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Health Systems Respond to COVID-19:
Priorities for Rapid-Cycle Evaluations

While it may be hard to even consider an agenda for evaluation and learning given the urgency and human toll of the pandemic, health system leaders and researchers must use appropriate and rigorous methods, reliable data, and realistic assumptions to learn quickly from each other about what is working and what is not.

Introduction

The COVID-19 pandemic is placing an unprecedented strain on the nation's health care facilities and revealing many underlying weaknesses that exist in the U.S. health care system. The policies, processes, and capacities of individual health systems for safe and timely patient care, emergency preparedness, resource allocation, and intra- and inter-sectoral collaboration are key determinants in the success of the response to the COVID-19 pandemic in the U.S. and beyond. Helping leaders in health systems learn quickly from each other in the coming months should be a top priority for public and private funders eager to contribute to an effective and evidence-based response to this national crisis.

AcademyHealth launched a responsive project on March 21, 2020, to identify priority questions health system leaders and care providers have now (and will likely have over the next six to nine months). Topics of potential interest included health system and policy responses to COVID-19 and the impact (both intended and unintended) on health system policies, processes, providers, and patient care, including for those patients not directly affected by the virus.

While it may be hard to even consider an agenda for evaluation and learning given the urgency and human toll of the pandemic, health system leaders and researchers must use appropriate and rigorous methods, reliable data, and realistic assumptions to learn quickly from each other about what is working and what is not. Formulating real-time processes to collect data and build an evidence base will be key to informing the new normal of care delivery, addressing other COVID-19-related health problems, and improving future preparedness efforts.

This report focuses less on the critical epidemiologic and infectious disease aspects of the pandemic and instead highlights the information needs of the health care and community organizations engaged in the response. The report is intended to inform decision-making of federal and foundation funders of health services research (HSR), and specifically health care delivery science, to guide rapidly launched investments in responsive research. At the time of this report's publication, both the Veteran Administration's **Health Services Research and Development** service and the **Agency for Healthcare Research and Quality** have released calls for this type of research. This report also builds on and complements other priority-setting activities, such as an **initial research agenda** prepared by the Health and Medicine Division of the National Academies of Sciences, Engineering, and Medicine following a March 11 meeting of the Standing Committee on Emerging Infectious Diseases and 21st Century Health Threats.

Approach and Participants

AcademyHealth, the professional home and leading national organization for health services researchers, policymakers, and health care practitioners and stakeholders, works to improve health and health care for all by advancing evidence to inform policy and practice. Leveraging its strength as a convener, AcademyHealth brought together experts in health systems and patient experience to contribute to this research agenda-setting activity. AcademyHealth has also launched a new learning community for experts in health systems to learn from each other.

The co-chairs of AcademyHealth's **Learning Health System Interest Group** collaborated with AcademyHealth leadership to design this effort and identify individuals to invite. Fifty-six leading experts from health care systems, patient-representative groups, policy research organizations, professional associations, and government agencies received an invitation to participate in a 90-minute virtual discussion and an asynchronous priority-setting activity using the **Codigital platform**.[1] Thirty-six individuals participated, generating ideas, contributing to the virtual discussion, and/or prioritizing among the wide range of proposed research topics (see Appendix B for the full list of participants).

The initial structure for idea generation delineated three domains of ideas for research topics: 1) health system actions related to care delivery within the health system (e.g., surge capacity, workforce deployment); 2) health system actions outside the health system in coordination with other settings of care (e.g., work with post-acute care settings, supporting food delivery to isolated elderly); and 3) other questions that did not fit neatly into either of those first two (e.g., urban/rural variation in health system responses and successes, impact of regulatory relaxation on care delivery).

During a six-day period, 19 participants generated a total of 57 ideas across the three domains in the platform, followed by the virtual discussion in which 28 individuals participated, generating additional ideas.

AcademyHealth staff captured all of these ideas and curated them in a single list. Input from three reviewers helped group the ideas into six new categories:

- Patient and community experience, engagement, and outcomes
- Care delivery, management, decision-making, and operations
- Workforce needs, training, and policies
- Technology, data, and telehealth
- Policies, including payment policy
- Collaboration and coordination

Domains of Priorities for Rapid-Cycle Evaluations

Patient and community experience, engagement, and outcomes

Care delivery, management, decision-making, and operations

Workforce needs, training, and policies

Technology, data, and telehealth

Policies, including payment policy

Collaboration and coordination

These six domains were then once again loaded into the Codigital platform and over a four-day period, 21 participants edited the priorities and ranked them through a series of pairwise comparisons; no new ideas were allowed. For example, in the domain of patient and community experience, engagement, and outcomes, Codigital presented participants with the 20 research and evaluation questions that had been suggested before, during, and after the virtual discussion. Once a participant was ready to vote, the Codigital platform presented two research questions at random, and the participant selected one of the two as more important to address; that question then moved up in the rankings, while the other moved down. The platform then presented the participant with another pair of research questions, and the rankings changed further. This process was cumulative across participants, resulting in a prioritized list that reflects the collective ranking of those who participated. The results of the prioritization round serve as the basis for this report.

