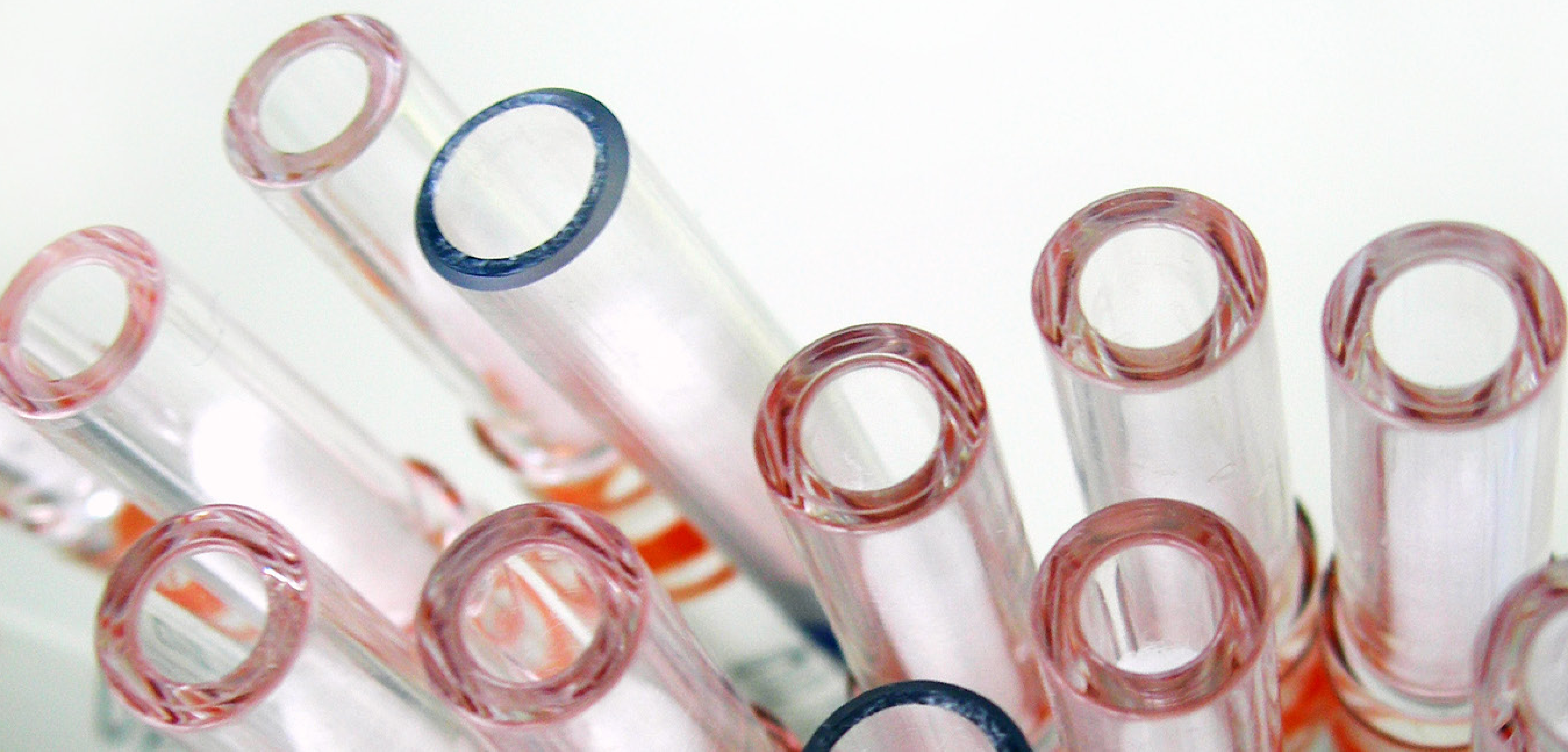




PwC Health Research Institute

Top health industry  
issues of 2021:  
Will a shocked system  
emerge stronger?

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## Heart of the matter

While in 2020 many healthcare organizations saw their financial plans obliterated, patient behaviors radically shift and virtual care explode, in 2021 they will work to put the system back together. Not to how it always was—but in a way that reimagines healthcare delivery, reconnects broken pathways and makes a giant leap toward a consumer-centric healthcare system.

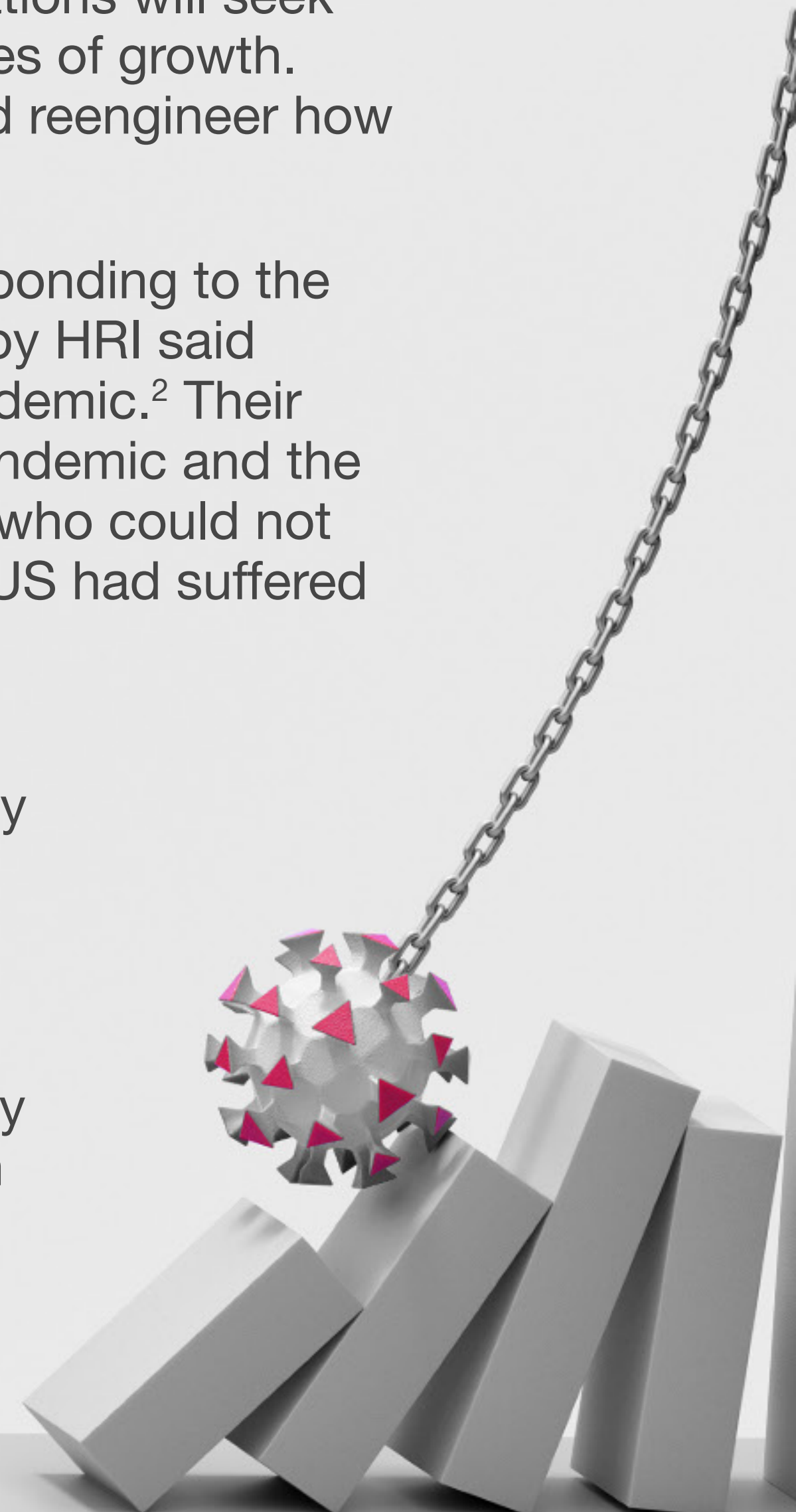
Nearly overnight, as volumes dropped precipitously, the deadly pandemic thrust patients, doctors, pharmaceutical companies and payers headfirst onto virtual platforms and other digital technologies that many had previously approached with hesitation. The sudden experiment allowed for valuable insights that health organizations in 2021 can use to fine-tune where they should land on the spectrum of virtual and in-person—in ways that make the most sense for care delivery, patient experience, reimbursement and clinical research. The insights also can help healthcare organizations navigate vaccine distribution as well as the ebbs and flows of patient volumes due to COVID-19 in the year ahead.<sup>1</sup>

In this year's Top health industry issues report, PwC's Health Research Institute (HRI) examines how the healthcare industry is expected to face the uncertainty of 2021, building resilience for long-term survival by developing its own forecasting systems, reshaping business portfolios post-pandemic for financial stability and growth, and creating a more nimble, modern supply chain.

However, the coming year also should bring about opportunities to build on a digital surge fueled by the pandemic. In 2021, healthcare organizations will seek to rightsize after the virtual health explosion, revealing new avenues of growth. They will strive to build better digital experiences for clinicians and reengineer how clinical trials are conducted.

Healthcare organizations also face a tremendous challenge in responding to the nation's mental health crisis, as 32% of US consumers surveyed by HRI said they had experienced anxiety or depression as a result of the pandemic.<sup>2</sup> Their own front-line clinical workforce has absorbed the brunt of the pandemic and the emotional toll of witnessing the deaths of hundreds of thousands who could not have loved ones present. A year after the virus first surfaced, the US had suffered more than 270,000 deaths as of early December.<sup>3</sup>

2020 drew the public eye to racial disparities and the blind spots of the healthcare system and other US institutions, brought acutely into focus by the high-profile killings of George Floyd and others. People of color suffered disproportionately under the pandemic, with Black people in the US dying from COVID-19 at 2.1 times the rate of whites.<sup>4</sup> The pandemic underscored the influence of a person's ZIP code, as where people live and their access to quality jobs, primary care, education and nutritious food can affect health more than clinical care.





Health systems and other providers in 2021 are expected to confront these inequities in healthcare through action. Community physicians, health system executives, insurers, community organizations, government officials, researchers and public health agencies should band together locally to respond to the realities in their communities.

“As this pandemic makes painfully visible, medicine alone—ventilators, drugs, ICUs—will not save us. Medical care contributes only 10% to 20% of positive health outcomes. Rather than facing these realities, we too often continue to reactively Band-Aid,” said Dr. Mona Hanna-Attisha during PwC’s 180 Health Forum in October as she discussed helping to uncover the lead water crisis in Flint, Mich. “We can’t afford to do that anymore. ... Addressing the upstream root causes is the only answer. What I have learned from Flint is that with crisis comes opportunity.”

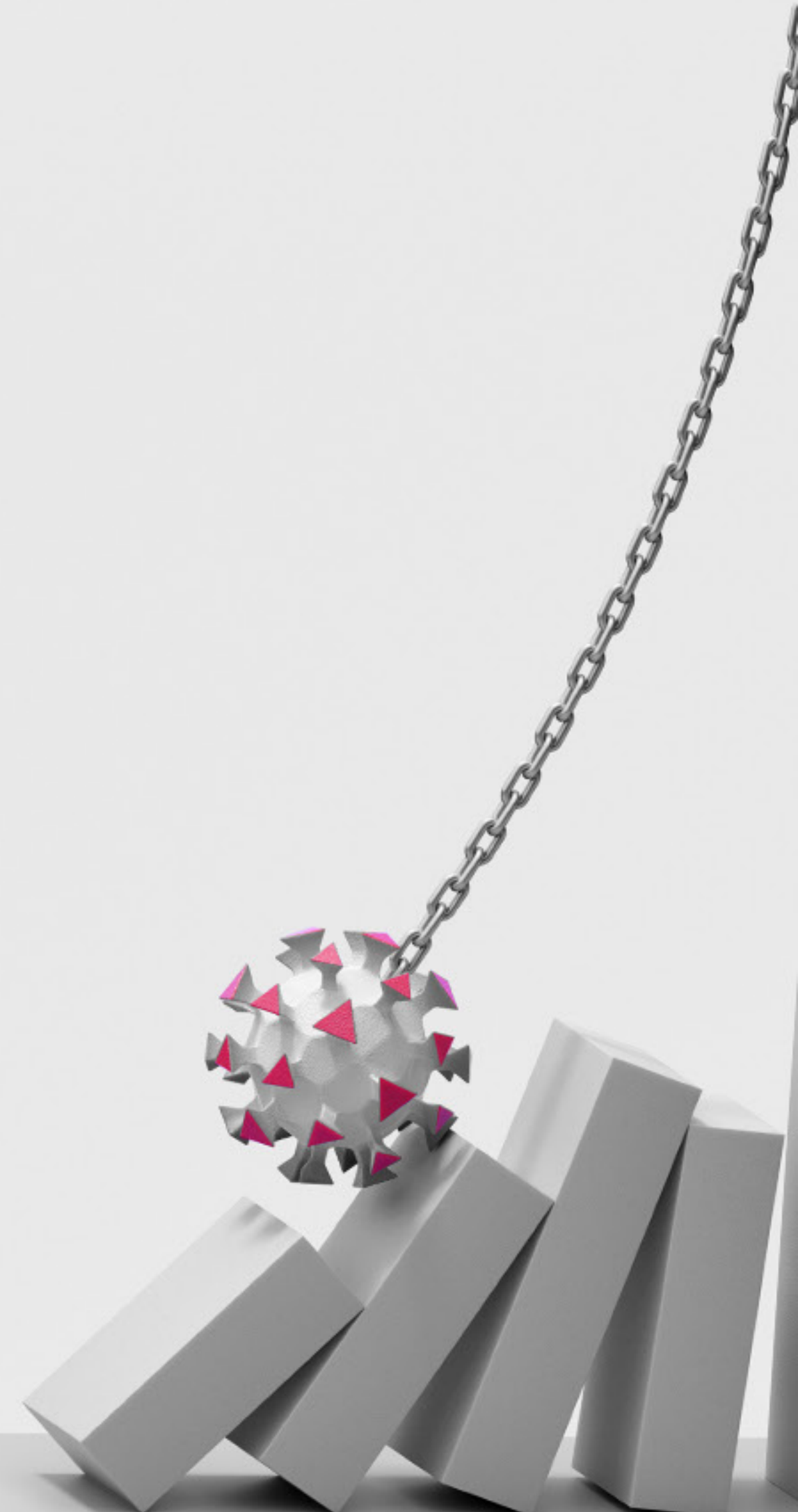
For this report, HRI surveyed 2,511 American consumers, 128 health plan executives, 153 health service provider executives, and 124 pharmaceutical and life sciences executives in August and September 2020. HRI also interviewed numerous thought leaders from throughout the industry and front-line clinicians to understand their on-the-ground experiences during a historic year.

The challenges of the year ahead mean that more than ever, organizations need resilient infrastructures and supply chains to absorb future shocks. They need detection systems that help them spot financial trouble ahead while identifying the right partners or deals. Healthcare organizations can use the lessons of 2020 to prepare themselves to better weather the year ahead, and some may use those learnings to create new business models.



# 32%

of US consumers said they have experienced anxiety or depression as a result of the pandemic





## The health industry rightsizes after the virtual visit explosion



The pandemic generated uneven experiences for millions of Americans as physicians, therapists, nurse practitioners, hospitals and other caregivers—all coming to telehealth with varying levels of experience themselves—tried suddenly to meet patients where they were. Some virtual visits happened on nontraditional mobile platforms, on personal phones, through texts and through messaging platforms more often used for sharing family photos or internet memes with friends. In the year ahead, the industry will work to determine which virtual visits make the most sense, and where and how they should take place.

Some specialties, such as mental health, may find stronger footing via virtual visits. Healthcare provider executives surveyed by HRI most frequently cited mental health and psychiatry (58%), family medicine (56%), obstetrics and gynecology (46%) and pediatrics (44%) as the specialties in which their organizations will offer virtual visits in 2021.

Payers may wrestle with how to reimburse and, in some cases, provide virtual care. Pharmaceutical and life sciences companies may have to determine where they can and should plug in, literally. Providers may continue to improve the patient experience and be careful not to create new disparities in the health system through lack of technology access.

With 95% of large US employers covering telehealth, up from 56% in 2016, business leaders will have a say in how virtual care is used and how it should be woven into the healthcare system.<sup>5</sup> “I think that the historical model for telehealth was an alternative to in-person health,” said Mike Thompson, president and CEO of the National Alliance of Healthcare Purchaser Coalitions, in an interview with HRI. “And going forward I think it will be an alternative to in-person health but not a replacement for provider relationships.”

