The Covid-19 pandemic has presented unparalleled risks and challenges for providers and spurred transformative response efforts, many leveraging digital health. In order to successfully launch and scale digital health programs effectively, 20 digital health system executives convened regularly to exchange successes, risks and innovations. Through these discussions, the following themes emerged: early investment enables adaptability, affordability and scalability are consistently prioritized over platform integration, providers can be successful by building first and refining after, employee wellness remains top of mind, and emergency drives broader innovation. This article will describe solutions launched or scaled during the pandemic, as well as learnings drawn from the collaborative.

When SARS-CoV-2 reached the U.S., providers were forced to reimagine care delivery rapidly. Although digital health tools have been available and evolving for years, most health systems had been slow to adopt and transform their care delivery models. Covid-19 presented new risks, requiring providers to limit unnecessary in-person interactions to reduce exposure risk and preserve personal protective equipment (PPE). Care models were adapted to address these issues, and a significant portion of healthcare encounters was shifted to virtual modalities. Many systems even accelerated models towards a “digital first” approach; for the first time, digital solutions were the default option, rather than in person options.

Health systems were largely unprepared to deliver care virtually at this scale. Many quickly activated a broad range of response efforts, sometimes building upon existing programs and other times developing entirely new care delivery models. In order to rapidly develop effective solutions, providers sought immediate feedback and learnings from others deploying similar initiatives. For this reason, Stanford convened a group of more than 20 Digital Health leaders, who have collaborated twice in-person during an annual event designed towards sharing best practices.
This group met weekly for an hour per week for 10 weeks to share ideas, plans and questions. The following sections outline the primary principles for launching and scaling digital health strategies to respond to the pandemic.

**Early investment enables adaptability**

Where foundational capabilities, including people, processes, and technology, already existed, providers were able to scale and pivot quickly to address evolving patient needs. For this reason, most digital health responses leveraged existing solutions within the health systems.

"Because many health systems had invested in a foundation for video visits prior to Covid-19, many chose to expand video visits to new providers, specialties, settings, and use cases."

Because many health systems had invested in a foundation for video visits prior to Covid-19, many chose to expand video visits to new providers, specialties, settings, and use cases. Following are a few examples of systems that scaled video visit programs exponentially:

- **Geisinger** more than tripled the number of medical specialties offering telemedicine visits.
- **Duke Health** scaled from approximately 100 video visits per month, delivered by a few specialty areas, to nearly 2,000 visits per day across all specialties.
- **Partners Healthcare** increased virtual visits as a percentage of total ambulatory volume from .8% to >70% in 6 weeks.
- **NYU Langone Health** scaled virtual urgent care from an average of under 25 visits a day to more than 1,000 in less than a month.
- **Sutter Health** increased the volume of video visits completed per day from 20 to 7,000 (a 350-fold increase) in less than a month, by expanding allowable use cases and enabling large groups of clinicians in waves, activating more than 4,600 clinicians in four weeks.

(Figure 1)
Video visits were not the only solution scaled. Intermountain Healthcare pivoted a synchronous tele-critical care program into an asynchronous model to deepen connections with rural providers during Covid-19. Partnered providers can record a three- to five-minute video at a patient’s bedside, to include visuals of the patient, vitals, and labs, and upload these videos into a queue. Intermountain critical care providers then review and deliver care recommendations to local providers. This model enables easier coordination for rural providers managing critical care needs and improved specialist access. Kaiser Permanente repurposed eVisit and chatbot functionality to create Covid-19 specific tools. Jefferson Health leveraged existing chatbot functionality to evaluate and direct patients to testing sites. Other providers significantly increased eConsults, which are asynchronous provider-to-provider written consultations. UNC Health was one of the first health systems, during Covid-19, to launch eConsults for inpatient care and allow this option across all specialties to reduce contact and preserve PPE.

These examples show how early development of foundational infrastructure enables improved preparedness, flexibility and opportunity. Given the precarious future of Covid-19, and more broadly an ever-evolving healthcare industry, early investments will remain pivotal to ensure preparedness.
Affordability and scalability are consistently prioritized over platform integration

Providers deployed a broad range of novel solutions that were low-cost and easy to scale. In contrast with standard health technology design principles, however, providers chose not to integrate some of these solutions into EHR-tethered patient portals.