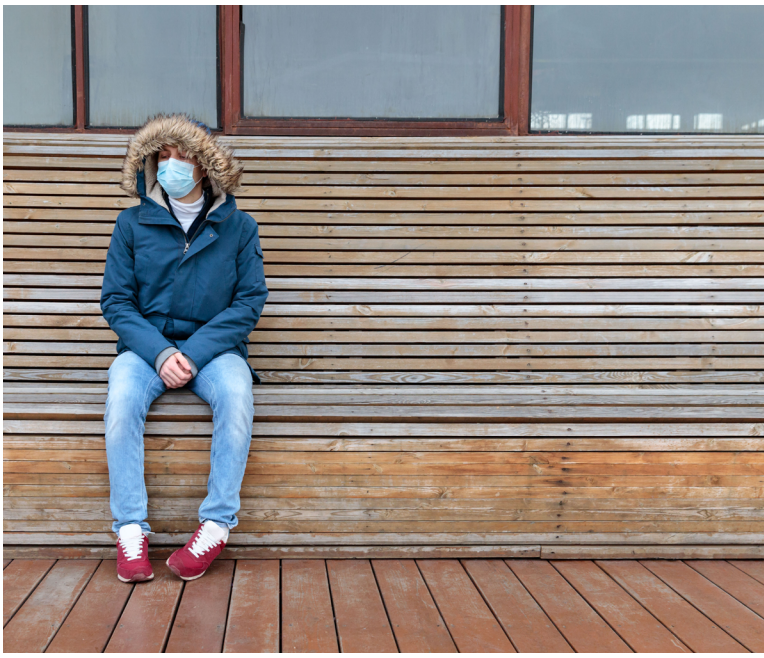
A Variety of Research Designs, Methods, and Data

For the purposes of this project, we define rapid-cycle research as projects that:

- are driven by the questions health system leaders have today;
- can be conducted within 3–9 months;
- balance responsiveness with the most rigorous methods possible; and
- support learning within a health system as well as broad dissemination of results and learnings to other health systems.

Longer-term studies will of course also be necessary and should be launched to learn from health system actions during this time, but the focus of this report is projects that can rapidly feed learnings back to inform health system strategy and decision-making.

Participants emphasized the need to utilize a variety of methods to answer critical questions—including qualitative approaches (e.g., case studies, input from the front lines), rapid development of new data collection tools, cross-system research, and population health surveillance/registries—as well as leverage the robust data assets that many health systems have developed in recent years. The urgent need for results in the face of the pandemic reinforces the growing emphasis in HSR for more rapid evaluation of the implementation of interventions, whether policy changes or care delivery innovations. The HSR field has made progress in this area in recent years, thanks to many efforts: the Patient-Centered Outcomes Research Institute (PCORI) and its Methodology Committee established new standards for evaluating complex interventions;[2] the Agency for Healthcare Research and Quality launched a new training program for learning health systems;[3] and the Center for Medicare & Medicaid Innovation supports numerous rapid learning projects.[4] Finally, given the variation in response to the pandemic across political jurisdictions, there are also opportunities to use a variety of classical and novel methods, including robust natural experiments, to evaluate the impact of new policies and system responses as they are deployed. AcademyHealth's **evaluation guide for program managers** is intended to help practitioners choose an appropriate design for a particular context.



The urgent need for results in the face of the pandemic reinforces the growing emphasis in HSR for more rapid evaluation from the implementation of interventions, whether policy changes or care delivery innovations.

Also of relevance are methods from the growing and evolving field of dissemination and implementation research and the increasingly blurred line between formal research intended to be published in peer-reviewed journals and rigorous improvement activities.[5] In fact, calls for new partnerships between care improvement/delivery leaders and researchers is part of the reason AcademyHealth established its Learning Health System Interest Group. COVID-19 makes it all the more important to rapidly bridge the gap between research and operations. Hospital and clinical leaders need to know which interventions are working in response to COVID-19, for which patients, and in what contexts.[6]

> **COVID-19 makes it all the more important to rapidly bridge the gap between research and operations.**

A final consideration is the data quality and consistency available for COVID-19 research. Our understanding of the disease's manifestations is evolving with each passing week, leading to changes in case definitions and therefore in which data are available and used to study the virus and its impact. For example, between March and early April, several organizations shifted from using only laboratory results for diagnosis to including a new ICD-10 code (introduced on 4/1/2020), updating the "pick list" of ICD-10 diagnoses that providers can use in the EHR, symptoms, and/or history of a close contact. Not surprisingly, there are several efforts underway to develop COVID-19 registries, including one by the Health Care Cost Institute (HCCI), CareJourney, and a sentinel network of geographically diverse health systems to create an **open COVID-19 patient data registry network**. Another, launched by the National Center for Data to Health (CD2H) and the National Center for Advancing Translational Science (NCATS), is taking a different approach and creating a centralized, secure portal for hosting row-level COVID-19 clinical data called the National COVID Cohort Collaborative (N3C).[7]

