage. If COVID-19 related, most of these telemedicine services are able to conduct the CDC COVID-19 screening online or remote (i.e., over video) as part of the consult registration process.
- COVID-19 (screen, test, triage, divert to appropriate place of care)—if a patient is diverted to the home, provide support, monitoring, and communications to encourage healing and containment; intervene if the patient needs a higher level of care.
- Use phone or online tools so patients do not have to come in-person for care.
- Use existing COVID-19 screening tools to conduct virtual CDC screening.
- Apply artificial intelligence (AI) such as using telemedicine chatbot tools for screening, decision support, and triage. (An additional benefit is that chatbots have proven to generate a more structured and informed response than a human interaction and they require very little staff resource time reducing demand on staff and enhancing surge capacity. Dozens of these tools are in place and available.)

- If likely infected, direct to drive through or home testing.
- Use virtual tools such as chatbots to inform patients of test results and to answer questions.
- If infected, direct to physician (virtually), set up virtual telemedicine appointment and triage.
- Route to the best site of care. Tell the patient where to go next, for example, to home or a COVID-19 specific facility.
 - Direct patients to the facility for emergencies or when an admission to the hospital is required or
 - direct patients to their home or place of residence, where care in the home is appropriate.
- Engage and monitor patients at home using telemedicine. Provide iPads or other technology (whenever possible use the patient's own technology) to allow care providers to monitor the patient and deliver continuity of care. Ensure that the technology also allows patients to engage with family and friends to reduce isolation and encourage healing.
- Provide regular daily contact to the patient at home to inform, answer questions, and advise of critical behavior to reduce spread of disease. Use existing contact management tools (e.g., Salesforce Health or your telemedicine platform) to assure, structure, and assure follow-up care.
- Implement/leverage existing engagement, RPM, and data sharing tools. Implement evaluations and triage of patients based on data.
- Home monitoring of patients—implement basic RPM tools to provide a daily assessment, measurement of temperature, and pulse oximetry (as well as measurements appropriate for any chronic disease). Provide daily contact with the patient and, where possible, the caregiver. Daily video contact is preferred but phone (audio) may be sufficient.
- Consider use of location monitoring to know whether patients stray from home; phone location monitor Apps are available (if socially acceptable).
- Wearable location monitors are also available for problematic cases.
- Patient/public-facing messaging is critical to reinforce messages concerning the disease, care, and recovery. It is also critical to provide continuous reinforcement of the need to quarantine, what quarantine means, the use of masks, social distancing, and frequent hand washing. A major issue in COVID-19 is that patients, care givers, etc. are being fed a wide variety of often conflicting information through social media and word of mouth. Your public

facing messaging must assume that it will have to counteract misinformation (See #11 below). Most RPM and CDM telemedicine platforms support this communication.

#4. REPLACE/COVER FOR INFECTED STAFF, PROVIDE FOR CRITICAL CARE STAFF NEEDS

Regardless of the procedures in place, some infection of staff must be expected and plans must be in place to mitigate the impact on staffing and care. There is a critical need to plan for shortages to occur as demand for specific specialties and for intensive care resources increases. Telemedicine offers advantages to reduce exposure of providers, to share resources, and to access resources outside of current operations.

Ideas/tactics

- Establish infrastructure to engage available replacement and surge staff in advance. Establish a program to identify and engage workers who are retired or underutilized who have the capability and willingness to serve in a “reserve” capacity. These should include public health care professionals, nurses, physicians, support staff, and management staff. Like all reserves, arrange for training on a regular basis or have crash training available and tested to bring personnel up to speed on current platforms and processes at the facility. Use telemedicine and telecommuting wherever possible to accomplish this.
- Be prepared to use virtual pools (UBER model) available through telemedicine providers.
- A pandemic may not affect hospitals evenly. Hot spots may result if over demand and need more resources. Other areas may have less demand and excess resources. It would be beneficial to have mutual aid agreements in place and a method of demand contraction surplus. An UBER model works well for this and shared resources software and Apps are available. Most on-demand telemedicine platforms can deliver this capability.
- On-demand telemedicine and panel services are widely available and can act as resources to augment capacity. These services can provide on-demand primary care, behavioral health, second opinion, and specialty consultations to relieve your staff. There are dozens of companies that provide these services on-demand (see TTAC tool kit: *On-Demand/Direct to-Consumer Telemedicine* (available at the TTAC website).
- Make management decisions and protocol regarding whether COVID-19-positive nurses can treat COVID-19 patients without infecting other staff and set protocols.