### What works well (and not so well) for virtual care

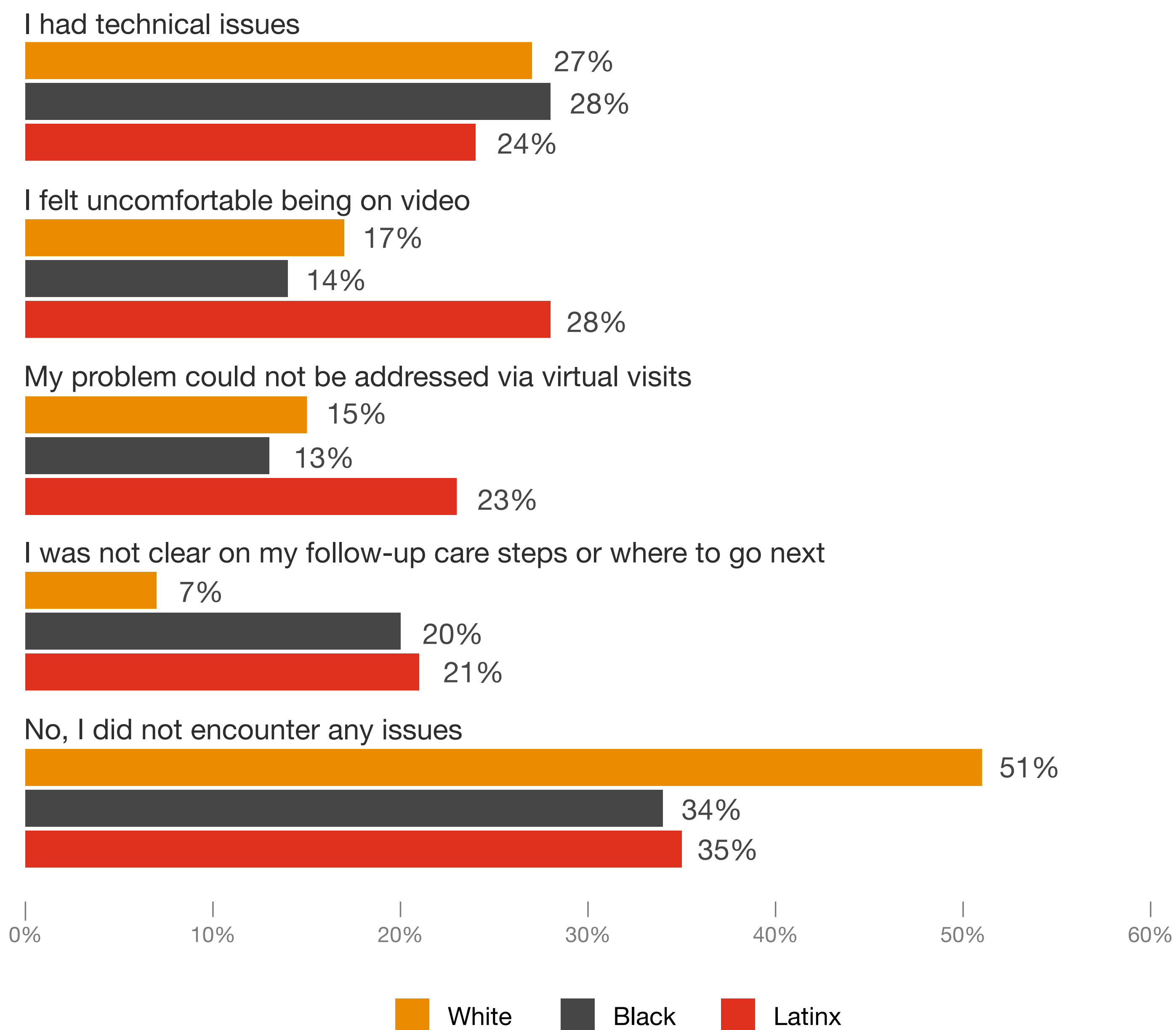
What have we learned so far? Ninety-two percent of healthcare provider leaders told HRI their organizations are using telehealth for primary care services. The largest share, 68%, said telehealth has been most useful for follow-up appointments.<sup>6</sup> Only 17% of health provider leaders said telehealth was useful for ongoing care management, which may indicate a missed opportunity to help the 11% of consumers who told HRI they are struggling to manage their chronic conditions.<sup>7</sup>



Although many consumers said they had a good experience with telehealth, not everything went as planned. Of consumers surveyed by HRI who said they have had a telehealth visit, 53% said they encountered at least one issue during the visit (see Figure 1). The most frequently cited issue overall was technical difficulties, indicated by 26% of the consumers. Minorities were more likely to have experienced a problem during their visit: 66% of Black consumers and 65% of Latinx consumers experienced at least one issue, compared with 49% of white consumers. Among Black and Latinx respondents, one-fifth said they were not clear on steps for follow-up care or where to go next, compared with 11% overall. Among Latinx respondents, 28% were uncomfortable being on video, compared with 18% overall.

**Figure 1: Half of consumers who have had a virtual care visit said they encountered at least one issue**

**Did you encounter any of the following issues during your virtual care visit(s)?**



Source: PwC Health Research Institute consumer survey, September 2020








Note: Selected data displayed. Other options selected less frequently included “The physician/health professional I saw did not seem comfortable on video,” “It was too expensive,” and “I felt rushed.”



There are many new opportunities for this care channel, such as managing mental health conditions, including those brought on by the pandemic. The mental health burden on the nation as a whole is also clear: 32% of US consumers surveyed by HRI said they had experienced anxiety or depression as a result of the pandemic, with the rate by race highest among Latinx respondents, at 44%, and 38% for Black consumers (see Figure 2). Those consumers who are already struggling with mental illness or who are in households with dependents under 18 were among the most impacted, according to HRI’s survey.

**Figure 2: The pandemic’s effect on Americans’ mental health is staggering**

**Since March 1, 2020, have you experienced any symptoms of anxiety or depression as a result of the COVID-19 pandemic?**

| LEAST AFFECTED<br>% responding yes   |     | Demographic  | MOST AFFECTED<br>% responding yes |                                     |
|--------------------------------------|-----|--|-----------------------------------|-------------------------------------|
| Male                                 | 27% | <br>Gender                | 36%                               | Female                              |
| 65 years and older                   | 15% | <br>Age                   | 47%                               | 18 to 24 years                      |
| White                                | 30% | <br>Race                  | 44%                               | Latinx                              |
| \$100,000 or more                    | 24% | <br>Income                | 43%                               | \$25,000 to \$34,999                |
| Medicare                             | 22% | <br>Insurance status      | 48%                               | Medicaid                            |
| Households w/out dependents under 18 | 25% | <br>Family status         | 48%                               | Households with dependents under 18 |
| Healthy adults                       | 19% | <br>Consumer health group | 60%                               | Consumers with mental illness       |

Source: PwC Health Research Institute consumer survey, September 2020



Forty-three percent of provider executives surveyed by HRI said they are offering telehealth for mental health services. Looking ahead, 58% said they plan to offer it for psychiatry and other mental health services in 2021.

Virtual care delivery may improve the ability to personalize care as mental health issues are increased and exacerbated by the pandemic. In an interview with HRI, Matt Kudish, executive director of the National Alliance on Mental Illness of New York City, said mental health issues present differently for everyone, “so it’s imperative that the system be more malleable to recognize and understand that in unique and personal situations, the interventions need to be unique as well.”

### **Health leaders should pay equal attention to revenue and customer experience**

Do consumers want telehealth? Do clinicians want to deliver it? It depends. Health leaders interviewed by HRI point to the fragility of the telehealth reimbursement system as a major hurdle to long-term sustainability. They worry about the lack of long-term payment parity between in-person and virtual visits, the reduction of ancillary services provided or ordered with a virtual visit, and the drop in prescription fills.





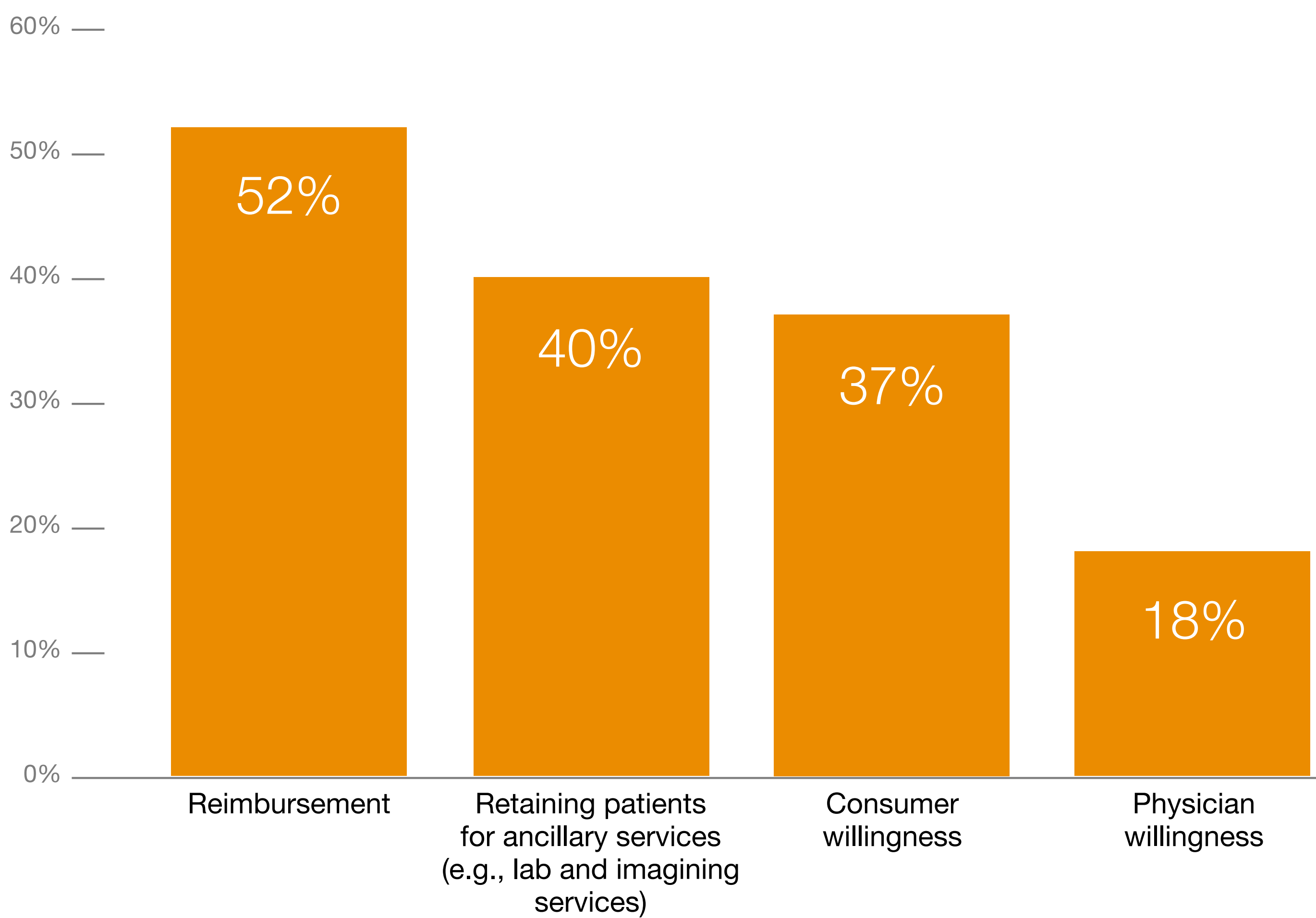


HRI found that a hyperfocus on getting the reimbursement right may be creating a blind spot to issues of consumer experience and clinical workforce satisfaction. When asked about the challenges to growing their virtual care programs, 37% of healthcare provider leaders surveyed by HRI said consumer willingness was a very significant challenge to growing their telehealth plan, and about one-fifth (18%) said that physician willingness was (see Figure 3).

### Figure 3: Health services provider executives cite multiple challenges in growing telehealth programs

#### How significant or insignificant a challenge are the following as they relate to growing your telehealth program?

Respondents indicating "very significant"



Source: PwC Health Research Institute Health executive survey, August-September 2020



But addressing clinicians’ willingness to participate in virtual care and how to make it a good experience for both caregivers and patients is not easy. HRI conducted a series of field interviews with front-line providers regarding the day-to-day experiences of using telehealth and what they learned during the period of most intense use (see Figure 4).

Figuring out the most efficient way to deliver virtual care is crucial for long-term sustainability. Seventy-nine percent of health system leaders said that staffing virtual care in a cost-effective manner is a significant issue.

**Figure 4: Voices from the field—front-line clinicians’ experience and observations**

| Clinician  | Here is my experience   | Here is what I learned   |
|--|---|--|
| <b>Pediatrician, children’s hospital</b>               | <p>Prior to the pandemic I treated 15-20 patients a day but none virtually. Now I treat 4-5 a day virtually and the rest in person.</p> <p>It is less than ideal for diagnosis but does work well for conferences with parents, educating patients and treating anxiety.</p>                  | <p>I bundle all of my telehealth visits for the end of the day. It was too disruptive to toggle between in-person and virtual visits.</p> <p>I know it is the future of medicine but I think it will always be a niche. People want a connection with their doctor. You can’t be a healer without a more human connection.</p>   |
| <b>Physical therapist and owner, outpatient clinic</b> | <p>In-person visits fell by 50% in spring of 2020 but are now at their highest volume as elective surgeries have returned.</p> <p>We treated one patient virtually during the pandemic and it was successful. We are now set up for virtual visits and will conduct them if requested.</p>    | <p>We will need to pair physical therapy virtual visits with a technology that can measure range of motion. Insurance companies only want to pay for objective measurements.</p> <p>Physical therapy patients prefer human interaction, the group environment in the clinic is what they want.</p>   |
| <b>Resident psychiatrist, academic medical center</b>  | <p>I now treat patients virtually during three hour blocks every morning. In-person visits are being slowly rolled out, as the situation evolves.</p>   | <p>Telepsychiatry allows us to peek into the patient’s home, which can be really valuable. You can see where they are calling from and really get a deeper understanding of their social context that you wouldn’t be able to do if they just came into the office.</p> <p>The relationship between the psychiatrist and patient feels more artificial in a virtual visit because nuances such as body language go a long way toward building this relationship.</p> |
| <b>Registered dietician, solo practitioner</b>         | <p>Pre-COVID-19, I had 12-15 in-person visits per week, which dipped some during the spring but is now up to 18 visits per week.</p> <p>Stress from the pandemic has increased eating disorders. I now have changed my practice to two days a week in person and two days a week virtual.</p> | <p>Moving to virtual visits became easier once I found the right technology. I installed a virtual platform for the visits and care management, which has the ability to connect to EMR/EHRs, but none are connected.</p> <p>Not all clients were willing to move to virtual visits. It can be difficult to really see the whole person because you lose subtle body cues.</p>   |

Source: PwC Health Research Institute clinician field interviews week of Sept. 14, 2020



## Implications



**Orchestrate care delivery to mitigate reimbursement issues.** Tying virtual to in-person seamlessly is important for reducing leakage and maintaining ancillary services, follow-up appointments and prescription levels. Better integrating virtual patient visits into a care pathway makes for improved care and reduces dropped handoffs. More than half of consumers (51%) surveyed by HRI said they wanted a care coordinator or navigator to help orchestrate virtual and in-person care and provide support services. Sixty-eight percent of provider executives surveyed by HRI said they plan to use more care navigators and coordinators in 2021.

Pharmaceutical consumer education may be challenged with virtual care visits, but technology may help bridge the gap. While only 19% of consumers surveyed by HRI said they have used a mobile app to help them take a prescription drug correctly or let them log symptoms, 83% of those who had done so thought it was useful.

**Happy clinicians are the best ambassadors for virtual care.** Sixty-nine percent of consumers said it was important to have a recommendation from their primary care doctor before using an alternative care setting such as virtual visits. Maintaining clinician satisfaction is key for virtual and in-person visits.

Health systems should carefully develop virtual care physician routines, such as making a standard patient check-in and checkout process, as with an in-person visit, and setting up the visit for the doctor. Having a standard process for embedding more than one provider, like an advanced practice nurse, a doctor and a dietitian, into the visit can help facilitate team-based care virtually and provide a bridge for real-time consultations with specialists. Health systems should consider a standardized technology platform with "help desk" support.

**Take care not to create new inequities.** The move to virtual may cause even more access and health disparities for underserved communities who lack technology or bandwidth. A recent report from the National Committee for Quality Assurance's Task Force on Telehealth Policy calls for addressing the lack of trust and deficits of digital literacy in specific communities.<sup>8</sup> Payers and providers partnering with community-based organizations and technology companies can ensure that this new care modality improves health and access.

Some health systems are handing out tablets, even if bandwidth is not an issue, as a way to get simplicity in the hands of users with a one-click solution for virtual care visits. Centene Corp., a multinational healthcare company, is partnering with Samsung to provide more than 13,000 smartphones to rural communities.<sup>9</sup> The phones will be distributed through Federally Qualified Health Centers (FQHCs) and will include 90 days of free service for virtual visits.



## Implications



**Start planning now for longer-term strategic issues.** In 2021, whoever captures the consumer first is expected to have more influence in guiding and navigating users through other parts of the health ecosystem. The competitive landscape may transcend geographies. For academic medical centers, offering free or low-cost telehealth consultations may be a way to attract new patients willing to travel for specialized procedures. Regional providers competing for better patient access for both primary and specialty care can use a similar strategy. Health providers that can offer the best access may win the patient.

Being able to scale up and down with virtual care is important for matching supply and demand and creating a more variable cost structure. But making the requisite changes to the health system's physical structure may lag even as outpatient space utilization is reduced. Only 3% of healthcare provider leaders said they had plans to reduce their capital footprint, versus 14% who expect to increase spending.<sup>10</sup> Health organizations should reengineer their products and services and how they are delivered in a way that creates a positive customer experience that is also financially sustainable.

**Avoid further fragmenting the health ecosystem.** Ultimately, the longer-term challenge with multiple groups and formats for providing care is increased fragmentation or duplication of care. It can become another disconnected option for consumers already faced with multiple fragmented choices for in-person care.

Insurance company executives surveyed by HRI said they also are offering virtual care services. Many health plans also are offering virtual care directly to members. According to HRI's survey, 74% of executives of fully-insured employer plans, 44% of executives of exchange plans and 78% of executives of Medicare Advantage plans said their plans are doing so.<sup>11</sup> Others are offering virtual options as a plan benefit. Understanding the impact to local primary care clinicians is important, including where health plans offering virtual care may refer for procedures and other hospital services.



## Clinical trials are changing—for good



In the face of a pandemic that forced nearly everyone, from patients to clinical trial coordinators, to stay home, at least temporarily, pharmaceutical and life sciences companies have been asking: How much can be done remotely? Quite a bit, it turns out.