Priority Questions Within Six Domains

The sections that follow discuss the refined sets of priorities within each of the six domains for rapid-cycle research and evaluation projects that emerged from this process. The prioritization occurs within each domain—no attempt was made to prioritize across domains. Although some questions are cross-cutting and therefore could easily have fit into another domain, questions are presented here in the domain in which they were ranked in comparison to others within that domain. An overarching theme throughout the domains is the distributional impact of COVID-19—and the health care system's response to it—and ensuing disparities, whether by age, race/ethnicity, geography, or other dimension. Thus, these questions appear throughout the report. While a higher mortality rate among the elderly was seen early on, data only now emerging demonstrate the significantly higher toll of COVID-19 in health care workers and African American communities.[8,9] Additionally, given the decentralized nature of the national response,[10] a critical dimension for many of the research questions suggested will be geographic variation and the role of the extant public health and care delivery infrastructure, together with assessment of which policies were adopted and when. Finally, several participants emphasized the need to carefully learn from global experience and share back with health systems and policymakers around the world (e.g., **this article from providers in Bergamo, Italy**).

Patient and Community Experience, Engagement, and Outcomes

In both the Codigital idea generation and virtual discussion activities, participants expressed a keen interest in understanding outcomes for both non-COVID-19 patients and COVID-19 patients. In the prioritization round, participants emphasized a need to characterize the impact of the COVID-19 response on those patients who have been effectively "displaced" from their usual source of care, as well as urgency to address disparities in testing, treatment, and outcomes across populations. The full set of questions in this domain spans a broader set of topics, such as the role of health systems in helping patient and community audiences understand the rapidly evolving (and sometimes conflicting) guidance communicated to the public.

Top 5 Topics in Patient and Community Experience, Engagement, and Outcomes

Evaluate the unintended consequences on non-COVID-19 patient outcomes (impacts of missed/delayed care on guideline-concordant care quality, hospitalization rates, complications, risk-adjusted mortality).
What are the patient-, provider, and system-level factors driving disparities in COVID-19 testing, treatment, and outcomes?
Evaluate the impact on and lessons learned about care for vulnerable populations (e.g., disproportionate impact on access to primary care/behavioral health and other "routine" care).
What are we learning about complaints and conditions that actually can be managed at home, which in prior times would have led to visits to the health care system?
How do we promote outcomes by shifting people with chronic diseases who are effectively displaced by COVID-19, not receiving their usual care management or as much direct care, to telemedicine?

Care Delivery, Management, Decision-Making, and Operations

This domain generated the largest number of topics (28) for research and evaluation, which is reflective of the discussion among the participants and the current phase of the pandemic. As health systems adjust to create surge capacity for COVID-19 patients, other patients have experienced a shift to telehealth or disruption of planned and routine care, such as cancelled elective surgeries or scaled back chronic care management. The impacts of these and many other unprecedented adjustments came up in the discussion and are reflected in the full list of priorities. The top priorities reflect the participants' discussion of the scope of this prioritization exercise, and range from identifying best practices for testing referral and management to understanding what is needed to build a strong health system for the future, balancing efficiency with surge capacity. In general, the group focused mainly on issues of services and systems performance and organizational behavior and less on the immediate and critical patient care questions, such as the safety of ventilator use or effectiveness of therapeutic interventions. The overall list of ideas in this domain includes health system and delivery questions, such as work flows and space utilization. There was also a recognition that learning about effective leadership and management at this time of crisis is essential.

Top 5 Topics in Care Delivery, Management, Decision-Making, and Operations

- How are systems setting priorities after the COVID-19 surge (e.g., who receives elective surgeries first)?
- What are best practices clinics and organizations have implemented for COVID-19, such as effective testing referral and management, triage, and delivery of home-based care and intermediate care outside hospitals?
- Did past pressures to increase health system efficiency lead to a lack of resilience and lack of surge capacity? What policies and incentives would be necessary to increase health system resiliency and surge capacity in the future?
- What mistakes and successful innovations emerging as a result of geographic variation can we learn from as a way to drive action and share learnings quickly in the future?
- What requirements are needed for a strong and resilient health system that uses integrated technology, data, analytics, and processes, to keep healthy people healthy and to obtain the best outcomes for those who are ill?

Workforce Needs, Training, and Policies

The pandemic has brought unprecedented attention to the quality and commitment of our health care workforce. At the same time, the stresses on the workforce are clear and go beyond the crushing need for adequate personal protective equipment. It is therefore not surprising that the impact of the pandemic on the workforce emerged as a priority domain for evaluation projects. Given the rapid shift to expanded telehealth use, the pandemic is also accelerating shifts in the workforce and creating the opportunity to test new models of workforce deployment that many have long discussed. Of highest priority among workforce issues was the need to define new workforce designs, including expanded roles of non-physician clinicians, and the myriad short- and long-term impacts of the COVID-19 pandemic on the health care workforce. The full set of research questions in this domain includes additional topics such as impacts of regulatory changes on the health care system's capacity to respond and the effect on health care workers themselves of community control measures designed to flatten the curve.