- Have testing in place for all staff (clinical and nonclinical) and continuously screen staff too.
- Teleintensive care unit (teleICU) can provide remote intensivists and intensive care nurses to support and enhance your current ICU operations. These services can also support the ability to convert additional beds to ICU beds and expand your ICU capacity. Planning is required and organizations should engage these services in advance on a contingent basis or integrate them into current day-to-day ICU operations. Facilities should have the communications and video capability in place with basic equipment staged and ready.
- Telestroke can provide timely access to remote stroke neurologists to support or enhance your current ED/neurology operations. Like teleICU, advanced planning and preparation is required, communications and video capabilities must be in place, basic equipment should be staged and ready for use, and specialist services should be engaged in advance on a contingent basis or integrate them into your current day-to-day ED operations.
- Use telemedicine to support other demands for specialists. As in ICU and stroke above, access to expert consultation through telemedicine is widely available in almost every other clinical specialty area. These resources can fill in for or augment your specialty providers.
- Allow and enable staff to work from home whenever possible, reducing their exposure and the risk of staff carrying infection into the hospital. This will also allow staff who have been exposed to COVID-19, or are infected but not seriously ill, to continue to fill at least a portion of their operational role.
- Enable training for providers and coders and ensure guidelines/compliance rules are in place for providers furnishing and billing telehealth services from home (e.g., coding, documentation, privacy, and security) (see #9 below).

#5. COVID-19 CONTAINMENT IN/FOR THE HOSPITAL/CLINIC

It is critical that COVID-19 infection in the care environment be contained to restrict the infection from spreading to patients and staff. A critical first step is to restrict the traffic in and out of the hospital and eliminate areas where patients and staff congregate. A key set of tools to achieve this is telemedicine that allows patients to be seen remotely both outside and within the health care facilities.⁷ A pandemic will also require facilities to create patient barriers, infection areas, wards, floors, and even buildings to help contain infection spread.

Ideas/tactics

- Close down/empty or reduce density in the waiting room.⁹
- Facilitate scheduling, registration, check-in, insurance verification, coding, billing and appointment reminders through portals, on-line registration Apps, and patient experience/engagement Apps. Most on-demand telemedicine platforms enable this.
- Create a virtual waiting room that is convenient to the patient. For example, have the patients schedule and register for an appointment online, then have the patients announce their arrival for the appointment by text, then wait in their car until they are called or texted to come in. Provide hand sanitizer outside the door, and upon entering the building/office, the patients are then routed directly to their provider, laboratory technician, etc. On-demand telemedicine and queueing software applications are available for this.
- Three telemedicine technologies that can enhance this process are AI-powered chatbots, portals, and kiosks.
- AI telemedicine chatbot can enrich the registration process. The structured interview helps both patient and provider collect and sort relevant data before the patient sets foot in a doctor's office. A chatbot can also provide context-specific response, instructions, and directions to the patient.
- Portals allow the patient to schedule an appointment, register, and be given added value response, instructions, and directions before entering the facility. It has also been shown that patients give more complete and accurate information to a portal (or kiosk) than they give in person to a registrar. This can save time and money in the registration and billing processes.
- Physical check-in kiosks present risks in a pandemic situation as they are used by multiple patients creating a transmission site for the virus. Virtual check-in eliminates this. However, certain kiosks are available to take images and temperature without contact.
- Provide for free testing and infection surveillance of hospital workers.¹⁰
- Allow and enable staff to work from home (telecommute) whenever possible, reducing their exposure and the risk of carrying infection into the hospital. This will also allow staff who have been exposed to COVID-19 or are infected, but not seriously ill, to continue to fill at least a portion of their operational role.
- Assure connectivity to the home especially in rural areas.
- Conduct a connectivity survey of all employees who can potentially work from home. Know the connectivity capabilities and gaps in advance. Update every year.