Forced to minimize in-person clinical trial visits, these companies are now trying to find ways to conduct trials with few in-person interactions. The COVID-19 crisis has increased the appetite for change across the industry as sponsors, contract research organizations (CROs) and patients see benefits in a more decentralized model. The virtual trial, to be sure, is not a new concept: One team of researchers counted more than 1,100 trials listed on ClinicalTrials.gov employing connected digital products for remote data collection in both 2017 and 2018.<sup>12</sup> Still, the shift to more decentralized, virtual studies has received a powerful push during the pandemic.<sup>13</sup>

### The regulatory ground shifts

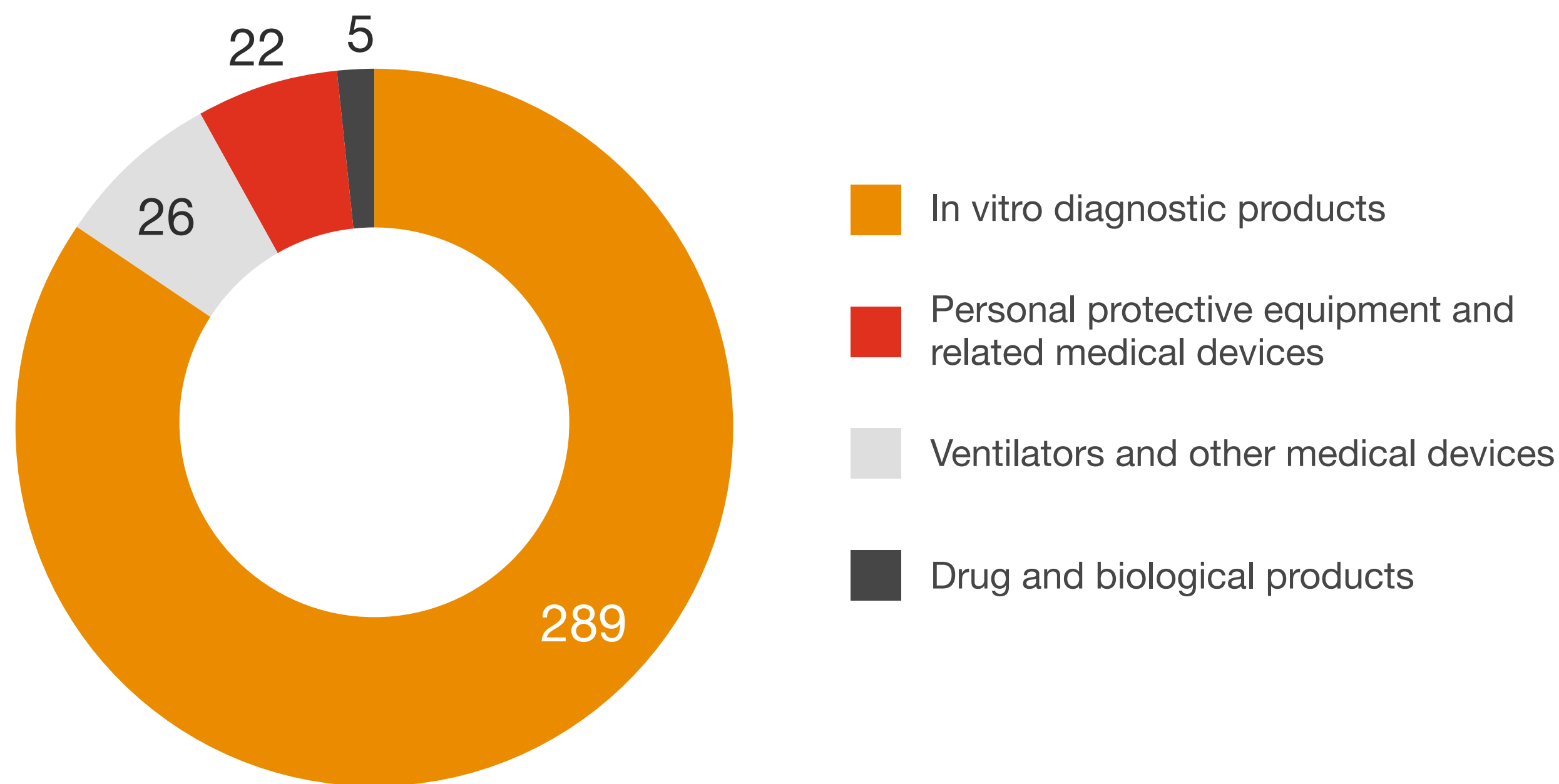
Regulators, for their part, have tried to smooth the way for a pivot to virtual during the public health emergency. In March, as states were issuing stay-at-home orders, the FDA published pandemic-specific guidance for trial sponsors, institutional review boards and investigators on how to ensure the safety of their trial participants and reduce risks to trial integrity, while sustaining compliance with good clinical practice.<sup>14</sup>

The FDA is hinting that some of these changes could be here to stay. “Being a clinical trialist of my own from the cancer world, I can see where some of the things we have adapted to in routine clinical practice during COVID-19 could then be parlayed into approaches in clinical trials,” FDA Commissioner Stephen Hahn, a radiation oncologist, said during the BIO Digital conference hosted by the Biotechnology Innovation Organization in June. “That could really help us expedite, and maybe we get that cycle time even shorter if we use some of these processes moving forward.”<sup>15</sup>



**Figure 5: The FDA issued nearly 350 emergency use authorizations over a nine-month period in 2020**

**FDA emergency use authorizations between Feb. 1 and Oct. 28, 2020**



Source: PwC Health Research Institute analysis of FDA, “Emergency Use Authorization (EUA) Information, and List of All Current EUAs,” FDA.gov

Between Feb. 1 and Oct. 28, the FDA issued nearly 350 emergency use authorizations (EUAs) for in vitro diagnostic products, personal protective equipment and related devices, ventilators and other medical devices, and drug and biological products (see Figure 5).<sup>16</sup> Between 2010 and 2019, the FDA had issued a total of 23.<sup>17</sup> In at least one case, Veklury (remdesivir), an antiviral treatment that received an EUA on May 1, received an approval less than six months later for use in children age 12 or older and adults hospitalized with COVID-19.<sup>18</sup>

The federal agency also is working more closely than ever with pharmaceutical companies on clinical trial development and reviews for COVID-19 therapeutics. The regulator is cutting time from the process with intensive pre-initial new drug application reviews and facilitation of master protocols.<sup>19</sup> Master protocols are trial designs that allow the testing of multiple drugs under one protocol, eliminating the need to develop new protocols for each trial.<sup>20</sup>

“We’re seeing a lot of additional flexibilities from agency and pilots around new clinical trial designs, adaptive arms and basket studies in last [Prescription Drug User Fee Amendments] cycles. We’re seeing decentralized clinical trials, remote monitoring and digital tools,” said Jocelyn Ulrich, deputy vice president of policy, research and membership at the Pharmaceutical Research and Manufacturers of America (PhRMA), in an interview with HRI. “The hope is that we are shifting the paradigm to things like this that have been available but not used widely and that we will see wider adoption and, in turn, positive impacts on clinical trial timelines.”



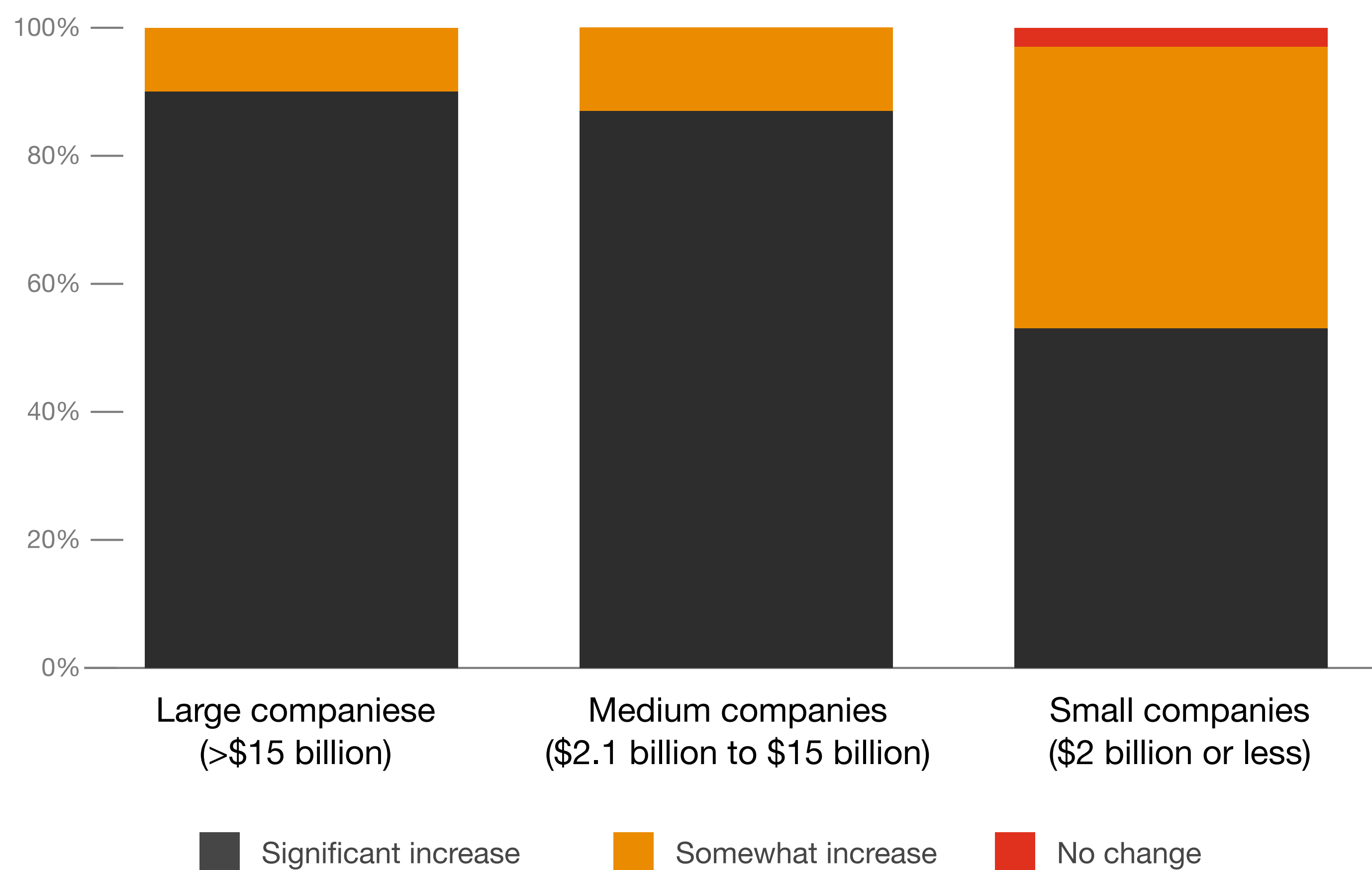
## An embrace of virtual tools transforms clinical trials

Almost all pharmaceutical and life sciences executives (98%) surveyed by HRI said they expect digital investment in clinical trials to increase next year. By revenue, large and medium-size companies were more likely than small ones to say their investments will significantly increase (see Figure 6).

**Figure 6: Pharmaceutical and life sciences executives expect significant investment in digitizing clinical trials**

### How significantly will your digital efforts in clinical trials increase or decrease in 2021?

Responses by company size (based on revenue)



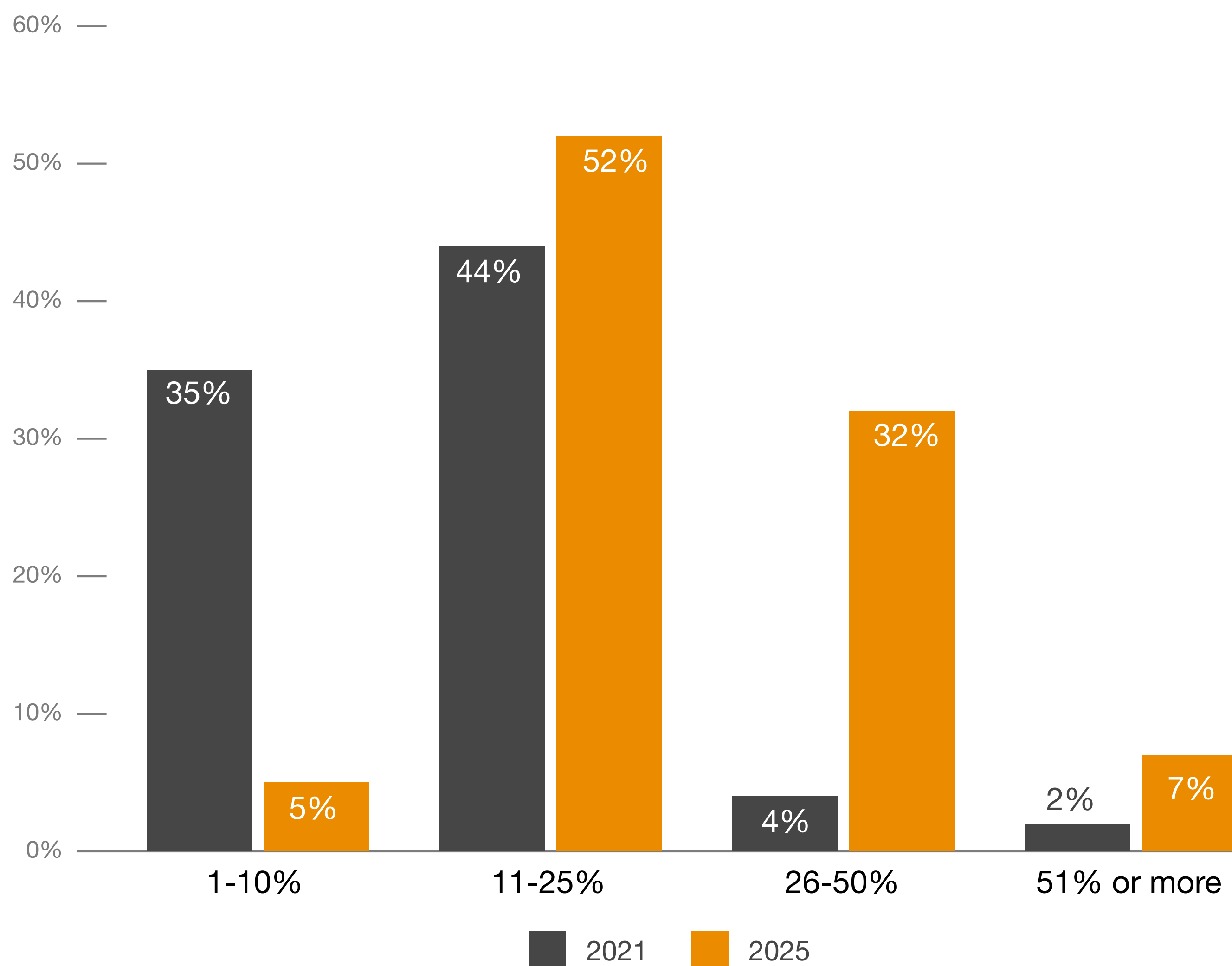
Source: PwC Health Research Institute health executive survey, August-September 2020  
Responses not shown: Somewhat decrease (0%), significantly decrease (0%)



Ninety-three percent of pharmaceutical and life sciences executives said virtual trials are important to their company's pipeline in the next five years. A small percentage of executives told HRI that they expect more than 50% of their trials to be virtual in the next five years (see Figure 7).

### Figure 7: Many pharmaceutical companies expect virtual trials to grow significantly over the next five years

**What percentage of your organization's clinical trials do you expect will be virtual in 2021? What percentage do you expect will be virtual in five years?**



Source: PwC Health Research Institute health executive survey, August-September 2020

Note: Not shown: 13% of respondents selected 0% for 2021; 2% selected 0% for 2025





In a post-pandemic era, post-market studies—studies that monitor the safety and effectiveness of approved drugs on the market—likely will rise in importance.<sup>21</sup> EUAs and expedited reviews and approvals to address high unmet needs may be supported by less clinical evidence. Generation of real-world evidence for post-market reviews is expected to be critical. This strategy offers the opportunity to solidify partnerships and co-development across biopharmaceutical companies and clinical diagnostics test manufacturers, health systems and insurers. Hospitals may try to limit trial participants’ exposures to pathogens by embracing virtual follow-up visits and remote monitoring of adverse events, mobility and body metrics.

Academic medical centers and other providers should be enlisted as the healthcare industry pivots to more virtual care and, for the biopharmaceutical industry, more decentralized trials, Dr. David Chin, distinguished scholar of health policy and management at Johns Hopkins Bloomberg School of Public Health, told HRI. “I don’t think the spike in virtual use is going back to where it was, so trials and delivery will need to adapt,” he said.

Payers and providers, awash in data about members and the populations they serve, including social determinants of health metrics, may be able to help pharmaceutical and life sciences companies develop trial protocols that serve more diverse populations. These trials could decrease the burden on trial participants, for instance, reducing the number of trips they have to make to a hospital or physician’s office, and make participation more attractive. For trial investigators, likewise, a decentralized approach, with more virtual elements, could make participation more attractive, too.



## Implications



**Determine the right studies that can be set up for success in a decentralized trial model.** Sponsors should identify and prioritize disease areas that are more conducive to enrolling patient populations through decentralized models. This likely will include understanding the feasibility of running studies in nonconventional locations that can adequately facilitate patient visits, drug storage and biospecimen collection. Also, not every therapeutic area is expected to have the same opportunity to virtualize trial components. According to HRI's survey, the top four therapeutic areas in which pharmaceutical and life sciences executives expect virtual trials in 2021 are oncology (44%), infectious disease (37%), immunology (28%) and women's health (26%).

**Set up the operations and infrastructure.** Traditionally, the sponsor and CROs have shared responsibilities in monitoring and overseeing clinical trial sites. These processes have been simplified through risk-based, data-driven approaches that have reduced the dependence on 100% source document verification. The decentralized trial model offers additional opportunities to disrupt the trial ecosystem and gain efficiencies through simplification of the trial drug supply chain, reduction of clinical research associate visits, and increased uses of data and analytics for trial oversight. The role of the CROs and other data providers is expected to evolve as roles and responsibilities shift. This may require reassessing CRO alliances and partnerships that had been anchored in traditional in-person clinical trials and may offer new opportunities to drive efficiencies.

This shift should help boost enrollment and drive down costs. Decentralized clinical trials are expected to force reconsideration of clinical standard operating procedures, training and quality management systems. Do they apply to the new model? What upgrades need to be made? Are there changes to how risk is considered? What are the new privacy and security considerations?

**Develop a holistic digital strategy.** As elements of trials go virtual, it will be important that benefits of the shift are realized. As Karen Noonan, senior vice president of global regulatory policy at the Association of Clinical Research Organizations, wrote in *The Pharma Letter* in September: "Patients stand to benefit from a [decentralized clinical trial] approach, both in terms of participation opportunities and the broader patient populations who will benefit from the ability to keep trials up and running. But what's currently missing from the conversation is not just why [decentralized clinical trials] are important, but how to effectively create and execute them by leveraging new and existing digital technologies."<sup>22</sup> New players are expected to emerge, offering digital tools and analytics aimed at decentralized clinical trials.



## Digital relationships that ease physician burdens



Until now, the health industry has focused more on ease and simplicity of technology solutions for consumers, and less for the clinicians who treat them. That may be changing in 2021. Nearly all respondents to HRI's survey—94% of provider executives, 92% of life sciences executives and 91% of health plan executives—said improving the clinician experience is a priority for their organizations as they enter 2021. Digital technology, if made right, could be the antidote to countless pain points that physicians encounter every day, leading to more efficient and satisfied doctors, happier patients and more patient referrals.