Top 5 Topics in Workforce Needs, Training, and Policies

- What new workforce designs emerge, including reconsidered scope of practice?
- To what extent did the use of non-physician clinicians (NPs, pharmacists, doulas, PAs) alleviate strains on the health care system?
- Assess impact of COVID-19 on the existing and future health care workforce, including ripple effects of COVID-19 deaths of health care workers and variable trust in health systems (e.g., media reports of systems not allowing providers or other staff to wear masks).
- What are effective models of providing the needed workforce support within health care and other industries on the front line (e.g., to account for the day-to-day emotional toll of enacting (or making) decisions in resource use, to provide grief support, etc.)?
- How are practices/health care organizations redistributing their current workforce? What strategies are they employing to recruit or expand their workforce in the short term?

Technology, Data, and Telehealth

Participants focused many of their comments on learning about the use of telehealth during the pandemic while also raising questions about the data infrastructure for evaluations. The top priorities in the technology domain focus on outcomes and capacity-building needs of telehealth interventions, especially for effectively serving a diverse patient population. The larger list of research topics in this domain include a variety of privacy, data-sharing, and technology questions.

Policies, Including Payment Policy

Participants' priorities in the policy domain underscore the opportunity presented by the introduction of flexibilities and relaxation of some policy restrictions as part of the COVID-19 response. In particular, participants focused on understanding the impact (and potential long-term utility) of changes to a variety of policies including scope of practice laws, payment rules, and regulation of data flows. They also identified the importance of understanding the financial impact of the pandemic on health care delivery systems. The full set of questions in the policy domain range from the current impact of past policy decisions at federal, state, and local levels to the long-term policy opportunities that may arise as a result of knowledge gained from the COVID-19 experience.

Top 5 Topics in Technology, Data, and Telehealth

What is the impact of swiftly moving outpatient chronic care into exclusively tele-care (synchronous such as video, phone; or asynchronous such as portal, SMS) on disease control, unplanned care (ED visits or hospitalizations), satisfaction, costs?
Evaluate effectiveness and outcomes of strategies for accelerating implementation of telehealth for primary care, specialty care, and mental health care.
What systems are required to create bandwidth for a large-scale shift to telehealth? How can we learn from what works during a pandemic for broader health systems science (future benefit)?
In the move to telehealth, what are we learning about adaptations and tailoring to meet the needs of diverse patients?
What are we learning as a result of the rapid change in the use of virtual monitoring and telecommunications that is actionable for equity and effectiveness of telehealth (e.g., lack of minutes, data and text for many Americans as a barrier to effective telehealth utilization—potentially an FCC policy issue to lift caps on minutes, text, and data)?

Top 5 Topics in Policies, Including Payment Policy

To what extent should the flexibilities that have been provided in this crisis period be sustained going forward (e.g., telehealth, scope of practice, care delivery models, etc.)?
What will happen to scope of practice laws? What was the effect of relaxed state licensing laws (to allow providers to cross state lines without long delays when applying for new license)?
Assess barriers and enabling policies to effective local system data flow up to community, regional, and federal levels to enhance planning and response. How were data shared (and not shared) with researchers to increase learning?
Evaluate the financial impact of COVID-19 on primary care practices, hospitals, and health systems in the short term (which may influence Congressional action) and long term (e.g., Will COVID-19 increase the rate of rural hospital closures?).
Which federal, state, and municipal policies are helping and which are not? What additional flexibility is needed and what is the impact?

Top 5 Topics in Collaboration and Coordination

Assess health system approaches to working collaboratively with public health to address immediate needs and sharing of workforce, facilities, PPE, medicines and testing capabilities.
To what extent are providers (and payers) that would otherwise compete with each other collaborating/cooperating? What are the enablers and barriers for these collaborations? What are the long-term implications?
Evaluate factors driving effective collaboration across systems (e.g., integrated health care delivery systems, provider networks, academic medical centers, health departments, VA, community-based organizations, faith-based organizations) in diverse communities.
Identify effective strategies for engaging trusted partners and community connectors and facilitating community connections to meet individuals' needs.
How are health systems coordinating care in collaboration with other care settings, especially those with large elderly populations?

Collaboration and Coordination

An effective response to the pandemic demands close collaboration and coordination at every level—between the federal, state and local government jurisdictions, between health care organizations operating in a regional market, and between health care entities and both public health and community-based organizations. The top priorities in this domain focus on identification of effective approaches to collaboration of health care systems with external entities, from public health to community-level organizations. The full set of research topics in this domain include the assessment of factors driving effective multilevel stakeholder engagement across systems, evaluation of the association between community resources and rates of COVID-19 screening and outcomes, and monitoring health systems' decision-making in response to public health advisories that vary by jurisdiction.