- Automated disinfection is being employed by airlines, factories, and hospitals. Some hospitals have adopted portable enhanced environmental disinfection systems (robots) that feature ultraviolet (UV)-C light or hydrogen peroxide vapor to complement infection control protocols already in place. These robotic technologies are widely available today.
- To control infection, it is advised to maximize air flow and filter/disinfect the air using UV and high-efficiency particulate absorbing (HEPA) filters in ventilation.¹¹ Consider ventilation systems that move the air vertically rather than across patients and space.
- Plan ahead and create the capability of pandemic-only wards and/or floors to contain the infection. Assure restricted access and proper ventilation, not shared with the rest of the facility. Design containment entry/exit points with UV or other disinfection in the ventilation systems. Conversion of these spaces. This will take advance planning. However, repaid build containment structures designed to be in the hospital are also available.
- Have sufficient negative pressure rooms or rooms/floors that can be rapidly converted.
- For containment of a limited number of infected patients, containment cubicles and enclosure tents can be set up quickly for containment of patients. These structures protect staff and have their own HEPA-filtered ventilation.
- Multiple health care systems converted current sites to pandemic-only facilities to care for infected patients. In some cases, these were unused hospital facilities. In other cases, hotels and even stadiums were converted for temporary use (alternative care sites). Use the CDC guidance for alternative care sites.¹²
- To protect providers, reduce the need to enter infected rooms by providing a “Pad on a Pole” for each patient in the hospital. This local application of telemedicine technology allows patients to communicate with staff and family outside the room to the extent possible and allows providers to visit patients without entering the rooms (and significantly reduces demand for PPE).
- Consider training staff to diagnose, triage, and respond making use of telemedicine, and mixed reality technology can reduce exposure and provide a lifelike training model (e.g., HoloLens or other AR glasses and simulation programs).

#6. PROVIDE URGENT CARE, ONGOING CARE/FOLLOW-UP CARE

Consumers continue to need health care services during a pandemic and need access to providers who can answer their questions, diagnose, and provide guidance and treatment. This

is a challenge as patients will resist coming to providers and providers want to avoid unnecessary exposure both for themselves (and family) as well as their patients.⁷

Providers are critically impacted in two ways. First, they are unable to provide the care they want and need to provide to their patients, and second, financially as their revenues are reduced significantly from both appointments and associated diagnostics, procedures, etc. The COVID-19 pandemic experience is showing significant impacts due to isolation from care and the failure to deliver ongoing care. Example: deaths due to CHF increased substantially during the COVID-19 pandemic, and the majority of these deaths have been attributed to a breakdown in the continuity of care.³

One effective solution is to see patients virtually for urgent care, primary care, and specialty consultations (where in-person examination is not required) using on-demand and scheduled telemedicine solutions.⁷ Urgent and initial consultations are occurring more and more through “direct to consumer telemedicine” services and platforms. This creation of a “Digital Front Door,” already adopted by many organizations before the pandemic, is a fast-growing area of convenient access to health care for day-to-day operations whether there is a pandemic or not. This trend increased substantially (over 700%) during the COVID-19 pandemic and any future pandemics will demand the same type of services.

Implementing such telemedicine capabilities in place may not only increase organizational market share in a competitive world but it will also become an easily deployed business continuation strategy when a future pandemic strikes. This type of platform also provides surge capacity by allowing as-needed access to the physicians on the platform as well as a potential staff replacement strategy for critical specialists and other health care staff who are absent due to exposure, illness, or deployment elsewhere.

On-demand and scheduled specialty consultations can also be delivered through the same type of telemedicine platforms. Many of these platforms can be integrated into the electronic medical record (EMR). (See TTAC report: On-Demand/Direct to-Consumer Telemedicine).

Direct-to-consumer capabilities in three ways:

1. Buy the service from a current provider.
2. Offer the service yourself using the health care organization’s own providers and using an available telemedicine software platform.
3. Implement a hybrid approach using your health care organization’s providers when available and augment services by using the providers from an outside service when needed.