Well before the pandemic, many physicians already were tired and burned out, wasting too much time on administrative tasks and wanting more from digital technology, specifically electronic health records systems (EHRs).<sup>23</sup> They still tussle with endless drop-down menus, alerts and regulatory reporting requirements that sap their efficiency and ability to provide a good experience for patients. Sixty-two percent of physicians responding to a 2018 survey by the Physicians Foundation found that issues such as third-party authorizations, treatment protocols and EHR design were hurting patient care.<sup>24</sup> And now with telehealth going mainstream as a byproduct of the pandemic, they also are challenged to meld the virtual and in-person care worlds in a bigger way than ever.

### **Healthcare organizations can achieve efficiency with better digital relationships**

The pandemic may have accelerated payers' efforts to reduce physicians' administrative burdens. Early on, CMS relaxed several administrative requirements—such as allowing verbal orders versus written EHR orders in the hospital and relaxing licensure requirements for providing virtual care across state lines—that resulted in physician relief, at least for the duration of the public health emergency.<sup>25</sup> Some private insurers stepped in to help, too. In April, Louisville, Kentucky-based Humana announced that it would make the claims process easier and faster so providers could get paid.<sup>26</sup> The company uses bots to assist employees in handling claims.<sup>27</sup> The insurer also prioritized easing requirements on prior authorizations, an effort it was already working on.



In 2021, HRI expects more investment by payers in process automation, such as provider contracting. Look for enhanced portals through which providers can see what is happening to different claims, or straight-through processing, which aims to automate handoffs between different systems.

For the first time since 2017, health plan executives were more likely to say they are prioritizing the focus of their operating model in 2021 on the physician-patient relationship versus members directly, according to HRI's survey. The CMS final interoperability rules may help accelerate their plans, allowing them more opportunities to provide actionable data to help physicians and hospitals succeed in value-based care models (see sidebar, Interoperability 2021: A key to emerging stronger, on page 47).<sup>28</sup>

Health systems are expected to make the shift in automation from the back office of finance and human resources to the doctor's office in 2021. Seventy-three percent of provider executives surveyed by HRI said their organizations are working on improving the clinician experience by automating administrative tasks. Companies like Nuance Communications and Augmedix, which announced in October its plans to go public, are expanding their speech-to-text EHR documentation services nationally to providers in various specialties.<sup>29</sup>

A number of health systems, including Seattle-based Virginia Mason Medical Center, are implementing new HIPAA-compliant communication technologies that help break down silos and allow care teams from different departments to connect in real time and work in parallel to deliver more efficient care.<sup>30</sup> Virginia Mason has used this technology to improve outcomes for stroke patients and is rolling it out more broadly.<sup>31</sup>

### **The right digital tools for clinicians can be an opportunity for growth**

Digital physician relationship management may be an important growth strategy for life sciences companies and health systems. In the early days of the pandemic, pharmaceutical companies saw new drug starts, chemotherapy treatments and prescription fills dwindle as fewer people went to the doctor and, for those who sought care virtually, fewer prescriptions were written.<sup>32</sup>



# 73%

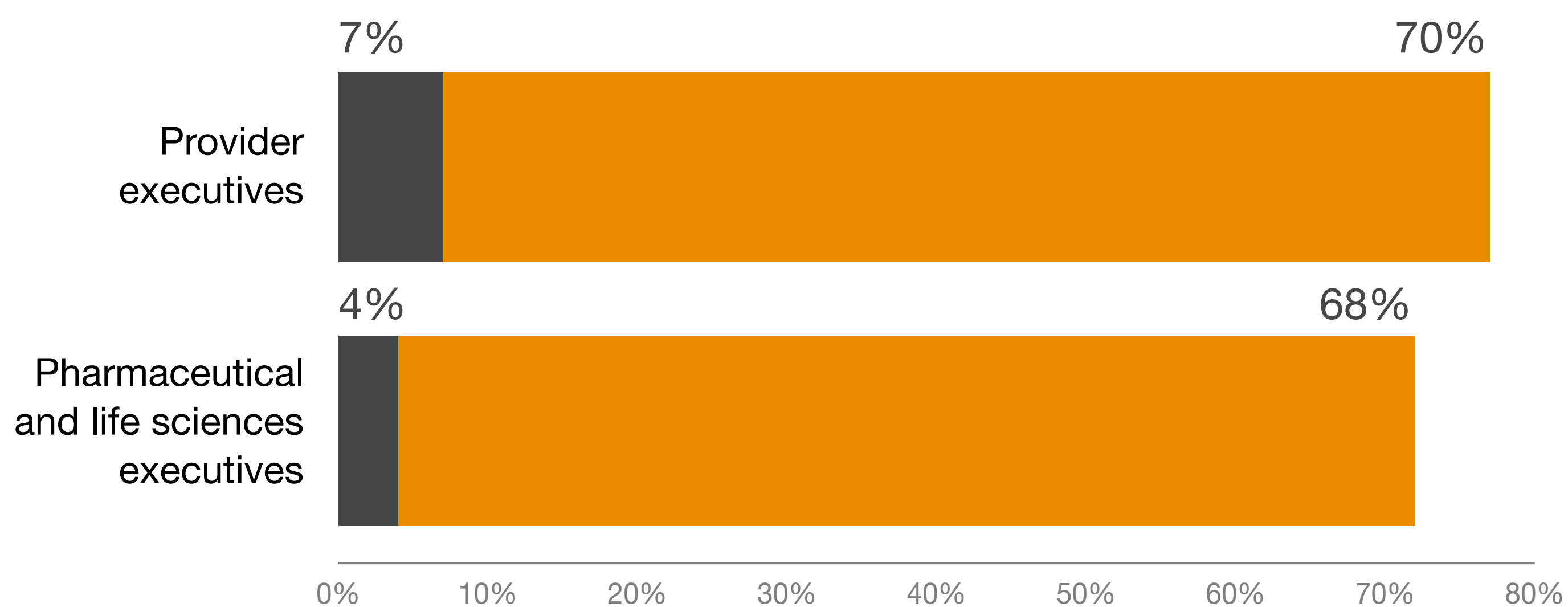
of provider executives said their organizations are working on improving the clinician experience by automating administrative tasks



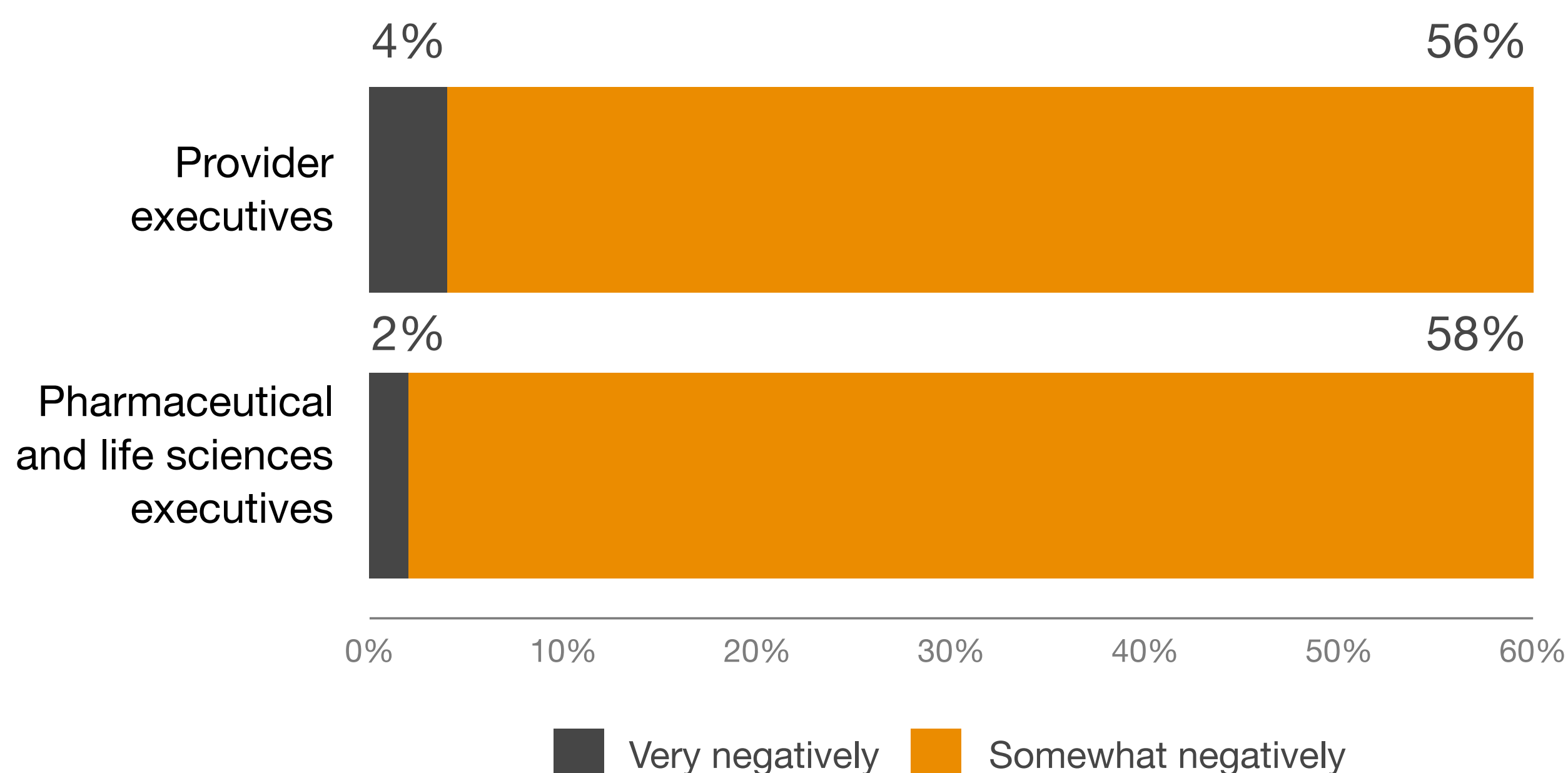
As state stay-at-home orders started being issued in March, many life sciences companies “grounded” their field sales forces. Seventy-seven percent of provider executives surveyed by HRI said the COVID-19 pandemic at least somewhat negatively affected the ability of their organization’s clinical staff to engage with pharmaceutical sales representatives (see Figure 8). Sixty percent said the same about medical science liaisons. Nearly all of the remaining respondents said the impact was neutral. Sentiment among pharmaceutical and life sciences executives surveyed by HRI mimicked that of providers.

**Figure 8: Provider and life sciences executives agree that the COVID-19 pandemic has at least somewhat negatively impacted pharma/clinician engagement**

**How negatively or positively has the COVID-19 pandemic affected engagement between pharmaceutical sales representatives and clinicians?**



**How negatively or positively has the COVID-19 pandemic affected engagement between medical science liaisons and clinicians?**



Source: PwC Health Research Institute Health executive survey, August-September 2020



Some companies that already had invested in digital platforms to virtually engage physicians, such as Eli Lilly, Esperion and Novartis, reportedly were able to make this transition quickly.<sup>33</sup> Some orchestrated a virtual market launch program for newly approved drugs, including Eli Lilly, which virtually launched Retevmo, a therapy for RET fusion-positive metastatic non-small cell lung cancer and advanced thyroid cancers, in May to 6,000 lung and thyroid specialists.<sup>34</sup> During a quarterly earnings call on July 30, Joshua L. Smiley, Eli Lilly's senior vice president and chief financial officer, told investors that Retevmo "had a strong launch despite debuting during a challenging external environment. We're encouraged by early demand signals. ... And our existing relationships with this customer base are leading to high-quality interactions."<sup>35</sup>

There have been a few pleasant surprises hinting at physician satisfaction with virtual interactions with the pharmaceutical industry. For example, the average duration of virtual pharma-physician interactions has been longer than in-person interactions pre-COVID-19, according to a survey by AbelsonTaylor, a health and wellness advertising agency serving pharmaceutical clients, published in June.<sup>36</sup> "I've had doctors respond that I've never met before just for lack of access," said a longtime sales representative of a large biopharmaceutical company in an interview with HRI. "Virtual engagement gives the customer a feeling that they have more control over it, versus worrying about perception and that I'll try to approach them in the hall."

Forty-three percent of provider executives surveyed by HRI said their clinicians still would prefer in-person meetings post-pandemic, but signs are pointing to a previously largely untapped way for biopharmaceutical companies to engage physicians to drive prescription growth.





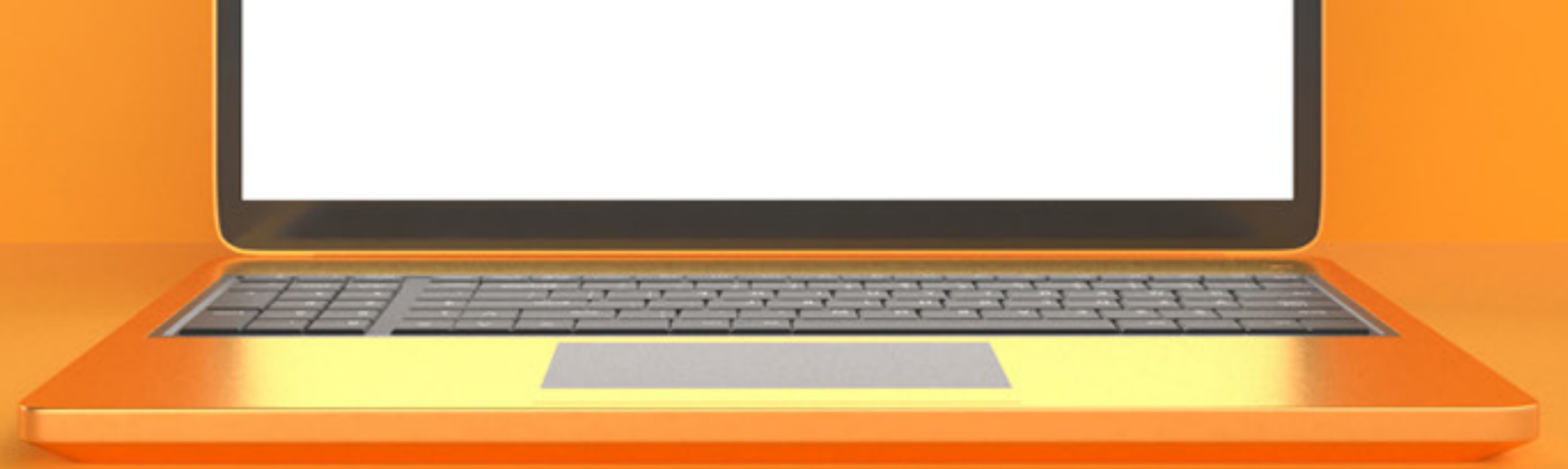
Physicians have had some complaints, including wanting more digital information and interactive tools from pharmaceutical companies to communicate with patients, and not just digital PDF versions of brochures that were meant for print.<sup>37</sup>

COVID-19 has worsened the financial outlook for many healthcare providers, who are already pressured to manage costs. At the same time, the pandemic has accelerated consumers' introduction to and use of alternative healthcare settings such as retail and urgent care clinics, according to HRI's consumer survey. Health systems are starting to think more strategically about how they build alliances and improve relationships with independent physicians to compete. HRI expects health systems in 2021 to improve physician relationships by using digital technology to help manage and grow referrals to the organization and prevent leakage from their physician networks. The global referral management technology and consulting market is expected to grow from \$2.6 billion in 2019 to \$11.3 billion in 2027.<sup>38</sup>

Providers likely will begin to understand and then predict physicians' behaviors and what influences their referral patterns. They are expected to invest in marketing technologies that can recommend targeted outreach strategies for use by physician liaisons in strengthening relationships with them and creating demand. They will likely work to integrate these tools with scheduling and patient outreach platforms so that they can intervene and proactively adjust patient scheduling, avoid cancellations and keep physicians happy. Access portals may be offered to referring physicians so that they can track where their patients are in the care process.



## Implications



**Prioritize clinicians' mental health.** According to HRI's consumer survey, 36% of healthcare clinical workers reported symptoms of anxiety or depression as a result of the COVID-19 pandemic, but only 12% said their employer had offered them new mental health benefits to cope with the pandemic. Health organizations should set the example for other industries by offering a menu of mental health benefits, including digital therapies, to their employees who as essential workers arguably have been under more stress during the pandemic than others. As of September, NYC Health + Hospitals had completed 9,000 "wellness rounds" at its locations in the five New York City boroughs, during which mental health professionals looked for signs of anxiety, depression and burnout among staff and connected them to resources.<sup>39</sup>

Beware that experience may be uneven based on gender, race or ethnicity. A one-size-fits-all strategy for improving clinician satisfaction likely will not work. Before the pandemic, burnout was found to be higher in the US among women than men, and white physicians reported higher levels of burnout and stress than nonwhites. By ethnicity, Chinese-American physicians reported the highest levels of burnout overall, while burnout levels among Black and Japanese-American physicians were among the lowest.<sup>40</sup>

Health organizations might consider investing in organizational culture studies that help them understand ingrained patterns of thinking and behavior in their organizations. They can use these studies to identify behaviors they want to reinforce and spread throughout the organization that align with company values.<sup>41</sup>

**Apply human-centered design.** Just as many already do for customer experience, health organizations should employ this popular design practice to improve the clinician experience. Human-centered design considers how people actually perform tasks, identifies pain points along the way and engages those same people in designing new ways of getting the job done. Companies should use personas and journey mapping to uncover barriers when building digital relationships with physicians.<sup>42</sup> They should gather feedback from physicians about their experiences across all interaction channels and "moments that matter" in their journey. Health organizations should employ nonintrusive tools such as speech/text analytics and nonsolicited feedback mechanisms such as social listening and call mining to gather insights on experience. They should integrate the clinician and customer experiences, and use predictive analytics to better connect experience insights to likely outcomes.





## Implications

**Go for omnichannel engagement.** The advent of telehealth, the focus on continuing to drive patient adherence in a more virtual world, and the increased need to provide physicians with evidence of a therapy's value are expected to drive many of the services that life sciences companies bring forward. They should map out how to support the patient-physician virtual interaction; for example, how can physicians get free drug samples to a patient if their visit is virtual? Field staff should be upskilled, and the tools and content they use upgraded to be effective in virtual interactions.