Conclusion, Implications, and Limitations

The priorities identified and prioritized here are just a beginning. As the pandemic plays out over time and across communities in this country, additional questions will continue to surface that will need to be communicated to funders, both public and private. The research questions presented here speak to the strengths and relevance of HSR as a field in this time of upheaval and opportunity. What works? For whom? Under which circumstances? These questions reflect the evolution of HSR beyond its predominant focus on the delivery of medical care services to include a focus on social factors, health and care disparities, and a broad understanding of the impact on the patient.[11] The prioritized questions also underscore the growing need for, and role of, research that is partnered with or even embedded in health systems to be able to quickly produce reliable answers to pressing questions. Closer partnerships between users of evidence and those producing it is a broad need within the field, as is a need for more rapid results that can still be trusted. Thus, the pandemic is also an opportunity for HSR to demonstrate its value to health systems, policy decision makers, and patients.

Given the importance of producing this agenda quickly, it should not be seen as comprehensive. The priorities presented here are the result of a rapid-cycle idea generation and prioritization activity, conducted in less than a month, which was therefore limited in both the number of participants and the time to reflect and discuss. As a result, these views are not necessarily representative of all health systems working to respond to COVID-19; indeed, those most deeply involved on the front lines of care would not have had the time nor strength to participate. See Appendix B for the full list of contributors to this effort.

The flexibility and dedication participants demonstrated to contribute to this idea-sourcing and prioritization activity underscore the importance of this effort for facilitating an effective response to COVID-19. AcademyHealth and the Learning Health System Interest Group leadership aim to honor this commitment and leverage this input by rapidly disseminating the results to public and private funding entities. These results will hopefully spur funders to promptly launch these investigations to inform health system strategy and decision-making. We recognize that funders often have predetermined focus areas and that many have pivoted from their usual approach to widen their scope, provide an expanded set of resources and funding amounts, and move nimbly to support the response to the global pandemic. This priority agenda from leaders in health systems and patient experience can shape a coordinated, intentional funding strategy to build the evidence base health systems need.

Appendix A: Full List of Prioritized Questions in Each Domain

Patient and Community Experience, Engagement, and Outcomes

1. Evaluate the unintended consequences on non-COVID-19 patient outcomes (impacts of missed/delayed care on guideline-concordant care quality, hospitalization rates, complications, risk-adjusted mortality).
2. What are the patient-, provider, and system-level factors driving disparities in COVID-19 testing, treatment, and outcomes?
3. Evaluate the impact on and lessons learned about care for vulnerable populations (e.g., disproportionate impact on access to primary care/behavioral health and other "routine" care).
4. What are we learning about complaints and conditions that actually can be managed at home, which in prior times would have led to visits to the health care system?
5. How do we promote outcomes by shifting people with chronic diseases who are effectively displaced by COVID-19, not receiving their usual care management or as much direct care, to telemedicine?
6. What types of "messaging" from health systems and other health stakeholders are most effective in helping patients (and the community in general) deal with the unfolding public health crisis, and how can they counteract misinformation?
7. What are practice changes and subsequent health consequences for various types of patients—people with chronic conditions diseases and/or disabilities or at end of life?
8. How do we support self-management and do shared decision-making in the telemedicine world? How does this vary for people with additional social needs?
9. Evaluate impact of area poverty and low area health resources on COVID-19 related screening, treatment and outcomes.
10. Evaluate health systems' activities regarding social needs and social determinants. If the focus has shifted, what is the impact in the community?
11. How do health systems manage people with mild COVID-19 symptoms at home?
12. Evaluate patient and family experience of access, patient-centeredness, and quality of COVID-19 screening, treatment, and end-of-life-care.
13. To what extent has guidance to communities addressed language access needs?
14. Assess the impact of COVID-19 on the incarcerated population.
15. How does one support and evaluate social media engagement and individuals' desire to help and donate money or resources while considering the challenges this poses for health systems that may be overwhelmed by the response. How can we best engage the community in grassroots efforts to help us better plan for that in the future?
16. Which strategies are most effective at ensuring patients are competent in self-management of chronic disease when discharged from hospital?
17. What is the impact of the public charge rule on trust of the health community? (Indications are showing that African Americans and Hispanic populations will bear the brunt of the pandemic.)
18. How do we leverage the information coming from data journalism and investigative reporting to inform learning?
19. In this age of social media, how do our patients define 'privacy'?
20. Where are folks getting guidance (e.g., of those for whom the U.S. is not their country of origin, how many are sourcing guidance from their home countries)?