Another method to provide care is to move more care into the home. (See #7 below.)

Ideas

- Choose a video platform that will be used for remote care and standardize it across services. Consider the availability and usability to the patient/consumer.
- Implement some form of remote scheduling system for making appointments now in your normal course of business.
- Encourage providers to conduct remote follow-up visits through telemedicine
- Implement direct-to-consumer urgent care online telemedicine as a normal course of business and as a method of preparing for a crisis situation.
- If possible, implement a complete direct-to-consumer telemedicine solution.
- See the TTAC Direct-to-Consumer Telemedicine Assessment.

#7. PROVIDE CARE AT HOME, CREATE THE ABILITY TO ROTATE PATIENTS OUT OF THE HOSPITAL TO MAKE ROOM FOR MONITORING MORE CRITICAL CASES

The need for continuity of care remains during a pandemic and the need to provide this care is essential. As stated in #6 above, the COVID-19 pandemic experience is showing significant impacts of isolation from care and the failure to deliver ongoing care. Deaths due to CHF increased substantially during the COVID-19 pandemic and most of this has been attributed to a breakdown in the continuity of care. Providing virtual care in the home is a proven solution.

The most common applications include postprocedure recovery, chronic disease management, and remote patient monitoring. Most health care providers are already considering these telemedicine applications as part of a day-to-day care strategy and as a method to reduce the cost/risk of readmissions. It is also a method of establishing longer term “sticky” relationships with patients and their caregivers/family. This is especially critical in the management of chronic diseases (e.g., hypertension, CHF, chronic obstructive pulmonary disorder, diabetes, and behavioral health). In addition, care for COVID-19 patients diverted to the home must be addressed (see #3 above).

A variety of RPM and CDM telemedicine services and solutions are available and many of these services are currently reimbursed at federal and state levels. (See the *Pandemic Action Plan Policy and Regulatory Summary*) Many of these platforms can be integrated into the EMR.

In addition to RPM for chronic disease, “Hospital at Home” capabilities are available to move more acute patients to the

home. This reduces exposure to infection, reduces cost, and makes more beds available in the hospital. Tools and technology are similar to RPM but are aimed at more acute patients.^{13,14}

To be successful, organizations must address technical issues, care support, monitoring, and address issues of isolation and quarantine/patient safety. A critical part of moving patients to the home is transition management. Whether diverting a COVID-19 patient to the home or transitioning a patient from the hospital to home, there must be a clear managed effective transition that ensures successful continuity of care. This will be more critical for patients with greater needs while convalescing in their homes. A formal assessment and discharge-to-home process or service and ongoing continuous communication with the patient and caregiver are essential. Most current telemedicine solutions offer all or most of these capabilities.

Using the telemedicine capabilities of RPM and CDM services, continuous contact systems and “Hospital at Home” services to enable safe early rotation of patients out of the home can ensure support for patients as they heal.

Ideas/tactics

- Automate postprocedure instructions and reminders.
- Transition support systems to assure smooth transition and prevent gaps in care.
- Implement at-home telemedicine solutions (RPM, CDM).
- Put RPM and CDM measurements, coding, and billing in place.
- Use a contact management system to prevent gaps in care and maintain contact with patients. Manage from discharge to heal.
- Create constant comment support for caregivers in the home.
- Consider the health care needs as well as the social requirements of patients.
- May include support group engagement (telemedicine can enable).
- Provide remote communication for family and friends outside the home, leveraging the capabilities of the telemedicine solutions in the home.
- Engage hospital-at-home providers in your area or initiate a program potentially with partners. Allow them to leverage the telemedicine solutions in the home.
- Train providers in the capabilities of these home care and telemedicine services to allow them to make informed decisions for when to send a patient home.

#8. SUPPORT REMOTE WORK FOR STAFF

The best way to protect personnel from contagions in the hospital and prevent them from introducing infection into the hospital is to have staff work from home. The COVID-19 experience has demonstrated that most administrative and management tasks in health care and other industries can be, and are being, successfully completed from home (telecommuting). Most of the challenges relate to equipment, bandwidth availability, and work schedules. Putting these capabilities also enables the use of remote/at-home resources to provide services through telemedicine.

