

## VIEWPOINT

## COVID-19: BEYOND TOMORROW

## How Academic Health Systems Can Move Forward Once COVID-19 Wanes

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**Over the past few months**, as the coronavirus disease 2019 (COVID-19) pandemic has spread across the world, academic medical centers have provided indispensable service in caring for patients and advancing science, including launching hundreds of clinical trials and other studies focused on treatments and vaccines.

To fully focus on COVID-19, many academic health systems (AHSs), as well as clinicians in other health care settings, have radically transformed their operations. AHSs have created additional critical care and acute care capacity, and redeployed physicians, nurses, and trainees to support the needs of patients. The changes have not been limited to the hospitals. Both clinical and nonclinical staff are working from home; AHSs and other groups have deferred a significant amount of nonurgent care; many, if not most, clinicians have begun using telemedicine widely for non-urgent care; and education has become largely virtual. Under normal circumstances these changes might occur over months, years, or even decades. Instead, they have happened in weeks.

As the pandemic begins to show signs of receding, life will slowly return to something closer to its pre-COVID-19 patterns. When this happens, AHSs have an opportunity to be reshaped.

[T]he next pandemic will surely come. The only question is when. [Academic health systems] and others must be better prepared for that moment.

**The New Normal for AHSs**

The first priority for returning to a new normal will be to ensure the safety of patients, families, and health care workers. AHSs can lead the way by establishing scientifically derived protocols for care delivery. The essential elements for success will include widespread testing for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), ensuring the appropriate use of personal protective equipment (PPE), and devising procedures to separate patients with COVID-19 from those without the virus.

Testing will be especially crucial. There is an urgent need for a massive national effort to roll out rapid, precise, and accurate testing—both polymerase chain reaction (PCR) and antibody tests—on a much larger scale. As patients who have not been affected by COVID-19 return for essential care, many AHSs are providing point-of-care viral PCR testing both to

assess patient risk and to help assure that asymptomatic persons infected with SARS-CoV-2 do not infect others. Many AHSs have generated their own PCR tests and produced reagents, swabs, and extraction kits. But many institutions continue to have shortages. For widespread testing to happen, these shortages must be fixed.

PCR testing for SARS-CoV-2 is used to detect active disease, while serology tests for antibodies against COVID-19 are most useful to determine whether a patient has been previously infected and will allow assessment of how widely the infection has spread within communities. There is concern that some of the currently available serology tests lack specificity, leading to misinterpretations of community penetration. The availability of testing for both acute disease and previous disease will allow AHSs to organize their services to ensure safety and efficiency in the delivery of care. It is quite possible that parallel care systems, including ambulatory care and elective surgery, will need to be developed to reflect a patient's history of COVID-19.

Safe and successful reopening will also require an adequate supply of PPE to protect health care workers from becoming infected. This is predominantly a supply chain issue. Demand is skyrocketing and supply is depleted, particularly because both manufacturing and international shipping have been impaired by the pandemic.

AHSs should also plan for future COVID-19 surges by identifying shortcomings in their response. Health care workers across the country and world have courageously stepped forward, providing essential care in extremely trying circumstances. At the same time, these events have highlighted opportunities for institutions to reconsider and redesign aspects of care that have come under intense strain, such as infectious disease testing capability and supply chain durability.

With speedy publication of case series and experiences from areas with substantial disease, clinicians and scientists are piecing together the clinical syndrome, including the unusual form of acute respiratory distress syndrome found in many patients as well as coagulation abnormalities.<sup>1</sup> The bench science community has also moved quickly, cloning and sequencing the virus within weeks.<sup>2</sup> Humanized mouse models, such as a knock-in of the angiotensin-converting enzyme 2 receptor, have been developed to help define underlying pathogenic mechanisms, and larger animal models are being used for preclinical trials of

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drugs, synthetic antibodies, and vaccines. Many clinical trials are also under way with a variety of drugs and convalescent plasma.

AHS education has also been transformed by this crisis. In areas with substantial disease, fourth-year students graduated early and began working with patients. In other locations, clinical rotations ceased, saving PPE for frontline workers. Many dedicated students volunteered to help, helping produce and distribute PPE or hunting down and tracking case clusters. As infectious disease epidemiology takes center stage, some experts have proposed that medical schools begin including health epidemiology electives.<sup>3</sup> Medical school classes are being conducted virtually, and enhanced virtual classes and increased simulation are likely in the post-COVID-19 era.

### Transforming AHSs

For years, AHSs have been perceived by some as not being as nimble and efficient as they could be. While there may be some truth in these observations, over the past 150 years, these institutions have also consistently created new approaches to clinical care, public health, research, and education, as well as strategies that are then adopted more widely throughout health care. Once the COVID-19 pandemic ebbs, AHSs are positioned for additional changes and transformation.