Appendix A: Full List of Prioritized Questions in Each Domain *(Continued)*

Care Delivery, Management, Decision-Making, and Operations

1. How are systems setting priorities after the COVID-19 surge (e.g., who receives elective surgeries first)?
2. What are best practices clinics and organizations have implemented for COVID-19, such as effective testing referral and management, triage, and delivery of home-based care and intermediate care outside hospitals?
3. Did past pressures to increase health system efficiency lead to a lack of resilience and lack of surge capacity? What policies and incentives would be necessary to increase health system resiliency and surge capacity in the future?
4. What mistakes and successful innovations emerging as a result of geographic variation can we learn from as a way to drive action and share learnings quickly in the future?
5. What requirements are needed for a strong and resilient health system that uses integrated technology, data, analytics, and processes, to keep healthy people healthy and to obtain the best outcomes for those who are ill?
6. Evaluate effectiveness and impacts of novel strategies for surge capacity across systems, agencies, and sectors.
7. What are the implications for how health systems will look a year from now? How many changes/adaptations being made will remain "normal" or standard in the future?
8. Have systems that have had to deal with previous crises (floods, fires, etc.) dealt better (or worse) with COVID-19?
9. How will primary care and behavioral health capacity be altered by the economic shock to practices?
10. From which sources are health systems sourcing information and evidence? What are the most trusted sources of data and evidence, and what criteria is that trust based on?
11. How will transferring inpatient care to outpatient settings result during the COVID-19 pandemic? How will the pandemic affect health systems' ability to transfer care, and how will we prepare for this for future public health crises?
12. Evaluate the disparities in access to COVID-19 testing and access to care by age, gender, race/ethnicity, health status, and other markers.
13. How can we develop (and update as data and evidence accumulates) protocols, processes and outcome measures, deploy them and rapidly evaluate their impact?
14. What lessons are organizations under severe stress learning about ethics and ethical dilemmas?
15. What is the pattern of adoption of promising treatments and what disparities emerged in their clinical or experimental use?
16. How do we engage clinical leaders to successfully train people in decision-making about scarce resources and prepare them for that situation?
17. How are practices changing in the long term with regard to their emergency management and crisis preparation?
18. Evaluate organizational (delivery system, provider networks, solo practitioner offices) policy and practice responses to COVID-19.
19. What services can be moved out of hospital (maybe out of region) when necessary (e.g., maternity, outpatient, etc.)? Where and how should they be transferred?
20. Design and pilot test rapid-response hospital "pods" (e.g., 10-bed increments) to accommodate the surge of patients expected to overwhelm today's brick-and-mortar hospitals.
21. Evaluate health care delivery system capacity and use of data and evidence in designing, adapting and delivering COVID-19 related services.
22. How do strategies and capabilities vary among organizations participating in the spectrum of payment/delivery reforms (ACOs, medical homes, oncology care model, ESCO, etc.) and compared to those that are not participating? Which predictive models are being used to plan for surge capacity? How are they performing? If there are differences in performance, can we understand why?
23. What does "capacity" mean in a "normal" scenario and what is needed during crisis? How do capacity and adaptations differ by type of health system (urban vs. rural, large vs. small, integrated, etc.)?
24. What level and strength of evidence are health systems relying on to make decisions about new technologies and other innovations to implement (e.g., telehealth; new workforce models)?
25. Did health care providers/systems have the data/evidence they needed to make decisions about equipment (e.g., reuse of PPE), patient triage, etc.?
26. How do we standardize the definition of the COVID-19 patient and the recovered COVID-19 patient?
27. Create stronger framework for the definition of "preparedness" at the organizational level.
28. Evaluate the deployment and impact (on care quality, safety, costs) of vital sign monitoring in Skilled Nursing Facilities (SNFs), Long-Term Acute Care facilities (LTAC), and Inpatient Rehabilitation Facilities (IRF) which is linked to display into the command center.

Appendix A: Full List of Prioritized Questions in Each Domain *(Continued)*

Workforce Needs, Training, and Policies

1. What new workforce designs emerge, including reconsidered scope of practice?
2. To what extent did the use of non-physician clinicians (NPs, pharmacists, doulas, PAs) alleviate strains on the health care system?
3. Assess impact of COVID-19 on the existing and future health care workforce, including ripple effects of COVID-19 deaths of health care workers and variable trust in health systems (e.g., media reports of systems not allowing providers or other staff to wear masks).
4. What are effective models of providing the needed workforce support within health care and other industries on the front line (e.g., to account for the day-to-day emotional toll of enacting (or making) decisions in resource use, to provide grief support, etc.)?
5. How are practices/health care organizations redistributing their current workforce? What strategies are they employing to recruit or expand their workforce in the short term?
6. What is the impact of changes in non-clinician roles (beyond MDs, NPs, RNs, techs)? (For example, all VA employees are being asked to step up in screening and other activities for which they have no training.)
7. What are the effects of the adaptations necessary to face COVID-19 on health care workforce health and wellbeing?
8. Assess the interface of health care and the public health response, particularly the effects of community control measures designed to flatten the curve on health care workers themselves, including access to resources they need (e.g., impact of closures of schools for parents in health care workforce who need to work regular/overtime shifts, safety of getting to and from work on isolated public transit systems, etc.).
9. Learn from inquiry of front-line providers: What policies (local, state, federal) help or impede you?
10. What are the most pressing workforce training needs and most effective ways to deliver these?
11. Assess the impact of credentialing/privileging policies.
12. Evaluate health system workforce attitudes, beliefs, and behaviors related to COVID-19 risks and best practices for different employee types, clinical settings, and organizational and area contexts.
13. Evaluate effectiveness of health system training/education and communication strategies to support workforce engagement and morale and reduce burnout.
14. Evaluate front-line provider and staff needs (from basics of equipment/supplies to support for physical and emotional toll).
15. To what extent is trauma-informed care for patients, families, and health care professionals being deployed and what are we learning about its effectiveness in different contexts?
16. Assess impact of COVID-19 on burnout and anxiety of frontline providers having come to terms with (but are nonetheless terrified about) going to work every day and potentially infecting their families, etc.
17. How can we protect older or other high-risk clinicians given their increased risks from COVID-19? In what ways are health systems adjusting duties such as consulting with younger staff, advising on the use of resources, being readily available for clinical and organizational problem solving, helping clinicians and managers make tough decisions, talking with families of patients, advising managers and executives, being public spokespersons, and liaising with public and community health organizations.