Ideas

- Ensure information technology (IT) infrastructure is prepared to support an expanded remote workforce. Including licensing, server capacity, and available bandwidth.
 - Develop key metrics for IT system health, such as available network capacity, unused licenses, and stock on hand; monitor status to identify possible shortages before they occur.
 - Ensure that HIPAA requirements are addressed through training and privacy accommodations/devices.
 - Determine and standardize equipment in advance to simplify procurement, and identify requirements and specifications in the event that alternatives need to be purchased due to supply chain issues.
 - Make the equipment that people use in their office the same as the equipment they will use at home so that staff can easily take equipment home when needed. Eliminate PCs and replace them with laptops and docking stations or virtual desktop infrastructure clients.
 - Decide on standard videoconferencing and collaboration platforms in advance. Promote the use of video patient encounters on a regular basis and create simple guidelines for appropriate use of different video technologies if the organization supports multiple systems.
 - Maintain spare equipment in inventory, ensuring adequate stock of all necessary pieces for connecting equipment, and develop processes for requesting and deploying items.
- Laptops, video, web cameras, speakerphones or headsets, headphones, lighting.
 - Mobile hotspots, cell phones, and tablets.
 - USB hubs, laptop docking stations, video cables, mice, keyboards.
- Plan in advance and incorporate in your disaster recovery plan.

- Communicate widely with hospital staff if there are changes in procedure for acquiring IT systems or support.
- Ensure necessary connectivity infrastructure into the homes of potential remote workers and consider providing troubleshooting guides for resolving routine home connectivity problems.
- Establish robust process for tracking equipment that is going out to support remote workers and ensure there is a process for receiving equipment when workers return to their offices.

#9. BEHAVIORAL HEALTH

Mental health strain on providers and patients is a critical issue.¹⁵ Easy dependable access to appropriate behavioral health services for patients, staff, and the community is essential. In part, access to these critical services will address the needs and fears of staff as well as patients and caregivers. On-site or local behavioral health resources can be limited, but commercial on-demand access to resources/services through telemedicine (on an on-demand and scheduled basis) is widely available through direct-to-consumer telemedicine companies. Almost all direct-to-consumer telemedicine programs offer behavioral health as part of their clinical portfolio and some of these services specialize solely in behavioral health and many include crisis intervention.¹⁶ Telemedicine can also enable health care systems with dispersed providers to share resources and laid level to better meet demand when and where it is needed.

Ideas/tactics

- Make behavioral health part of any direct-to-consumer telemedicine program/service line.
- Engage on-demand or scheduled behavioral health services by employing, staff, current local providers through telemedicine and/or on-demand providers.
- Focus on addressing social engagement to reduce isolation for patients and staff.
- Provide regular training and engagement with staff to reduce stress.
- Address provider wellness and clinical support through telehealth.

#10. TRANSPORTATION

The COVID-19 pandemic demonstrated a significant impact on transportation. Closing of flights, shutdown of some shared car services, and resistance to using mass transit drastically cut the ability to move people and goods. Slowdowns in logistics constrained supply deliveries on a global scale. It is critical to understand how these issues will affect the

organization and workflow. It is then critical to find replacements for current options that may no longer exist or be practical for people, patients, supplies, treatment equipment, critical pharmaceuticals, etc.

Providing care through telemedicine and enabling telecommuting/remote work can significantly reduce the need to move people (patients, providers, and staff). This is critical in a pandemic. The pandemic has also shown us that by putting these two options in place as part of an everyday strategy/workflow, organizations will then have the tools in place to scale/expand the use of them to reduce everyday transportation needs and costs. (Example: The University of Washington Medical Center has made telecommuting permanent. This will save \$180,000 per month in office space costs.) Other organizations are looking at these potential savings and potential reuse of space.¹⁷

Telemedicine can also be a method of delivering higher acuity services to facilities that do not have these in place such as capabilities of telestroke and teleICU (see #4 above).