Organizations should also make sure to integrate digital solutions into care models and business operations. For example, a health system may design a digital app that allows patients to add drugs to their medication lists. But unless it also designs for providers to get a notification and prompt to perform a medication reconciliation, it could create a patient safety issue.

Health organizations should invest in cloud-based technologies and analytics that can pull in patient data—including social and lifestyle—from several devices and sources, allow clinicians to access them in real time and use machine learning to arm clinicians with suggestions and recommendations for patient care.



## Healthcare forecasting for an uncertain 2021

A health industry that found itself fighting in the dark during the opening waves of the pandemic will need a forecasting system that provides a lens for the uncertainty ahead. Better sightlines can help health companies prepare for shifts in the insurance market, the economy, utilization, consumer behavior and future waves of infectious disease. Seventy-four percent of health executives responding to HRI's survey said their organizations would invest more in predictive modeling in 2021.

This capability to forecast the future could be as important to healthcare survival in 2021 as a mask may be for slowing the spread. No longer can healthcare organizations review the past 30 days of claims or historical behavioral trends to determine next steps. They need real-time insights to create the healthcare industry's own forecasting system to alert healthcare leaders to the shifting fronts that may have a major impact on their business.

As the pandemic experience varies at different times across different regions of the country, local partnerships between health providers, payers, community groups and government agencies can help power a more informed response.

### **A CEO flight simulator relies on advanced analytics and modeling**

The industry has been missing the equivalent of a CEO flight simulator to help health leaders identify warning signs early, so they can be prepared to make quick decisions when necessary while also allowing for dynamic strategic planning.

HRI's survey found that provider and life sciences executives believe they are reasonably able to understand their supplies and workforce, but they feel they have less of a vision into predicting supply and demand. Stronger forecasting could help health services providers predict volumes by service lines and sites of service, as well as plan for clinician staffing, personal protective equipment needs and vaccine distribution. Payers could use insight into how members may shift between commercial insurance, Medicaid and Medicare, and when to expect significant changes in utilization and projected impacts to medical loss ratios. Life sciences companies need visibility on changes in health screening behaviors, while medical device companies need an immediate understanding of surgery totals to align their manufacturing plans in real time.



All sectors should have better insight into patients to understand whether transportation needs or work schedules will prevent them from following through on a treatment, to predict when their conditions might be worsening, or to determine how to best connect pharmaceutical products to individuals.

### **The regional forecast requires community leadership**

While national models on virus spread and the impact of social distancing measures provided a base of knowledge for healthcare organizations to use to inform their own forecasts, “healthcare and disease management is a local phenomenon,” said Paul Castillo, chief financial officer of Michigan Medicine, in an interview with HRI. In his state, the pandemic experience played out differently in southeastern Michigan compared with, for example, the western part of the state.

But “the pandemic created an opportunity for collaboration that otherwise would not have happened,” Castillo said. He pointed out that Michigan Medicine is working with insurers and other health systems to determine how to best solve future issues collectively. “It is important to bring partners together to move forward and get a better, shared outlook,” he said.

No one organization holds all the data needed to paint a full picture of the future. Understanding where health, consumer and economic data intersect helps healthcare organizations form accurate predictions so they can determine where to target resources to encourage healthy lifestyles in the future, not just during the pandemic.





The ecosystem approach could be made easier by new federal interoperability rules that aim to make data sharing between payers and providers smoother and give consumers more access to their own health data. New entrants or health information exchanges may have the platforms to help collaborators unite the data in one place to feed their radar system and simulations.<sup>43</sup>

Academic medical centers have a role to play, as some of them stepped in during the pandemic to help make sense of the deluge of information for their regions. M. Kristen Peek, chair ad interim of the department of preventive medicine and population health at the University of Texas Medical Branch, participated in daily command center meetings as the region tried to get a handle on the situation locally, tapping a university demographer to create predictions of which patients were likely to get sick in their county. In terms of forecasting and planning, the window of time shrank drastically from traditional timelines. “I see a lot more short-term forecasting going on now, and that seems to be useful because changes seem to be happening daily,” Peek said in an interview with HRI.

Every healthcare organization will need regional radars to help them simulate possible future paths. Cross-sector collaboration could help spread the work (see Figure 9). For example, an academic medical center or county government might convene a consortium to develop a regional forecast fueled by data contributions from health information exchanges, community hospitals, payers, suppliers and sources with data on the local economy, consumer behaviors and community demographics. From that forecast, all organizations, including life sciences companies, can make data-driven decisions to improve the health of their communities and reduce waste.



## Figure 9: A regional forecast leads to healthier consumers, cost savings and less waste



Source: PwC Health Research Institute illustration



The pandemic experience pushed healthcare organizations to increase collaboration: 73% of healthcare executives surveyed by HRI said they were starting to collaborate or had plans to collaborate with other care providers and payers as a result of the pandemic. Sixty-five percent told HRI that they were starting to collaborate or had plans to collaborate with public health agencies.

### **Forecasting a better, more equitable health future**

Population-wide simulations can enable healthcare leaders to consider how interventions, such as food deliveries, mental health services or care coordinators, can maximize the impacts of their investments.<sup>44</sup> But they can also look to the individual details of a person's life to better understand, for example, how to communicate with an elderly asthma patient without a smartphone during the pandemic, or how to determine what would make a middle-aged woman worried about COVID-19 comfortable scheduling a hip replacement.

Such tools could identify those most at risk of poor outcomes from COVID-19, so organizations can develop targeted community responses. "We can document all the inequities we want, but this has laid bare the problems in our health system with minority populations having incredible health inequities," Peek of UT-Medical Branch told HRI.

Consumers show confidence in their primary care physicians, ranking them equal to the CDC for whom they trust most for accurate information about COVID-19, according to HRI's consumer survey. More than half of consumers (53%) surveyed still report fear about going to the doctor during the pandemic, but only 27% said they are getting information from their physician or local hospital/health systems about when it was safe to return for care.

Especially concerning is the higher level of worry among consumers with complex chronic disease, with 66% of these respondents still fearful, and what that worry might mean for their care going forward, as volumes still have not fully rebounded (see Figure 10).<sup>45</sup>



# 73%

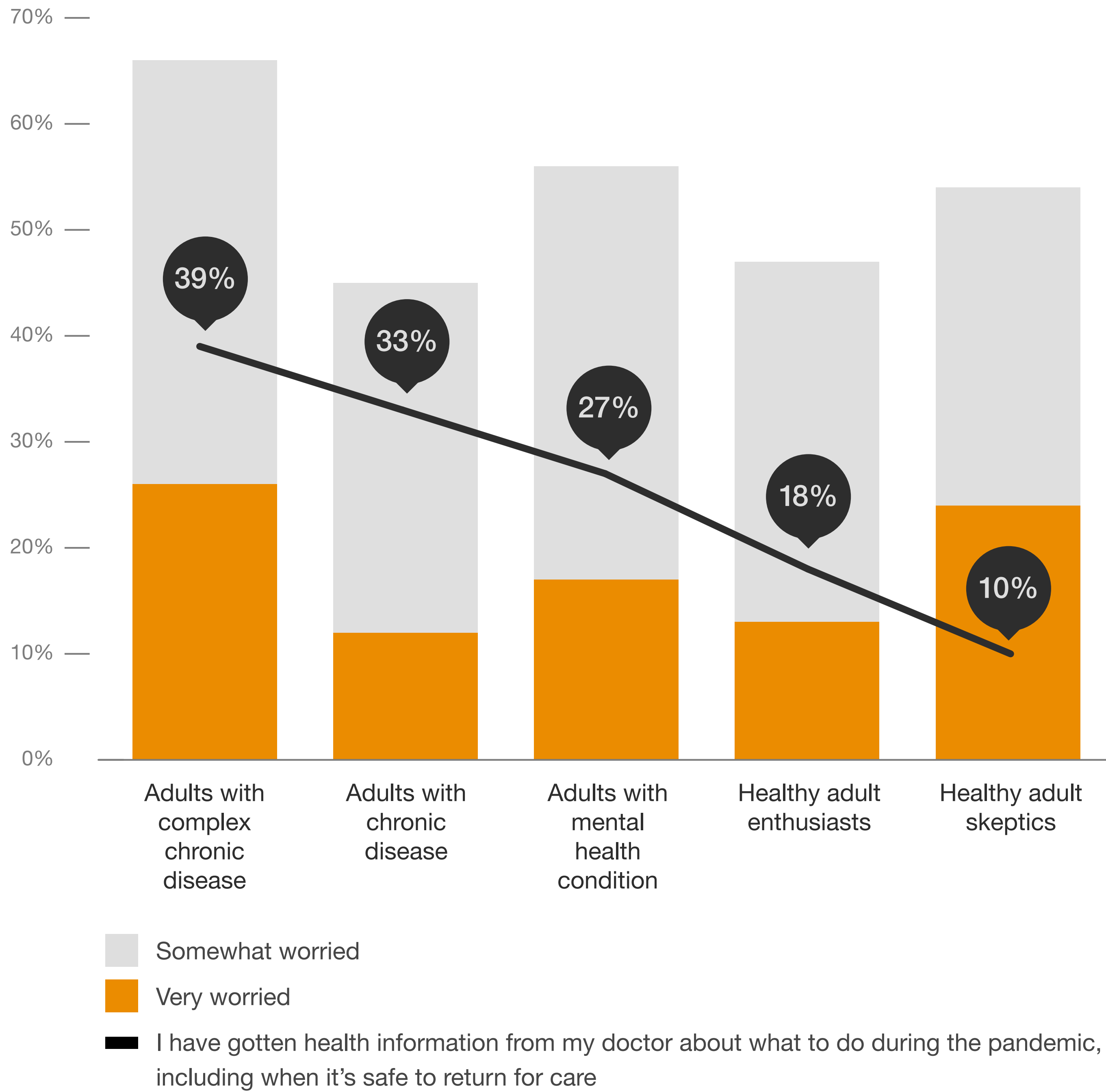
of healthcare executives said they were starting to collaborate or had plans to collaborate with other care providers and payers as a result of the pandemic



**Figure 10: More communication from doctors could ease worry and encourage patients to return for care**

**How worried are you, if at all, about going to the doctor in-person during the COVID-19 pandemic?**

(Responses collected in early September 2020)



Source: PwC Health Research Institute consumer survey, September 2020

In 2021, healthcare leaders should not rest on the assumptions from past trends; they should be willing to build and monitor their radars to pivot when the environment changes.



## Implications

**Develop the right sensors to alert leaders to important shifts ahead.** The experience of the pandemic showed the need for healthcare leaders to move from a retrospective view fed by historical trends and past claims to a prospective view based on real-time information, both clinical and nonclinical. This is not a one-time exercise; healthcare companies need a constant reading on these streams to understand how to adapt care and engagement in response to crises or sudden shifts in behavior and mobility. Beyond crisis moments, the ability to model out these different scenarios, and make decisions accordingly, can help organizations monitor and prevent chronic disease progression by responding to patients differently and adjusting their plans. Organizations may not be taking advantage of existing data to synthesize it in this way, but during the pandemic, companies were forced to step back and assemble clearer pictures.

Health organizations also can use these sensors to shift gears to prevent dramatic drops in revenue from plummeting surgeries, and allow leaders to fine-tune their workforce plans to make sure they have exactly the right number of employees to respond—all of which avoids wasteful spending during crucial times.

**Reconnect patients to the healthcare system with improved data insights.** Healthcare providers have a giant opportunity to improve communications with patients to bring them back into the system, informed with models about consumer motivators and preferences in response to the pandemic. They can develop targeted marketing and communication strategies to help patients feel safe to return. Avoiding those waves of care disruptions can bolster the entire healthcare ecosystem.

After the pandemic, these data insights and approaches can power proactive strategies to help patients manage chronic conditions, modeling for consumers the impact of behaviors or therapies on their health so they can make better decisions.

**Fuel forecasts with real-time, local data that contextualize people's lives.** It's not just more data that health organizations need; they need the data that allow them to paint a better picture of their patients' lives, to understand, for example, whether the person lives in a multigenerational household or works in an essential industry. Both are important pieces of information to help members stay safe during the pandemic.

Data from local and regional partners can also help determine the best response. For example, in Boston, the Beth Israel Deaconess Medical Center found that national models overlooked details about the local market that were affecting what the hospital was experiencing.<sup>46</sup> The team used machine learning to tap into the information in its electronic medical records (EMRs) and to process data on COVID-19 patients from multiple hospitals at the same time.





## Implications

**Convene regional collaborations.** Academic medical centers, business councils, community leaders, government and large local employers have the opportunity to convene regional efforts, filling in gaps in capabilities and making use of their institutional expertise. New entrants can serve as key partners, helping generate insights from health and consumer data that drive smart outreach strategies. Community organizations could also help execute these strategies by building on community trust and providing a lens into the social determinants impacting the health of their communities.

New federal rules for interoperability and a push toward more health information exchanges may accelerate the flow of data needed to make regional collaborations more successful (see sidebar, Interoperability 2021: A key to emerging stronger, on page 47).<sup>47</sup>



## Health portfolios reshaped for growth

The COVID-19 pandemic placed some companies in a position to invest and evolve, and others needing to partner to survive. The shock of the pandemic has highlighted the need for many health organizations to diversify their capabilities and revenue streams to be more resilient, readying for impactful court decisions, increased focus on pricing and price transparency, and the unknown. Some companies, as they better understand the impact of COVID-19 on their business, are expected to return to driving their pre-pandemic growth agendas. In 2021, HRI expects to see increased investment in and by healthcare companies to shore up gaps exposed by the pandemic and position them for growth.

### **Deferred care leaves health plans flush with capital**

Most states require health insurers to maintain an average risk-based capital (RBC) ratio of at least 200%.<sup>48</sup> Plainly speaking, the RBC ratio is a measure of how much money a payer has on hand as a percentage of its dollars at risk.<sup>49</sup> A PwC analysis found that in the second quarter of 2020, nearly a quarter of health insurers had RBC ratios of 800% or higher, indicating a strong capital position. The average risk-based capital ratio for the sector grew from 616% in 2019 to 690% in the second quarter of 2020 (see Figure 11).

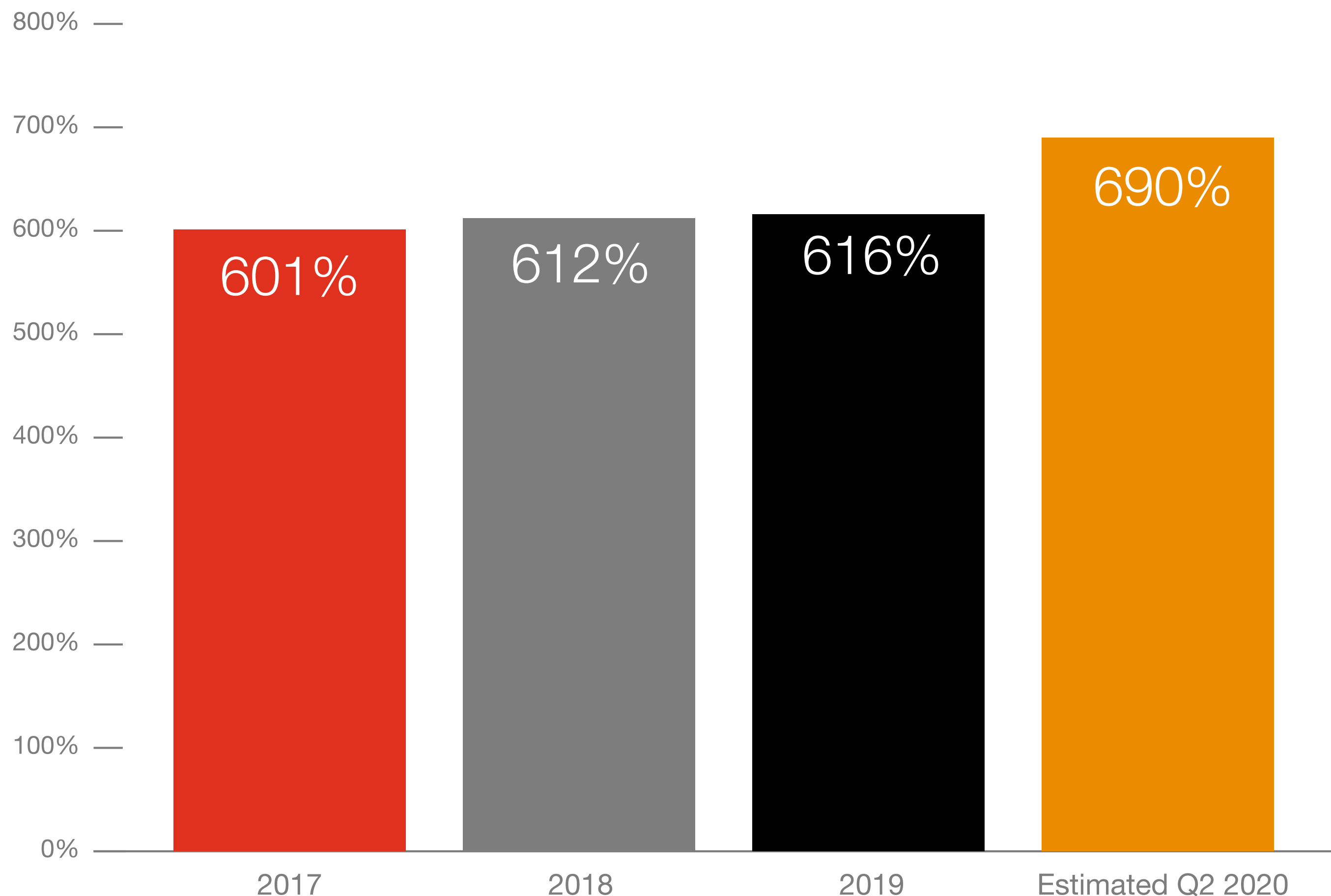


In the second quarter of 2020, nearly a quarter of health insurers had risk-based capital (RBC) ratios of 800% or higher, indicating a strong capital position



## Figure 11: Payers' rising risk-based capital ratios during the pandemic create opportunities to invest

### Average risk-based capital for the health insurance industry, weighted



Source: PwC analysis of statutory financial data from SNL Financial (part of S&P Global Market Intelligence)<sup>50</sup>

This capital creates opportunities to invest. It also can generate risks if it is not invested. For example, state regulators could force health plans to return money to members or invest it in a manner not aligned with their strategies. Payers also could face reputational risk if they are seen by the public as profiting during a global pandemic. And insurers that do not invest in virtual care, in care providers and in consumer-focused capabilities and outreach could face higher claims costs due to worsening health outcomes from deferred care during the pandemic. As of September, 55% of consumers with complex chronic disease surveyed by HRI said they or a doctor had delayed some care since March 1; 29% said they had not yet received it. Dallas-based Tenet Healthcare and Nashville, Tennessee-based HCA Healthcare reported higher patient acuity among inpatient cases in the third quarter of 2020.<sup>51</sup>

Payers can focus virtual care investments on specialties, geographies and patient populations—such as consumers with complex chronic disease—that are most likely to benefit from it. They may consider buying providers, especially primary care providers, or striking alliances with them to advance their virtual care business. In a survey conducted in early September by the Primary Care Collaborative, 81% of primary care physicians surveyed said that primary care has not rebounded; 35% said revenue and pay are lower than pre-pandemic levels, threatening current and future viability; and 27% reported that their pandemic financial support has run out or is about to run out.<sup>52</sup>



Insurers in 2021 may invest in better integration internally and with health service providers to create a better member experience. Traditional health insurers are facing competition from newer companies such as Oscar, Bright Health and Accolade, with business models built around the member experience and digital tools to enhance that experience.<sup>53</sup> Nearly 50% of payer executives surveyed by HRI said their organization is investing in digital product support and educational tools such as mobile apps to improve the member experience.