There has been a movement to shift clinical care from large hospitals and clinics to the community and home settings for patient convenience and to reduce the cost of providing care. A major part of this strategy is telemedicine, which until February was growing, but incrementally. A 2016 survey of 1260 physicians found that 12.7% of primary care clinicians used videoconferencing with their patients.<sup>4</sup> Now, with the urgent need to maximize social distancing, it is likely that most clinicians at AHSs are using virtual care and telemedicine widely. Despite the hurried pace of adoption, this shift appears to be working well. To sustain this approach, commercial health insurance companies, as well as local, state, and federal regulators, will need to embrace the change.

The response from the research community, while impressive, highlighted areas where additional research is needed. Why is COVID-19 asymptomatic in many patients but is catastrophic for others? How does the disease manifest in different subgroups of patients and what treatments are best for each? Harnessing a variety

of data sources, precision medicine, artificial intelligence, and data analytics may be helpful in better understanding COVID-19, and eventually other diseases, and in providing rapid electronic decision support to diagnose patients.

Precision medicine may also inform clinical trial design. Researchers have already identified so many potential compounds that it has overwhelmed the current clinical trial infrastructure. Precision medicine approaches may help solve this issue, for example, the use of adaptive clinical trial platforms, that allow multiple drugs to be tested simultaneously, with few patients receiving placebo.<sup>5</sup>

AHSs should also think broadly about their future role. They should work with federal, state, and local governments, as well as organizations such as the American Public Health Association, to build a robust early-warning system to identify potential pandemics before they can spread and, if they do spread, to precisely track the outbreak as it expands. Moreover, people of color, as well as those with less income, have experienced disproportionately high rates of COVID-19.<sup>6</sup> AHSs can partner with government, payors, and other agencies to identify these inequities and promote steps to reduce them. Moreover, this crisis has underscored the need for an increased focus on mental health. Social distancing has almost certainly intensified loneliness, which was a national problem even before the pandemic.<sup>7</sup> The strain of dealing with this pandemic—for everyone, including health care workers—will likely increase the risk for other mental health disorders. AHSs can help craft strategies to alleviate this.

Overall, AHSs and other health care centers have shown remarkable speed and ingenuity in responding to the COVID-19 pandemic. This virus could spur institutions to more quickly embrace needed change. At the same time, the pandemic has illuminated the need to focus on, and adequately fund, infectious disease, public health, and mental health programs. This crisis has underscored the need for AHSs to be able to rapidly increase capacity in response to a pandemic. Society has shown a desire for health systems to have this ability, and going forward, they will have to strike a balance between the desire for this readiness and its costs.

Perhaps the most essential lesson—for AHSs, the health care industry, the United States, and the world—is this: the next pandemic will surely come. The only question is when. AHSs and others must be better prepared for that moment.

#### ARTICLE INFORMATION

**Published Online:** May 20, 2020.  
doi:10.1001/jama.2020.8002

**Conflict of Interest Disclosures:** Dr Rothman reported serving on the boards of Merck and the King Faisal Specialty Hospital, for which he receives compensation. No other disclosures were reported.

#### REFERENCES

- Sethuraman N, Jeremiah SS, Ryo A. Interpreting diagnostic tests for SARS-CoV-2. *JAMA*. 2020. Published online May 6, 2020. doi:10.1001/jama.2020.8259
- Lu R, Zhao X, Li J, et al. Genomic characterisation and epidemiology of 2019 novel coronavirus: implications for virus origins and receptor binding. *Lancet*. 2020;395(10224):565-574. doi:10.1016/S0140-6736(20)30251-8
- Bauchner H, Sharfstein J. A bold response to the COVID-19 pandemic: medical students, national service, and public health. *JAMA*. Published online April 8, 2020. doi:10.1001/jama.2020.6166
- Kane CK, Gillis K. The use of telemedicine by physicians: still the exception rather than the rule. *Health Aff (Millwood)*. 2018;37(12):1923-1930. doi:10.1377/hlthaff.2018.05077
- Angus DC. Optimizing the trade-off between learning and doing in a pandemic. *JAMA*. Published online March 30, 2020. doi:10.1001/jama.2020.4984
- Yancy CW. COVID-19 and African Americans. *JAMA*. Published online April 15, 2020. doi:10.1001/jama.2020.6548
- Galea S, Merchant RM, Lurie N. The mental health consequences of COVID-19 and physical distancing: the need for prevention and early intervention. *JAMA Intern Med*. Published online April 10, 2020.