For example, many providers activated alternative video solutions, such as Zoom, Webex and FaceTime, to maintain patient care when integrated solutions demonstrated bandwidth issues, capacity constraints, or limited usability. The University of Utah had seven video solutions used actively by providers to deliver virtual care. These supplemental solutions were not integrated into EHRs or patient portals but were deemed scalable and affordable by providers and acceptable by patients.

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Mercy Virtual, which integrates virtual care and population health across Mercy Health, chose to pursue a “device-light” approach, leveraging consumer-owned devices to deliver low friction virtual care for a home monitoring program. (Figure 2) For patients who either had tested positive or were deemed presumptive positive for Covid-19, Mercy Virtual chose to use SMS text messaging to automate communications with patients, inquiring about symptoms and processing responses to escalate as needed. Mercy Virtual was monitoring approximately 1,500 patients through this program within the first month. High adoption was attributed to the use of personal devices, lack of user application downloads, and low costs required to grow this program.
Children’s Hospital of Philadelphia similarly developed a secure mechanism to leverage clinicians’ personal devices, smartphones and tablets, rather than deploy thousands of new devices for video visits, thereby avoiding costly and harmful delays in care delivery.

Prior to Covid-19, most health systems had prioritized deep integration for all solutions into EHR-based patient portals which required significant resource and time investments to execute. However, driven by Covid-19, these priorities changed and providers found success by focusing on low investment, low friction solutions to drive rapid experimentation, adoption and engagement. Although some leaders continue to believe that a fully integrated experience is critical, many have noted observed benefits by choosing not to fully integrate certain solutions and they suggest that integration may be evaluated differently in the future.

**Providers can be successful by building first and refining after**

In response to Covid-19, numerous digital innovations were launched more quickly than previously thought feasible, and existing programs grew at a tremendous rate. Prior to Covid-19, one frequent failure of digital health programs was to focus on eliminating risk prior to launch. Such programs often developed recurring small pilots, without ability to scale and achieve broad adoption. Amidst Covid-19, provider organizations cut through prior barriers and friction, supported by federal policy
changes such as waivers to relax telehealth reimbursement restrictions. Some health systems have been successful in launching and scaling programs quickly and refining afterwards.

For example, the University of Utah promptly grew video visit programs by enabling providers to conduct any visits virtually. In order to activate new use cases quickly, video visits conducted during Covid-19 were flagged by providers documenting the reason for visit as “Covid-telehealth”; this indicator could then be used to reconcile billing and other guidelines as quality improvement efforts began. Instead of refining protocol prior, the health system launched quickly and is continuing to adapt the program as more information becomes available.

By leveraging prior infrastructure investments, Providence launched in just three days an internally developed Covid-19 chatbot with flexibility to iterate and refine post-launch as new research and guidelines were released. (Figure 3) The initial version allowed patients to conduct a self-assessment of their symptoms and directed the patient to either an on-demand virtual appointment or educational information. Over the following weeks, the tool was improved and expanded to include directing patients to testing sites, primary care provider appointments and other services. In March alone, Providence’s bot exchanged over 650,000 messages with patients across the country.
Although healthcare systems are not commonly committed to building and growing programs quickly without refining mechanics and reducing risk beforehand, many saw successes by allowing swift action. Because of the successes demonstrated by deploying light solutions and refining with time, providers are now embracing an iterative model.

**Employee wellness remains top of mind**

Whether virtual or in person, health care cannot be delivered without effective employees and clinicians. Throughout Covid-19, healthcare workers were pushed to new limits, working longer hours, dealing with uncertainty, assuming additional risks, and potentially compromising personal wellness and family life. To help counter these challenges, health systems invoked and scaled digital health resources to support employee safety, well-being and satisfaction.

In order to promote patient and employee safety and access to appropriate resources, the University of California, San Francisco (UCSF) launched two employee screening tools. One is an app requiring employees to report health information prior to in-person work shifts to clear the
employee for work or triage them to testing or health support. A second tool provided mental health screening and directed towards access to behavioral health resources, when needed.