### **Some providers may struggle to survive while others can invest and evolve**

The recovery from the early days of the pandemic has been uneven for healthcare providers. Health systems that own a health insurer were able to provide a financial cushion to support clinical operations at places like Salt Lake City-based Intermountain Healthcare, Albuquerque, New Mexico-based Presbyterian Healthcare Services and Oakland, California-based Kaiser Foundation Health Plan and Hospitals.<sup>54</sup>

“The pandemic opened the eyes of a lot of providers that make their money through volume. Suddenly they had no volume and no revenue,” said Ceci Connolly, president and CEO of the Alliance of Community Health Plans, in an interview with HRI. “Providers with value-based arrangements with health plans kept getting a check every month, regardless of volume. They were able to focus immediately on telehealth and other creative ways of caring for patients, because they weren’t as worried about volume or reimbursement.”

Hospitals and health systems that have mostly recovered from the initial hit of the pandemic had invested before the crisis in areas such as hospital-at-home services and digital capabilities that allowed rapid expansion into virtual care and remote patient management. Other providers are still struggling financially and may need to consider deals, such as partnering with or being acquired by a larger health system or a health insurer, in order to survive.



“The pandemic opened the eyes of a lot of providers that make their money through volume. Suddenly they had no volume and no revenue.”

**Ceci Connolly, president and CEO of the Alliance of Community Health Plans**



## Pharmaceutical sector sees flash of investment in vaccines with sustained interest in pre-pandemic growth areas

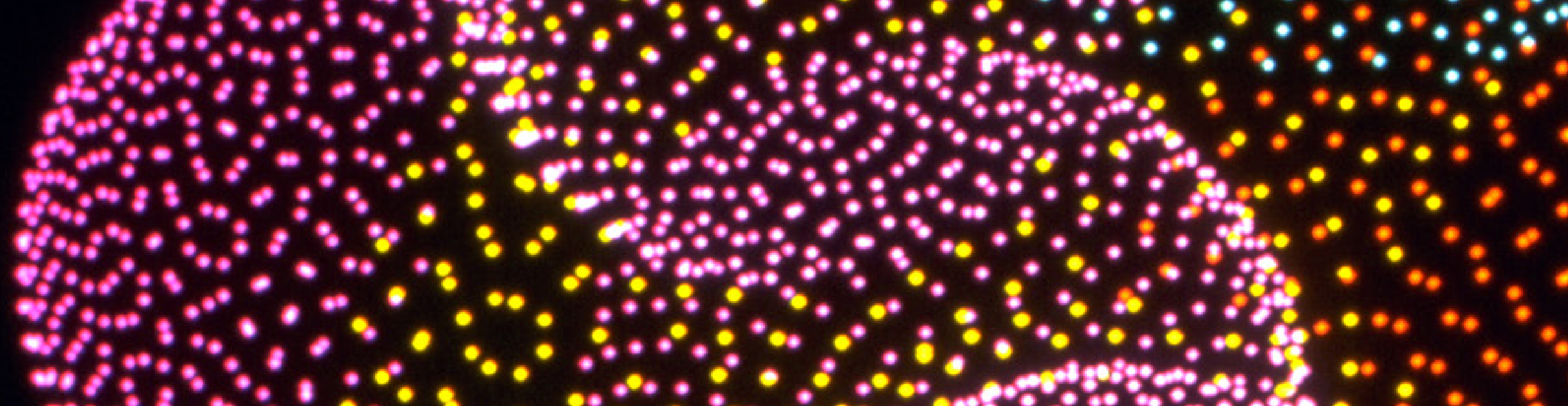
While there has been an influx of activity by pharmaceutical and life sciences companies into COVID-19 diagnostics, therapeutics and vaccines, these investments may not drive long-term profitability or mergers or acquisitions.<sup>55</sup> Investment in COVID-19 diagnostics, therapeutics and vaccines will likely continue to flow until the pandemic is under control, but short-term strategies focused on partnerships rather than deals are expected. For example, Pfizer and BioNTech are jointly working on a COVID-19 vaccine and scaling up manufacturing capacity.<sup>56</sup> Moderna has partnered with Lonza, a contract development and manufacturing organization, to boost production of Moderna's mRNA vaccine candidate.<sup>57</sup>

Investment in pre-pandemic growth areas, such as gene and cell therapies and research and development (R&D) innovation, likely will continue in 2021. The Massachusetts Institute of Technology's New Drug Development Paradigms initiative estimated that 500,000 US patients are expected to receive gene and cell therapy treatment by 2030.<sup>58</sup>





## Implications



**Insurers and well-positioned providers can advance investments in digital, value-based arrangements and customer experience.** They should use the telehealth claims data accumulated during the pandemic to target investments in virtual care, including hospital at home, to areas where it is most likely to lower healthcare costs. For example, consumers with a complex chronic disease who also suffer from mental illness cost employers 12 times more than healthy ones, according to an HRI analysis of the Medical Expenditure Panel Survey.<sup>59</sup> HRI's survey found that consumers with complex chronic disease and those with mental health conditions are overwhelmingly willing to use telehealth. Insurers and providers should also consider where they lag behind their competitors in digital capabilities that enable a smooth customer experience.

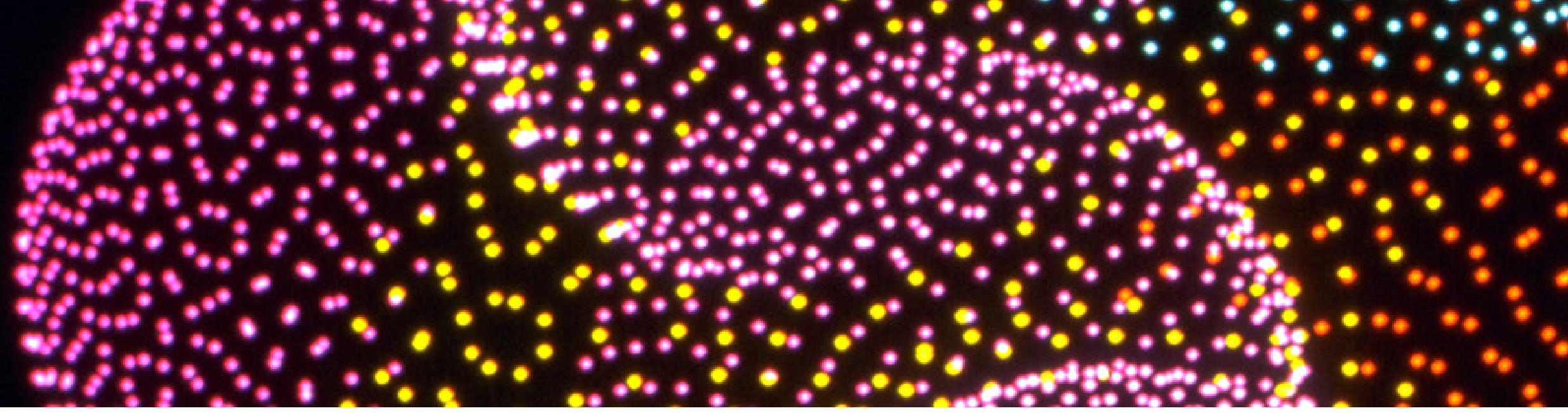
Payers should consider forming more value-based partnerships with providers who may be more open to diversifying their revenue stream. In September, a regional insurer joined with a not-for-profit health system serving the Baltimore-Washington area to announce a value-based partnership centered on preventive and primary care that they estimate will save the insurer \$400 million over the next seven years by improving outcomes.<sup>60</sup>

**Struggling providers may find deals key to survival in 2021.** Those that are still struggling may consider partnerships with other health plans or providers before a full-on acquisition. This could mean partnering with a larger health system to drive more volume, or a value-based care arrangement with a payer to start diversifying revenue. For example, nursing homes were hit hard by the virus.<sup>61</sup> In an August survey by the American Health Care Association and the National Center for Assisted Living, the majority of long-term care facilities said they could not sustain another year under current financial conditions.<sup>62</sup> Long-term care facilities may look to diversify into home health, which fared better during the pandemic, or to partner or sell to a health system or private equity firm investing in long-term care.<sup>63</sup>

A sale to private equity also may be an option for some specialties in which private equity continues to invest, such as dermatology, gastroenterology and ophthalmology, or has started investing more heavily, such as behavioral health.<sup>64</sup>



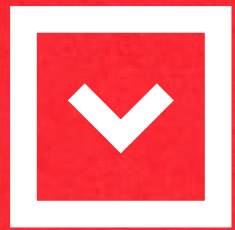
## Implications



**Pharmaceutical and life sciences companies continue to eye gene and cell therapy investments and R&D innovation.** High-cost, curative gene and cell therapies require a specialized “cold chain” to ensure that products are stored at the right temperature and handled properly from the manufacturer to the patient.<sup>65</sup> So do some of the COVID-19 vaccines.<sup>66</sup> HRI found that the existing gene and cell therapy cold chain could serve as a skeleton for distribution of vaccines that require ultra-cold storage.<sup>67</sup> Healthcare distributors, such as AmerisourceBergen, and logistics companies such as UPS are developing cold chain capabilities, building out freezer farms and creating logistics plans for the vaccine.<sup>68</sup> These investments could serve the US health system well beyond COVID-19, creating a wider distribution network for cell and gene therapies and other medical products, such as vaccines, that require similar conditions.

As the deals environment heats up, companies should be prepared to move quickly. They should make strategic deals that align with their identities, have a playbook on hand for how to run an efficient deals process, and act decisively.<sup>69</sup>

Virtual clinical trials also are getting more attention during the pandemic. Life sciences companies should continue to invest in digital tools and data analytics to improve the patient experience and retention in clinical trials by making trial participation more convenient and relevant.<sup>70</sup>



## A resilient and responsive supply chain built for long-term health

From managing the cost and tax implications of onshoring manufacturing to developing a network approach to redundancy, HRI expects the health industry in 2021 to start to reconstruct the supply chain to function more flexibly as it does in other industries, such as automotive or technology. Where possible, the health system is expected to begin to triangulate supply chain risks, knowing as much as possible about their suppliers' suppliers and establishing new collaborations to secure the supply chain through diverse geographies and sourcing materials. These actions will likely mean near term incremental investments into supply chain capabilities resulting in marginally higher direct costs. However they could lay the groundwork for a more flexible and responsive supply chain that could rapidly scale up or down to meet customer needs.

The challenges plaguing the medical products supply chain—lack of geographic diversity, limited numbers of suppliers for essential medicines, inability to predict demand surges, and limited purchasing power of small and midsize health systems—existed before the COVID-19 pandemic but have been exacerbated by the crisis. Furthermore, the fragility of the supply chain has only increased based on the stress the crisis has placed on its suppliers.

### **The rippling costs of supply chain disruptions**

Economics are driving much of the dysfunction. The declining profitability of generic drugs and low-margin supplies such as surgical gowns and tubing has created what the FDA calls a “race to the bottom,” pushing manufacturing overseas.<sup>71</sup> Thirteen percent of drugs in the US come from China, with 83% imported as drugs ready for the market; China provides 39% of US medical devices and supplies 80% of the active pharmaceutical ingredients (APIs) used by companies in India—the largest supplier globally of generic drugs.<sup>72</sup> Lower labor costs in India, plus fewer environmental regulations and a network for raw materials, reduce costs for US and European companies by 30% to 40%.<sup>73</sup> A fragmented and dispersed medical supply chain can result in shortages if just one supplier or manufacturer takes a facility offline, natural disasters strike or trade tensions rise.





The impacts from this spill over onto hospitals and insurers. The American Hospital Association found that 80% of hospitals reported a moderate to large impact of drug shortages on spending between fiscal years 2015 and 2017.<sup>74</sup> Limited suppliers of some generic drugs have also led to increased prices that are passed on to consumers and insurers.<sup>75</sup> This year, 18 Blue Cross Blue Shield plans formed a collaboration with Civica Rx, a not-for-profit organization established by a group of providers, to manufacture their own generic drugs.<sup>76</sup>

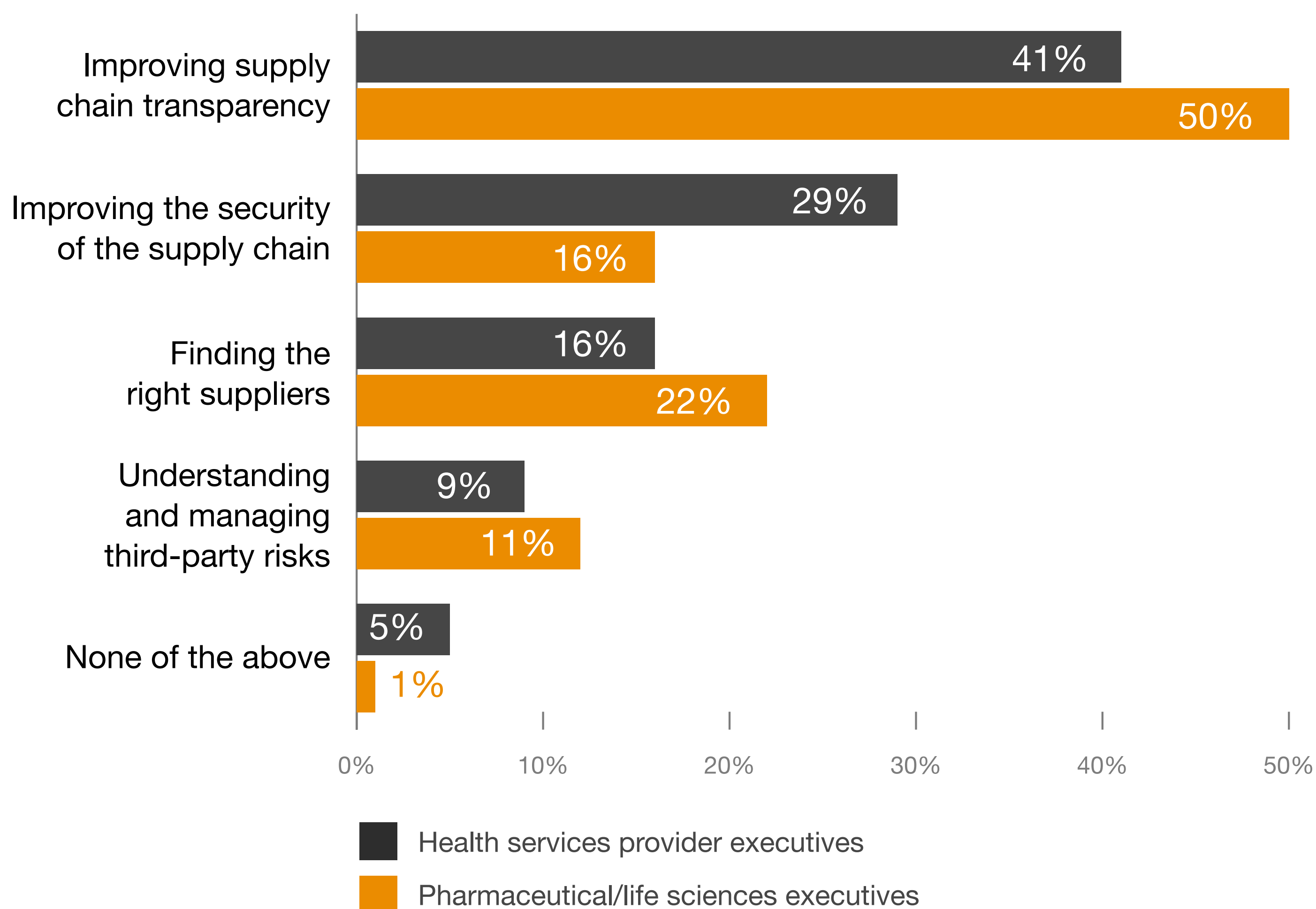
With the COVID-19 pandemic, these impacts have played out in rapid fashion. Shortages of APIs, supportive care drugs, ventilators and personal protective equipment (PPE) were rampant.<sup>77</sup> The Society for Healthcare Organization Procurement Professionals (SHOPP) estimated that PPE supplies were marked up 2,000% for isolation gowns and 6,000% for 3M N95 masks during the early weeks of the pandemic.<sup>78</sup> Health systems were unable to quickly vet and enlist secondary sources; those at smaller systems were left scrambling.<sup>79</sup> “Academic medical centers are small players, compared with large national health systems, and we have very little leverage as the end user,” Dr. David Chin, distinguished scholar of health policy and management at Johns Hopkins Bloomberg School of Public Health, told HRI.



In 2021, HRI expects distributors and health systems to consider establishing contracts with secondary suppliers, joining new group purchasing organizations, relocating facilities and approaching storage and distribution on a more regional scale. According to HRI’s executive survey, 94% of life sciences executives and 86% of provider executives said that improving their supply chain overall was a priority in 2021. Specifically, improving supply chain transparency was their top priority (see Figure 12).