Where physical transportation cannot be avoided, organizations will also need to have plans in place for cleaning and disinfection of vehicles transporting people. CDC guidance is available for this.¹⁸

Maintaining and moving adequate supplies during a pandemic are a different issue. To some extent, this issue must be addressed with increased stocking of basic critical supplies (e.g., PPE). However, especially for small and remote hospitals, addressing more on-demand items such as blood supplies and specialty pharmaceuticals will require more creative out-of-the-box thinking. Be creative in your options. For example, Lyft and UBER have stayed in business through the COVID-19 pandemic for delivering both people and items. The University of Virginia and others have proven that drones can be an effective method of delivering limited but critical supplies remotely.¹⁹ Volunteer flight services are also available and, in some cases, can be expanded.²⁰

Ideas/tactics

- Assess your current transportation dependencies for patients, personnel, and supplies (urgent and nonurgent).
- Have a contingency plan for each dependency.
- Avoid moving people.
- Use telemedicine to schedule appointments and deliver clinical expertise remotely reducing travel needs for both patients and staff.
- Enable the use of telemedicine for delivery of low to high acuity services where and when they are needed, reducing travel needs for both patients and staff.

- Enable remote work.
 - UBER/LIFT—set/monitor guidelines for shared car use.
 - Set/monitor protocols for use of on-campus shuttles, trams, or other transportation to move students/faculty on campuses during the COVID-19 pandemic.
 - Set/monitor protocols for use of community vehicles (see CDC has guidelines for community cabs/vehicles).
 - Be creative and think about ways to Uberize local private pilots or flight services to address critical transportation needs (Examples: Veterans Airlift and Angel Flight) especially for urgent supplies.
 - Consider the use of drones to deliver critical supplies.
- Look to successful use cases (University of Virginia).

#11. PUBLIC HEALTH

Weaknesses in our public health system have become apparent during the COVID-19 pandemic and must be addressed before the next pandemic.²¹ Grant-based funding and limited ongoing funding make operating a long-term sustained public health infrastructure difficult. Lack of consistent national messaging and the lack of infrastructure, systems, and inconsistent standards/methods for data collection/reporting limit effectiveness.

ED-focused data collection misses changes that have occurred in health care delivery. More and more people are not going to the ED and turning instead to urgent care centers, retail “convenience clinics” (e.g., CVS Minute Clinic), and on-line “direct-to-consumer telemedicine” as a matter of convenience and cost. Furthermore, during the COVID-19 pandemic, people are avoiding going to the ED. (Example: Use of “direct to consumer telemedicine” jumped 700–1000% in 2020. Telemedicine CMS claims jumped 12,000%²²) Public health information gathering has to change to take into consideration rapid changes in the delivery of care.

COVID-19 presents a unique problem: understanding risk at a community level and understanding risk at a personal level in an emergency that impacts the resources of every part of the nation at once. We have experience and understanding of storms and other regional events. We know what to do, what to bring in, what to tie down, and what to buy. For example, we have both institutional and personal memories of what wind or water does to your living environment and community. So choices are easier, and communities act more in concert with appropriate behavior (not everyone but most). With COVID-19, there was no institutional memory at the community or personal level. It has been that lack of experience and lack of sound guidance, which has prompted frequent inaction or wrong action. That makes planning even more essential as plans capture institutional knowledge and plans to act.

An essential function of public health is to provide for community communications, accurate information, training, and guidance. This was severely complicated during the COVID-19 pandemic by conflicting messages occurring at the national and local levels, the promotion of conspiracy theories, and unproven/nonscientific claims and pronouncements. All these things were encouraged by the vacuum caused by a lack of a clear direction and planning. The situation has become dangerous with the politicization of messages and claims. This further deteriorated into social media information wars, protests, disruption of public health meetings, and threats against public health officials, employees, and their families.

Other public health considerations must address safe housing for vulnerable populations to reduce infection spread and provide care and quarantine when needed.