Mount Sinai App Lab and its partners leveraged a comprehensive employee tool kit to better support employees through precarious circumstances during Covid-19, including: 1) assessment tools for Covid-19 symptoms, emotional wellbeing, and work satisfaction 2) tools to triage and monitor employee needs 3) prescription of a mindfulness app, and 4) a resilience course. (Figure 4)

FIGURE 4

Mount Sinai Employee Wellness Toolkit

21 Microdoses of Mindfulness

For nurses, physicians and all front line workers

In recognition of nurses week and may as mental health awareness month, we are providing a 21 days mindfulness program free of cost with simple, easy, quick and practical tools to help clinicians and allied health care workers contend with increased stress.

Want to enroll? Follow the steps below:

1. Text mindful to 64722
2. Complete initial survey and you will receive daily dose of mindfulness tip and weekly webinar as daily text or in your email

Everyone can participate. without any restrictions.

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Stanford Children’s and Stanford Health Care rapidly deployed inpatient telehealth solutions to help facilitate social distancing in the hospital, conserve PPE, and help keep front line workers safer. Stanford launched inpatient video solutions to support discrete interactions, such as provider consults, and for continuous monitoring for patients requiring ongoing attention. In approximately six weeks, the Stanford Health Care team developed and deployed more than 400 iPad-based carts throughout the hospital and completed more than 5,000 video consults through these devices. These solutions allow providers to reduce direct patient contact to create a safer work conditions for clinicians.

Clinician burnout continues to be a challenge for health systems, during and outside of the pandemic. Our healthcare workers, extended by digital tools, will continue to drive our success and potential in the future. For this reason, providers are continuing to invest in solutions to sustain and promote employee health.
Emergency drives broader innovation

Although health care initiatives are frequently scoped locally or regionally, Covid-19 spurred broader collaboration and forced healthcare providers to think bigger. Driven by need, providers launched new programs quickly, extended farther geographically, and reached further outside of direct care delivery in order to support our communities through recovery.

For example, Boston Children’s and Stanford Medicine each released population surveillance tools, CovidNearYou and the National Daily Health Survey, respectively. These tools were framed as a “call to action” to the general public and solicited health information, daily, from both healthy and sick individuals, such as symptom, demographic and behavioral data. This data was used to predict the true prevalence and severity of Covid-19 by region. Boston Children’s has partnered with the CDC and shares insights to inform national response efforts.

Figure 5 shows the number of responses, by state, to the Stanford Medicine National Daily Health Survey between April 1, 2020 and October 22, 2020, representing a total of 8,306,864 responses.

FIGURE 5

Stanford Medicine National Daily Health Survey
The number of responses, by state, to the Stanford Medicine National Daily Health Survey between April 1, 2020 and October 22, 2020, representing a total of 8,306,864 responses.

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Ochsner partnered with the Louisiana Department of Health and the Governor’s Office to support containment and population management efforts. Ochsner receives and processes testing data, which is received daily. With this information, it aims to leverage nearly-real-time geolocation of “hot” spots and “blind” spots, where testing is more or less prevalent respectively, to inform statewide and hospital-level action plans.

“Covid-19 forced providers to think and act differently and, for some, to extend outside of standard care delivery catchments to support broader public health and recovery efforts.”

Covid-19 forced providers to think and act differently and, for some, to extend outside of standard care delivery catchments to support broader public health and recovery efforts. Providers may continue to reach further to deliver more value to our communities.

The Covid-19 pandemic challenged health systems to respond in unprecedented and unvalidated ways to support their patients, clinicians, and communities. Many accelerated digital health solutions and accomplished years-worth of product evolution in just a few months. These provider systems are now challenged to build on this foundation to enhance care delivery for the duration of the pandemic, and beyond.

As health systems recover from initial Covid-19 responses, each will continue to build upon successes and reconcile discrepancies resulting from Covid-19 efforts. Most are shifting focus towards quality improvement, billing and financial reconciliation efforts for deployed solutions, both to refine where swift launches left gaps and to iterate for continuous improvement. Partially driven by the exacerbated health inequities that were highlighted by Covid-19, many health systems have further committed to grow where health inequities currently exist to ensure all populations have access to the right resources.

In order to continue to benefit patients with improved access and experience, health systems will solicit support from payors and regulatory agencies to ensure guidelines and policies allow for flexible care delivery options. This support will allow for further innovation across many dimensions of care delivery. As shown, health systems will continue to succeed by applying digital health capabilities when they make early investment to enable adaptability, prioritize affordable and scalable solutions, build quickly and reconcile after, retain focus on employee wellness, and continue to pursue broader innovations.

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