Appendix A: Full List of Prioritized Questions in Each Domain *(Continued)*

Technology, Data, and Telehealth

1. What is the impact of swiftly moving outpatient chronic care into exclusively tele-care (synchronous such as video, phone; or asynchronous such as portal, SMS) on disease control, unplanned care (ED visits or hospitalizations), satisfaction, costs?
2. Evaluate effectiveness and outcomes of strategies for accelerating implementation of telehealth for primary care, specialty care, and mental health care.
3. What systems are required to create bandwidth for a large-scale shift to telehealth? How can we learn from what works during a pandemic for broader health systems science (future benefit)?
4. In the move to telehealth, what are we learning about adaptations and tailoring to meet the needs of diverse patients?
5. What are we learning as a result of the rapid change in the use of virtual monitoring and telecommunications that is actionable for equity and effectiveness of telehealth (e.g., lack of minutes, data and text for many Americans as a barrier to effective telehealth utilization—potentially an FCC policy issue to lift caps on minutes, text, and data)?
6. How can we build a data infrastructure that links public health, community human services, and health care? What are the necessary data elements?
7. How are systems to capture and share data, evidence, and insights changing as a result of the pandemic response? What long-term lessons should we take away from this?
8. Has the availability of technology (especially communications) impacted the effectiveness of social interventions (connecting people in need with available resources) and led to an increase in participation?
9. Will practices (especially primary care practices) utilize more telehealth long-term, or will the drive towards telehealth slow once the crisis is over? How will practices need to adapt to accommodate this change?
10. How does one prioritize and deploy tele-outreach for high risk patients with chronic disease to prevent Emergency Department visits and hospitalizations?
11. Which digital innovations are being deployed to move care into the community?
12. How does mobile communications technology (for secure texting, knowledge management, distribution of protocols and training materials, video conferencing, and other services) maximize the knowledge and capacity of front-line providers to respond to a dynamic environment? How does this impact vary by care setting and type of provider?
13. Assess utilization of the new host of telehealth options (e.g., Zoom) and flexibilities announced by CMS: What is the impact on sharing and privacy/HIPAA?
14. What are the key data issues (sharing, linking, infrastructure, quality, etc.) that are serving as barriers to the response?
15. Evaluate COVID-19 pandemic predictive modeling (e.g., the Imperial College report) as a multi-disciplinary inquiry into the design and use of such population predictive models, and assess how they can be improved in the future.
16. Assess the need for improved data sources and flows at local, state, and federal levels to inform resource allocation (e.g., need for more real-time data about health care system supply, local demand, and how to allocate resources to areas with the greatest need in the short term; and need for data systems for emergency preparation in the longer term).
17. Design, implement and evaluate integrated home monitoring with disposable or remote sensors and mobile devices that feed data into command center to track the health of the community, in order to proactively respond to fluctuations in community health-driven demand for health care services.
18. Evaluate the enabling factors or barriers to data sharing with other sectors during this crisis.
19. What are the types or elements of data that we need to focus on sharing vs. those that may not be as necessary (so we can focus on the highest impact areas of data exchange)?
20. Evaluate the relative/comparative effectiveness of different hospital command centers to integrate patient data and information, where decision-makers rely on integrated systems to manage hospital capacity in response to patient surges while intelligently using data to manage non-COVID-19 patients present in the hospital and in the community.
21. Design, implement, and evaluate solutions for safety, quality and cost such that the data from and the usage of devices (infusion pumps, ventilators, dialysis machines, etc.) and IT (EHR, supply chain tracking, etc.) for every ICU bed are managed to maximize outcomes.