Ideas/tactics

- Provide direct community outreach/communications by locally driven communication public health providers.
- Inform citizens about the availability and advantages of telemedicine.
- Provide vetted nationally sourced information (see #1 above).
- Coordinate information from the experts—public health and local providers.
- Establish communication channels through local clinical providers to deliver vetted public health guidance (i.e., patients trust their providers).
- Offer a system/application to deliver vetted public health guidance through local providers. Keep it local through local providers who have the confidence of the community.
- Consider using local social platforms as a distribution channel to reach certain populations.
- Collect mapping and surveillance data for reporting. Include other care entry points (see #5, #6, #7, #9 above).
- Provide shelter and care to reduce infection in vulnerable populations.
- Ensure plans and resources to provide shelter for homeless people, including sufficient structures, isolation, and quarantine facilities.
- Transition homeless to medical home and away from reliance on emergency care.
- Consider developing telehealth space and resources for use within homeless housing/shelters (e.g., dedicated private space, internet, computer, camera, and HIPAA compliant).
- Provide counseling and behavioral health through telemedicine.

- Protect students and schools.
- Consider schools as potentially significant infection transmission environments and plan accordingly.
- Understand and compensate for the effect of students going in and out of the classroom and carry the investigation to friends and family in their homes and wherever they have activities.

Conclusions

This pandemic imposed new demands and critical pressures on our health care system, staff, systems, and facilities. It also revealed weaknesses in delivery of care including access, equity, continuity of care, connectivity/technology disparities, and public health. It imposed increased business pressures driven by a reduction in revenues and increased costs as well as increased pressures on staff and supplies. This action planning process found that many of these can and are being addressed with telemedicine and related technologies.

Deploying telemedicine can contribute significantly to preparation for, and response to, the demands of a pandemic. Moreover, telemedicine offers significant everyday benefits including attracting new patients, providing expanded service to your market area, expanded revenue potential, and creating higher levels of patient satisfaction. However, proper assessment, preparation, and having these technologies and workflows in place and in use are critical for them to be available and scalable when a pandemic strikes.

The fact that telemedicine had not been broadly implemented limited provider's flexibility and ability to serve their patients during the pandemic.

The COVID-19 experience brought focus on inefficiencies in health care delivery and outmoded methods of day-to-day hospital operations. It also identified where technology can improve care, reduce inefficiencies, reduce the demand for facilities, and reduce costs. Examples:

- Provide increased care and disease management in the home.
- Provide urgent care on-line/virtually.
- Provide continuity of care for chronic disease patients.
- Eliminate/minimize space needed for waiting rooms while reducing infection risk in these environments and reducing consumer frustrations inherent in waiting rooms and long waiting times.
- Reduce demand for office space and commuting.

Telemedicine also showed us how to better share resources, convert bed use with telemedicine (teleICU, telestroke), and provide higher acuity services at home, opening hospital beds and reducing infection risk.

Telemedicine should be made an essential part of the new normal and should be integrated into every appropriate segment of day-to-day operations. Telemedicine use and escalation of use should also be part of every strategic plan and every disaster recovery plan for hospitals and providers.

Disclaimer

This document does not represent the opinion of Health Resources and Services Administration (HRSA), Federal Office of Rural Health Policy (FORHP), Office for the Advancement of Telemedicine (OAT), Alaska Native Tribal Health Consortium (ANTHC), the TRCs, or any other grant-funded entity. It comprises suggestions and opinions of experts in the fields of telehealth, epidemiology, public health, nursing, hospital administration, and policy/regulatory who worked together to comprise this action plan for a pandemic response. For more information regarding this publication, or to learn more about Telehealth, please contact TTAC at www.telehealthtechnology.org, or your regional telehealth resource center or the national policy telehealth resource center. The 12 regional and 2 national telehealth resource centers (TRCs) provide assistance, education, and information to organizations and individuals who are actively providing or interested in providing health care at a distance. You can find your regional or national telehealth resource center through the national consortium of telehealth resource centers (NCTRC), which comprises all 14 telehealth resource centers. The NCTRC website is (www.telehealthresourcecenter.org).

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Supplementary Material

Supplementary Appendix SA1

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