**Figure 12: Life sciences and provider executives say they will prioritize supply chain transparency in 2021**

**Which of the following will your organization prioritize in 2021 related to supply chain?**



Source: PwC Health Research Institute Health executive survey, August-September 2020

“Our members are interested in making sure we have the right kind of resiliency and understanding of where any vulnerabilities may be,” said Jocelyn Ulrich, deputy vice president of policy, research and membership at PhRMA. “But moves to reconfigure the supply chain take time.”



## The industry can take a cue from tech or automakers

Relocating manufacturing facilities back to the US has garnered attention in Washington.<sup>80</sup> One option could be dual sourcing, in which a company relies on facilities or suppliers in more than one region. It is also a strategy that has been employed by other industries as a means to add redundancy without disrupting established networks.<sup>81</sup> A tech supplier based in China built a secondary facility in the US, potentially giving it a competitive advantage as geopolitical tensions ebb and flow between the two countries.<sup>82</sup>

Automakers have added resiliency by standardizing parts across products. They also have beefed up risk management by asking primary suppliers to have contingency plans for disruptions to the supply of raw materials.<sup>83</sup> The foreign carmaker BMW built a factory in the US to be closer to a new and growing customer base for certain models.<sup>84</sup>

A cross-industry analysis by PwC found that in situations where companies don't want to leave China, a China "plus one" strategy, in which they add manufacturing or supply redundancy in another locale, could help companies establish networks in a new country while maintaining some of the financial advantages, such as reduced labor costs, that come with foreign facilities.<sup>85</sup> Depending upon the locale, it could also provide opportunities for lower tax jurisdictions, as China isn't considered as having tax advantages compared with areas such as Ireland.<sup>86</sup> The dual-sourcing strategy may produce savings of 5% to 20% over sourcing or producing only in China.<sup>87</sup>





## Implications

**Prepare and plan for reshoring now.** Pharmaceutical and life sciences companies can assess their risk by analyzing their manufacturing portfolio to ensure that it is diversified enough to absorb future geopolitical, public health or natural disaster crises that could disrupt the supply of finished goods, APIs or raw materials.

Among pharmaceutical and life sciences executives surveyed by HRI, 82% said they expected to reshore components of the supply chain within two years or within five years. In the current political environment, the tax scenario for manufacturers is unlikely to favor reshoring except for new or growing products that require expansion or will be sold overseas.

Companies should consider the time and costs of establishing a new network of raw materials suppliers in the region where a new facility is built, identifying logistics and transport providers and the availability of a skilled workforce. Organizations that choose to onshore low-margin products could have a competitive advantage in times of crisis but should consider collaborations with hospital systems and health plans to secure sufficient, predictable volumes.

**Collaboration may be key to securing primary and secondary resources.**

Hospitals should weigh the costs and benefits of group purchasing organizations and of bringing parts of the supply chain in-house. For physician practices, regional group purchasing organizations are emerging as an alternative to national groups.<sup>88</sup>

Hospitals should proactively map suppliers of essential medicines and products to assess if they are in geographies that could be subject to future disruptions and identify risks and potential secondary suppliers.

Hospitals should assess what parts of the supply chain they can bring in-house, such as devices, pharmaceuticals or related products. This could also include partnerships or joint ventures with local manufacturers as an alternative supplier or redundancy measure. Direct relationships with manufacturers could also help to stabilize the supply chain.

**Consider demand surge contracting.** Healthcare systems and manufacturers could borrow from demand surge contracting that is used by some cellphone makers. The manufacturers make payments to the suppliers for maintaining a surge stock of materials in case of demand spikes, allowing the companies to quickly respond without having to identify secondary suppliers. The highly specialized nature of some medical device parts could make this a challenge, but it could be possible for less specialized supplies, such as tubing, that can be shared across devices and products, enabling companies and hospital systems to secure secondary suppliers.

Hospitals and distributors should identify key products that are subject to surge risks and collaborate to develop more local warehousing and storage opportunities for key supplies and maintain them at higher levels than the traditional just-in-time inventories.



## Implications

Health plans should consider shortage formularies for drugs or devices that are in short supply. In the event of a disruption, the health plan would have an alternative option for patients without having to redesign the formulary. When surge planning and stocking, health plans and hospitals may also need to monitor the shelf life of pharmaceuticals and some supplies.

**Advanced analytics can drive transparency and communication.** Whether for the next pandemic or across the medical products supply chain, the industry needs an end-to-end view in a supply-constrained world that includes the “last mile” to the consumer. For example, as the funnel of prioritized individuals widens for a COVID-19 vaccine, consumer preferences could become a major factor to help ensure vaccine uptake and minimize concerns over vaccine hesitancy or pandemic fatigue.<sup>89</sup> Among consumers surveyed by HRI who said that they'd be willing to get a COVID-19 vaccine within the first year, preferences for the site of vaccination differed based on age and race. Two-thirds (66%) of consumers 55 or older selected their doctor's office while younger Americans were more closely split between retail clinics, urgent care centers and their doctor's office. By race, white consumers were more likely to say they preferred the physician's office (52%) compared to Black (27%) and Latinx (28%) consumers.

Investment in advanced analytics could allow manufacturers to better deliver on the promise of the right treatment to the right patient at the right time and in the lowest-cost appropriate setting. Such investments could reduce costs associated with shortages and provide transparency into the murky US supply chain. Fifty-six percent of healthcare provider executives surveyed by HRI said their organizations were effective at predicting demand, while 12% said they were very effective.

According to Erin Horvath, president of distribution services at AmerisourceBergen, one opportunity to build from is the Healthcare Ready public-private partnership and the use of advanced analytics during the pandemic to map the supply chain from APIs to patients. “This visibility and transparency is going to persist. We don't want to get rid of it, because people are starting to count on it; there's no going back,” Horvath said in an interview with HRI.

Advanced analytics that reevaluate stocking levels of raw materials and finished products at the facility could enable companies to predict when supply may be disrupted and communicate to distributors. For providers, advanced analytics could help better manage inventory, understand demand and improve the efficiency and service levels of their medical consumable supply chain across their facilities.

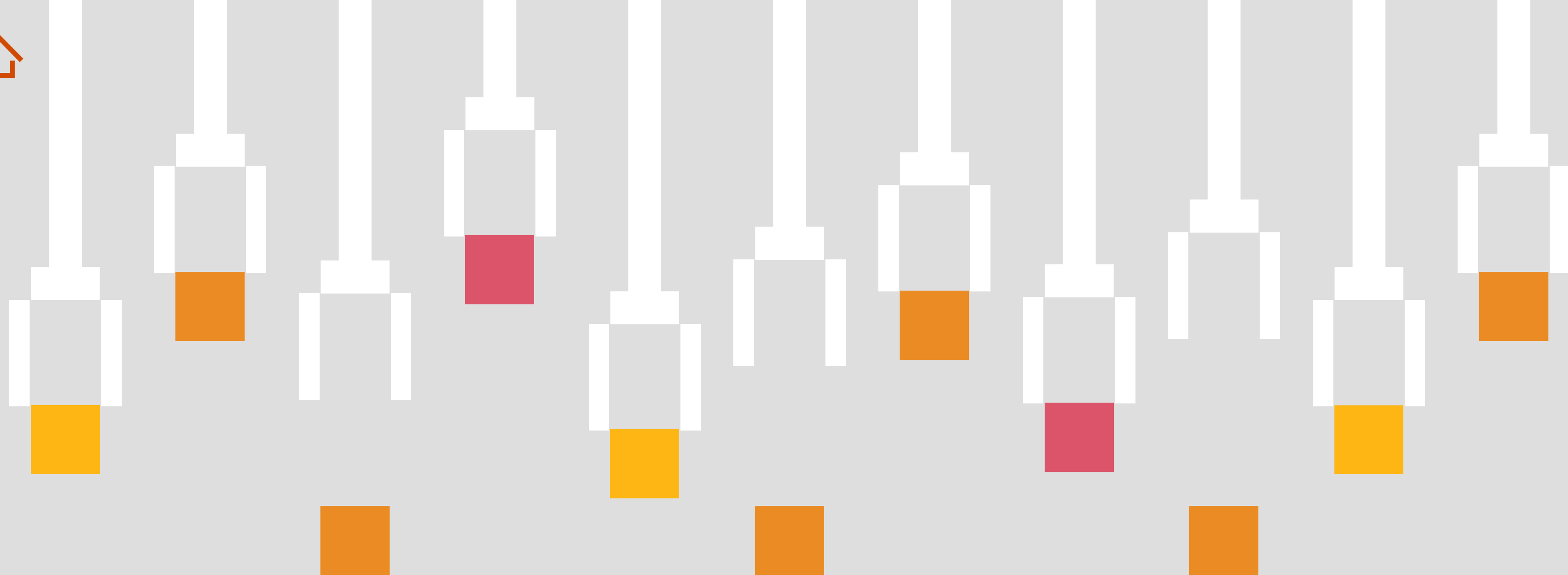


## Conclusion

Thrust outside its comfort zone, the healthcare system in 2021 should not regress. The industry will have to balance the challenges of pressing for innovations while battling the uncertainty of a deadly pandemic and the economy. It should work to right the wrongs of institutional inequities that have disadvantaged communities of color, whether through COVID-19 or through basic lack of access to care. It should root itself in processes and systems that work for clinicians and consumers, while improving mental health care for both. It should strengthen its infrastructure to better weather the next crisis.

Winners in 2021 are expected to determine how to profitably merge virtual and in-person care, and weave in the digital tools that improve consumer and clinician relationships while enabling pharmaceutical companies to find their new footing in the blended virtual-physical visit and clinical trials. They will strike partnerships that strengthen their portfolios and will rebuild their supply chains. The result is likely to lead to more reflective research, more resilient operations, next-generation care delivery and, most importantly, better health for all.





## Interoperability 2021: A key to emerging stronger

New federal rules requiring providers and payers to free patient data from behind their own organizational walls for patient apps and broader data sharing could lay a foundation to power forward a more consumer-centric healthcare system after the pandemic. But only about a quarter (24%) of providers and health plan executives surveyed by HRI say their organizations view the new federal rules on interoperability as a strategic opportunity. Most view new federal data-sharing requirements from a compliance angle.

But HRI research suggests that a compliance-focused approach could leave traditional healthcare organizations behind as the push toward interoperability attracts disrupters.<sup>90</sup> As the rules force organizations to liberate patient health information, some organizations will emerge as the winners, by earning consumer trust, synthesizing the data and providing innovative products and services. For 2021, healthcare organizations need strategies to make sure they are not excluded.

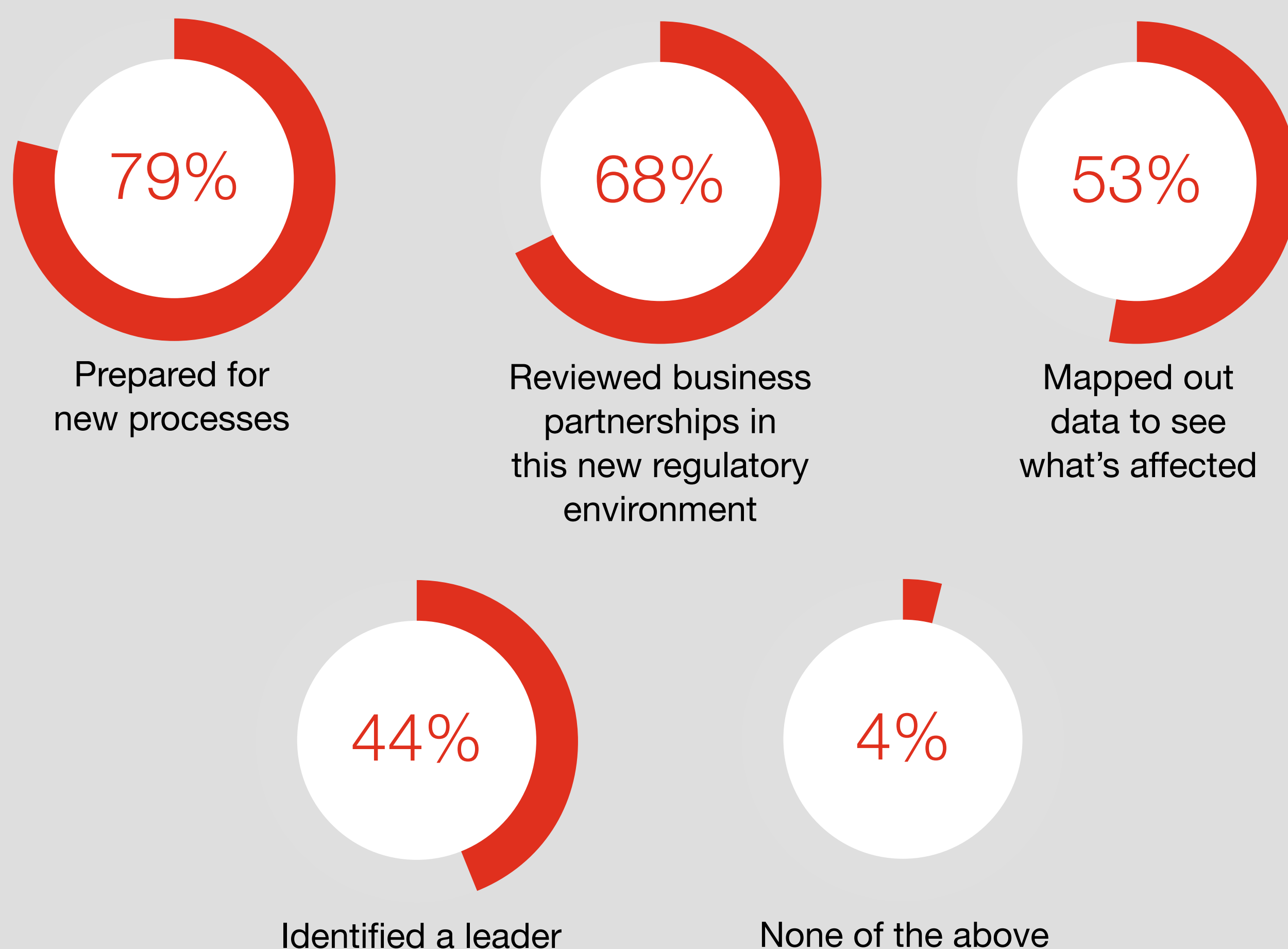
The new rules finalized in March 2020, just as the US was hit by the COVID-19 pandemic, aim for a system in which consumers can use smartphone apps developed by third parties to access the personal health data traditionally housed by providers and insurers.<sup>91</sup> Providers will have to alert other providers electronically when a patient is admitted, discharged or transferred. Claims, clinical and encounter information will follow members as they move from health plan to health plan. The rules require new investments, processes and quick turnaround of data, while bringing new compliance and cyber risks for healthcare organizations—highlighting the need for a comprehensive strategy.

But only about 44% of provider and payer executives surveyed by HRI said their organizations are heading into 2021 having identified a leader to guide their interoperability efforts within the organization (see Figure A). About half said their organizations had mapped out their data to see what is affected by the new rules, with more having taken steps to prepare for the new processes required when responding to external requests for patient health information.



**Figure A: Fewer than half of provider and payer executives surveyed have identified someone to lead their interoperability efforts**

**What steps have you taken to prepare for new federal interoperability rules?**



Source: PwC Health Research Institute Health executive survey, August-September 2020

While consumers and healthcare organizations have operated for years under a system in which sensitive health data were protected through the Health Insurance Portability and Accountability Act (HIPAA), these new rules allow patient health data to flow outside the jurisdiction of HIPAA, with patient permission—raising new privacy concerns about how the data may be used.<sup>92</sup>

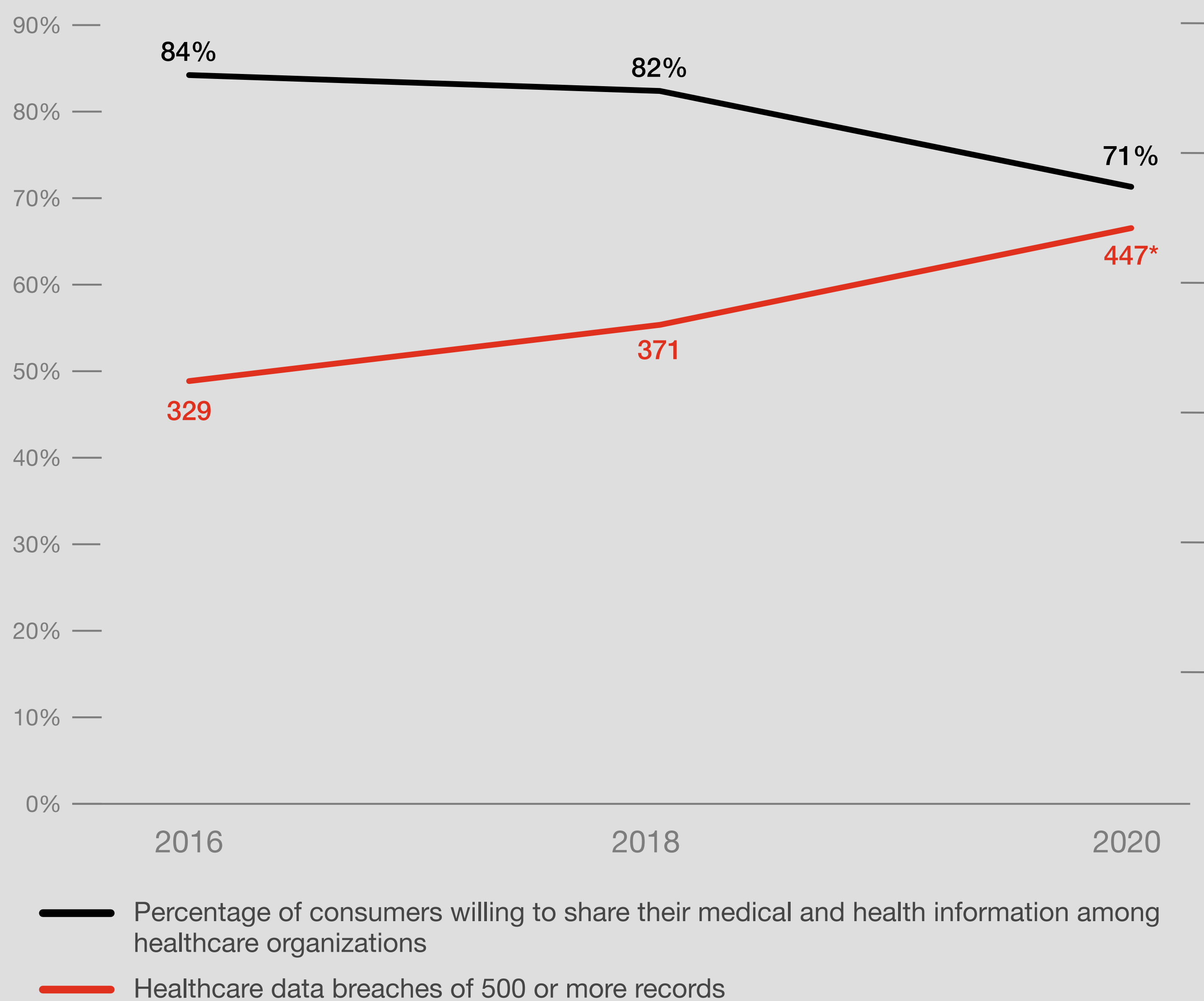




That's why consumer education should be a priority in 2021. Educating consumers can help build trust, which has been eroding for years. HRI survey results show that as the industry's data sharing is positioned to explode, consumers show a marked decline in their willingness to share their healthcare information (see Figure B).