Appendix A: Full List of Prioritized Questions in Each Domain *(Continued)*

Policies, Including Payment Policy

1. To what extent should the flexibilities that have been provided in this crisis period be sustained going forward (e.g., telehealth, scope of practice, care delivery models, etc.)?
2. What will happen to scope of practice laws? What was the effect of relaxed state licensing laws (to allow providers to cross state lines without long delays when applying for new license)?
3. Assess barriers and enabling policies to effective local system data flow up to community, regional, and federal levels to enhance planning and response. How were data shared (and not shared) with researchers to increase learning?
4. Evaluate the financial impact of COVID-19 on primary care practices, hospitals, and health systems in the short term (which may influence Congressional action) and long term (e.g., Will COVID-19 increase the rate of rural hospital closures?).
5. Which federal, state, and municipal policies are helping and which are not? What additional flexibility is needed and what is the impact?
6. What is the impact of various regulatory changes (e.g., telehealth, licensing, waivers, etc.) on health systems?
7. Will the pandemic response speed up or slow down the transition toward value-based care? (State and community variation provide natural experiments.)
8. Determine how the field can learn from the COVID-19 experience to reinvigorate and redesign the ideal public health infrastructure for the 21st century.
9. Determine how the field can leverage learnings from the COVID-19 pandemic in educating policymakers about larger health care issues (e.g., health coverage, safety-net issues, Medicare, preparedness, thinking about health as one whole instead of separate pieces).
10. What is the financial cost of the pandemic to the health systems, payers, and patients?
11. What have we learned from COVID-19 about the functions, design, importance, and effects of Medicaid, and what are the implications for future Medicaid policies?
12. Can site neutral payment policies be balanced to accommodate the need for infrastructure to handle crises?
13. What should be happening in rural and critical access systems, and what policies are needed to better support them?
14. How do ideological influences on state-by-state decisions about what “essential” health services are during a pandemic affect health outcomes (e.g., abortion, maternal mortality)?
15. What is the impact of how states are leading and influencing the national picture?
16. Evaluate implementation of the newly finalized ONC rules on data sharing and interoperability.
17. Evaluate the need to redesign HIPAA privacy rules.
18. Assess the overall evaluation and monitoring of the implementation of federal and state policy into regulatory language, and the downstream impact on health systems and communities.

Appendix A: Full List of Prioritized Questions in Each Domain *(Continued)*

Collaboration and Coordination

1. Assess health system approaches to working collaboratively with public health to address immediate needs and sharing of workforce, facilities, PPE, medicines and testing capabilities.
2. To what extent are providers (and payers) that would otherwise compete with each other collaborating/cooperating? What are the enablers and barriers for these collaborations? What are the long-term implications?
3. Evaluate factors driving effective collaboration across systems (e.g., integrated health care delivery systems, provider networks, academic medical centers, health departments, VA, community-based organizations, faith-based organizations) in diverse communities.
4. Identify effective strategies for engaging trusted partners and community connectors and facilitating community connections to meet individuals' needs.
5. How are health systems coordinating care in collaboration with other care settings, especially those with large elderly populations?
6. Assess health system approaches to working with and learning the needs of local community partners that are expanding service in order to address social needs in that community.
7. What is the role of employers, who are often health insurers and (directly or indirectly) health care service providers (i.e., similar role to primary care), in the pandemic response?
8. Identify multilevel stakeholder engagement strategies (leadership, policies, practices, communication) associated with effective COVID-19 screening, triage, and treatment approaches.
9. How do community health partners and other CBOs think about and put in place their own crisis response/preparedness plans (uncharted territory)?
10. What is the role of health systems in engaging community-based organizations in COVID-19 response in their catchment areas?
11. Clarify the roles of official public health agencies vs. health system in components of crisis response (e.g., active surveillance for public health purposes, coordination of community health organization/population health activities).
12. How are health systems within a region collaborating to track demand and capacity (e.g., demand for ICU/ventilators, collaboration with VA as another source of surge capacity, etc.)
13. Evaluate area and community resources (e.g., # acute care beds per 1,000 population, primary care shortage area, and health care worker staffing rates) associated with COVID-19 screening, case rates, and outcomes.
14. What forms of strengthening community, county, and state public health infrastructures are urgent for now vs. for the future (e.g., new ways to interface those public health structures with care delivery systems.)
15. How do individual systems that span multiple jurisdictions (e.g., counties) respond to public health advisories that differ?
16. With regard to organizational governance and authority, how does a community come to agreement around issues (e.g., PPE conservation), especially in places like a Tri-State area where there are multiple health department jurisdictions and 10 large health systems?

Appendix B: List of Participants

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About AcademyHealth

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Endnotes

1. In order to aid idea-sourcing and prioritization in service of the COVID-19 response, the Codigital CEO provided the service to this project free of charge. The Codigital platform facilitates creative brainstorming and co-creation, refinement, and prioritization of ideas.

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11. The definition of HSR was updated in 2000 by AcademyHealth's predecessor organization: "Health services research is the multidisciplinary field of scientific investigation that studies how social factors, financing systems, organizational structures and processes, health technologies, and personal behaviors affect access to health care, the quality and cost of health care, and ultimately our health and well-being. Its research domains are individuals, families, organizations, institutions, communities, and populations."