**Figure B: Consumers are becoming less open to sharing healthcare information as data breaches are trending upward**

**Are you comfortable sharing your medical and health information among healthcare organizations?**



Source: PwC Health Research Institute consumer surveys, 2016, May 2018, September 2020  
HIPAA Journal healthcare data breach statistics - <https://www.hipaajournal.com/healthcare-data-breach-statistics/>  
\*PwC Health Research Institute projected monthly breaches for September-December 2020 based on the monthly average of January-August actuals.



Through consumer education efforts that make sure patients understand who is accessing their information when they click yes on a wordy pop-up box, healthcare organizations can protect their brand and reputation to avoid consumer backlash in case patients believe their data have been misused by the third party. Though the federal government has issued guidance that the healthcare organization is not liable once the patient approves the transfer of data to an app, providers and insurers should consider the importance of building consumer trust as competitors roll out new digital tools and apps and new entrants try to gain footing.<sup>93</sup> In some cases, providers and insurers may consider adopting partners who are vetted and communicating that with members or patients to encourage trustworthy use of highly sensitive and personal data.

In this new environment, providers, insurers and new entrants should think about how they want to play. Beyond achieving compliance, organizations may find ways to tap into operational efficiencies, and new sources of internal value, by building out their interoperability program. A comprehensive strategy that considers how the rules can lead to a more effective healthcare system that puts the consumer in the center would put the organization on offense in this new data-sharing environment.



## About this research

For this report, HRI interviewed executives from healthcare providers, health plans, and pharmaceutical and life sciences companies along with academics, policy experts and representatives of industry trade associations.

HRI's consumer survey was conducted online from Sept. 9 to 22, 2020 with 2,511 US adults representing a cross section of the population in terms of insurance type, age, race, gender, geographic region and political affiliation. The margin of error was plus or minus 2 percentage points at a 95% confidence level. The survey collected data on consumer perspectives about the healthcare landscape before and during the COVID-19 pandemic, including respondents' use of health services and thoughts about how they may interact with the health system in the future. HRI used these data to compare with previous polls of US adults.

HRI defines the consumer health groups reported on in this report as follows: Frail elderly are over the age of 75, living at home and facing health issues related to falls or dementia and suffer generally poor health; Adults with chronic disease have problems affecting a single body system such as hypertension and require uncomplicated disease management; Adults with complex chronic disease live with one or more chronic diseases affecting multiple body systems and requiring complicated disease management; Adults with mental illness have a primary health issue of depression or mood disorders, post-traumatic stress disorder, addictions and/or suicidal ideations; Healthy adult skeptics generally avoid interacting with the health system and are less likely to have health insurance than other consumer groups; Healthy adult enthusiasts value a regular physical, recommended screenings and wellness/coaching services.

HRI also surveyed health executives. This survey was conducted online from Aug. 21 to Sept. 10, 2020 with responses from 153 provider, 124 pharmaceutical and life sciences, and 128 payer executives. The margin of error was plus or minus 5 percentage points at a 95% confidence level. HRI periodically surveys industry executives to gain insight into current business leader perspectives and experiences, as well as to track changes over time.





## Endnotes

1. Lisa Schenker, “Illinois Hospitals Delay Elective Surgeries, Add Beds as COVID-19 Cases Climb,” Chicago Tribune, Nov. 11, 2020, <https://www.chicagotribune.com/coronavirus/ct-coronavirus-hospital-beds-elective-surgeries-glenbrook-20201112-qpd6rgmxkzhorhw2zbnjd7nvl4-story.html>; Alia Paavola, “41 Hospitals Postponing Elective Procedures amid the COVID-19 Resurgence,” Becker’s Hospital Review, Nov. 18, 2020, <https://www.beckershospitalreview.com/patient-flow/8-hospitals-postponing-elective-procedures-amid-covid-19-resurgence.html>.
2. PwC Health Research Institute consumer survey, September 2020.
3. Johns Hopkins University, COVID-19 Dashboard, accessed Dec. 2, 2020, <https://www.arcgis.com/apps/opdashboard/index.html#/bda7594740fd40299423467b48e9ecf6>.
4. US Centers for Disease Control and Prevention, “COVID-19 Hospitalization and Death by Race/Ethnicity,” accessed Oct. 27, 2020, [www.cdc.gov/coronavirus/2019-ncov/covid-data/investigations-discovery/hospitalization-death-by-race-ethnicity.html](http://www.cdc.gov/coronavirus/2019-ncov/covid-data/investigations-discovery/hospitalization-death-by-race-ethnicity.html).
5. PwC Health Research Institute, Medical Cost Trend: Behind the Numbers 2021, June 2020, [www.pwc.com/us/en/industries/health-industries/library/behind-the-numbers.html](http://www.pwc.com/us/en/industries/health-industries/library/behind-the-numbers.html).
6. PwC Health Research Institute, health executive survey, August-September 2020.
7. PwC Health Research Institute, consumer survey, September 2020.
8. National Committee for Quality Assurance, Taskforce on Telehealth Policy (TTP) Findings and Recommendations, September 2020, [http://connectwithcare.org/wp-content/uploads/2020/09/20200914\\_Taskforce\\_on\\_Telehealth\\_Policy\\_Final\\_Report.pdf](http://connectwithcare.org/wp-content/uploads/2020/09/20200914_Taskforce_on_Telehealth_Policy_Final_Report.pdf).
9. Morgan Haefner, “Centene Partners with Samsung to Send Providers, Patients 13,000 Smartphones,” Becker’s Hospital Review, Sept. 14, 2020, [www.beckershospitalreview.com/payer-issues/centene-partners-with-samsung-to-send-providers-patients-13-000-smartphones.html](http://www.beckershospitalreview.com/payer-issues/centene-partners-with-samsung-to-send-providers-patients-13-000-smartphones.html).
10. PwC Health Research Institute, health executive survey, August-September 2020.
11. Ibid.
12. Caroline Marra, Jacqueline L. Chen, Andrea Coravos, and Ariel D. Stern, “Quantifying the Use of Connected Digital Products in Clinical Research,” NPJ Digital Medicine 3 (2020): 1–5.
13. Simon Erridge, Azeem Majeed, and Mikael Sodergren, “Virtual Trials: Looking beyond COVID-19,” BMJ Opinion, July 6, 2020, <https://blogs.bmj.com/bmj/2020/07/06/virtual-trials-looking-beyond-covid-19/>.
14. US Food and Drug Administration, FDA Guidance on Conduct of Clinical Trials of Medical Products during COVID-19 Public Health Emergency: Guidance for Industry, Investigators, and Institutional Review Boards, March 2020, [www.fda.gov/media/136238/download](http://www.fda.gov/media/136238/download).
15. BIO Digital, “Fireside Chat with FDA Commissioner Dr. Stephen Hahn,” June 2020, [www.bio.org/policy/human-health/vaccines-biodefense/coronavirus/bio-digital-sessions?wchannelid=7bm3dffscr&wvideoid=u53urix7le](http://www.bio.org/policy/human-health/vaccines-biodefense/coronavirus/bio-digital-sessions?wchannelid=7bm3dffscr&wvideoid=u53urix7le).
16. US Food and Drug Administration, “Emergency Use Authorization,” accessed Sept. 22, 2020, [www.fda.gov/emergency-preparedness-and-response/mcm-legal-regulatory-and-policy-framework/emergency-use-authorization](http://www.fda.gov/emergency-preparedness-and-response/mcm-legal-regulatory-and-policy-framework/emergency-use-authorization).



17. US Food and Drug Administration, “Historical Information about Device Emergency Use Authorizations,” accessed Oct. 9, 2020, [www.fda.gov/medical-devices/emergency-use-authorizations-medical-devices/historical-information-about-device-emergency-use-authorizations](http://www.fda.gov/medical-devices/emergency-use-authorizations-medical-devices/historical-information-about-device-emergency-use-authorizations).
18. US Food and Drug Administration, “FDA Approves First Treatment for COVID-19,” Oct. 22, 2020, [www.fda.gov/news-events/press-announcements/fda-approves-first-treatment-covid-19](http://www.fda.gov/news-events/press-announcements/fda-approves-first-treatment-covid-19).
19. US Food and Drug Administration, “Draft Guidance: Master Protocols: Efficient Clinical Trial Design Strategies to Expedite Development of Oncology Drugs and Biologics – Guidance for Industry,” September 2018, [www.fda.gov/regulatory-information/search-fda-guidance-documents/master-protocols-efficient-clinical-trial-design-strategies-expedite-development-oncology-drugs-and](http://www.fda.gov/regulatory-information/search-fda-guidance-documents/master-protocols-efficient-clinical-trial-design-strategies-expedite-development-oncology-drugs-and).
20. Ibid.
21. US Food and Drug Administration, “Postmarketing Requirements and Commitments: Reports,” Nov. 9, 2020, [www.fda.gov/drugs/postmarket-requirements-and-commitments/postmarketing-requirements-and-commitments-reports](http://www.fda.gov/drugs/postmarket-requirements-and-commitments/postmarketing-requirements-and-commitments-reports).
22. Karen Noonan, “Realizing the Promise of Decentralized Clinical Trials,” *Pharma Letter*, Sept. 28, 2020, <https://www.thepharmaletter.com/article/realizing-the-promise-of-decentralized-clinical-trials>.
23. Mackenzie Bean, “Half of Physicians Report Anger, Anxiety over Pandemic: 5 Survey Findings,” *Becker’s Hospital Review*, Sept. 18, 2020, <https://www.beckershospitalreview.com/public-health/half-of-physicians-report-anger-anxiety-over-pandemic-5-survey-findings.html>.
24. The Physicians Foundation, 2018 Survey of America’s Physicians, September 2018, <https://physiciansfoundation.org/wp-content/uploads/2018/09/physicians-survey-results-final-2018.pdf>.
25. US Centers for Medicare and Medicaid Services, “Coronavirus Waivers & Flexibilities,” accessed Nov. 10, 2020, [www.cms.gov/about-cms/emergency-preparedness-response-operations/current-emergencies/coronavirus-waivers](http://www.cms.gov/about-cms/emergency-preparedness-response-operations/current-emergencies/coronavirus-waivers); Christine Sinsky and Mark Linzer, “Practice and Policy Reset Post-COVID-19: Reversion, Transition, or Transformation?,” *Health Affairs*, August 2020.
26. Paige Minemyer, “Humana Easing Administrative, Financial Burdens on Providers amid COVID-19 Crisis,” *Fierce Healthcare*, April 2, 2020, [www.fiercehealthcare.com/payer/humana-aims-to-ease-administrative-financial-burdens-providers-amid-covid-19-crisis](http://www.fiercehealthcare.com/payer/humana-aims-to-ease-administrative-financial-burdens-providers-amid-covid-19-crisis).
27. Neil Edwards, “Humana Aims to Streamline Services with AI,” *Forbes*, March 2, 2020, <https://www.forbes.com/sites/neiledwards/2020/03/02/why-doesnt-your-healthcare-insurer-use-ai-like-humana-does/#3762b731608e>.
28. PwC Health Research Institute, “Beyond IT: Why the Regulatory Push toward Interoperability Requires Whole Organizational Responses from Providers, Payers,” updated March 2020, <https://www.pwc.com/us/en/industries/health-industries/health-research-institute/fed-on-interoperability.html>.
29. Rebecca Pifer, “AI Clinical Documentation Player Nuance Preps for Nationwide Expansion,” *Healthcare Dive*, Feb. 25, 2020, <https://www.healthcaredive.com/news/ai-clinical-documentation-player-nuance-preps-for-nationwide-expansion/572847/>; Heather Landi, “Google Glass Powered Medical Scribe Service Going Public as Part of Reverse Merger Deal,” *Fierce Healthcare*, Oct. 22, 2020, <https://www.fiercehealthcare.com/tech/google-glass-powered-medical-scribe-service-going-public-as-part-spac-deal>.



30. Anuja Vaidya, “How Virginia Mason Medical Center Broke Down Healthcare Communication Silos,” *Becker’s Hospital Review*, Sept. 27, 2019, [www.beckershospitalreview.com/healthcare-information-technology/how-virginia-mason-medical-center-broke-down-healthcare-communication-silos.html](http://www.beckershospitalreview.com/healthcare-information-technology/how-virginia-mason-medical-center-broke-down-healthcare-communication-silos.html).
31. Ibid.
32. Muthiah Vaduganathan et al., “Prescription Fill Patterns for Commonly Used Drugs during the COVID-19 Pandemic in the United States,” *JAMA* 323, no. 24 (May 28, 2020): 2524–26, <https://jamanetwork.com/journals/jama/fullarticle/2766773>.
33. Kyle Blankenship, “How to Launch a Drug in a Pandemic? Here’s How 4 Drugmakers Are Using Digital Tools and Fast Footwork to Do Just That,” *Fierce Pharma*, June 18, 2020, [www.fiercepharma.com/marketing/new-launches-time-covid-drugmakers-face-unexpected-challenges-opportunities-during](http://www.fiercepharma.com/marketing/new-launches-time-covid-drugmakers-face-unexpected-challenges-opportunities-during); Eli Lilly & Co. at UBS Global Healthcare Conference, May 2020 - <https://investor.lilly.com/events/event-details/ubs-virtual-global-healthcare-conference>; Carly Helfand, “Novartis Leans into Digital for Mid-Pandemic Lung Cancer Launch,” *Fierce Pharma*, May 11, 2020, [www.fiercepharma.com/marketing/novartis-leans-into-digital-for-mid-pandemic-lung-cancer-launch](http://www.fiercepharma.com/marketing/novartis-leans-into-digital-for-mid-pandemic-lung-cancer-launch).
34. Eli Lilly & Company, “Q2 2020 Earnings Call Transcript,” July 30, 2020, <https://www.fool.com/earnings/call-transcripts/2020/07/30/eli-lilly-co-lly-q2-2020-earnings-call-transcript.aspx>.
35. Ibid.
36. Beth Snyder Bulik, “Physicians Are Looking to Pharma for COVID-19 Comms. Where Are They?,” *Fierce Pharma*, May 6, 2020, [www.fiercepharma.com/marketing/physicians-look-to-pharma-for-covid-19-comms-but-digital-meet-ups-and-materials-lagged-at](http://www.fiercepharma.com/marketing/physicians-look-to-pharma-for-covid-19-comms-but-digital-meet-ups-and-materials-lagged-at).
37. Larry Dobrow, “AbelsonTaylor/Veeva report: Physicians Are Adjusting to COVID-era Uncertainty, But Want Support from Pharma,” *Medical Marketing & Media*, July 8, 2020, [www.mmm-online.com/home/channel/agencies/abelsontaylor-veeva-report-physicians-are-adjusting-to-covid-era-uncertainty-but-want-support-from-pharma/](http://www.mmm-online.com/home/channel/agencies/abelsontaylor-veeva-report-physicians-are-adjusting-to-covid-era-uncertainty-but-want-support-from-pharma/).
38. Verified Market Research, “Global Referral Management Market”, *Reports Globe*, February, 2020, <https://reportsglobe.com/product/global-referral-management-market/>.
39. NYC Health + Hospitals, “In Recognition of National Physician Suicide Awareness Day, NYC Health + Hospitals Provides Update on Staff Mental Health Services, DOD Partnership,” press release, Sept. 16, 2020, [www.nychealthandhospitals.org/pressrelease/system-provides-update-on-employee-mental-health-services-after-covid19-peak/](http://www.nychealthandhospitals.org/pressrelease/system-provides-update-on-employee-mental-health-services-after-covid19-peak/).
40. Carol Peckham, “Medscape Lifestyle Report 2017: Race and Ethnicity, Bias and Burnout,” *Medscape*, Jan. 11, 2017.
41. Paul Leinwand and Cesare Mainardi, “Connect Your Firm’s Strategy to Its Identity,” *Harvard Business Review*, Sept. 28, 2016, <https://hbr.org/2016/09/connect-your-firms-strategy-to-its-identity>.
42. Paddy Padmanabhan, “How Human-Centered Design Is Driving Digital Health,” *CIO*, Nov. 21, 2019, <https://www.cio.com/article/3455156/how-human-centered-design-is-driving-digital-health.html>.
43. PwC Health Research Institute, “Beyond IT: Why the Regulatory Push toward Interoperability Requires Whole Organizational Responses from Providers, Payers,” updated March 2020, [www.pwc.com/us/en/industries/health-industries/health-research-institute/fed-on-interoperability.html](http://www.pwc.com/us/en/industries/health-industries/health-research-institute/fed-on-interoperability.html).



44. PwC Health Research Institute, Action Required: The Urgency of Solving for the Social Determinants of Health, 2019, [www.pwc.com/gx/en/healthcare/pdf/pwc-social-determinants-of-health.pdf](http://www.pwc.com/gx/en/healthcare/pdf/pwc-social-determinants-of-health.pdf).
45. Tyler Heist, Karyn Schwartz, and Sam Butler, “Trends in Overall and Non-COVID-19 Hospital Admissions,” Kaiser Family Foundation issue brief, Oct. 19, 2020, [www.kff.org/health-costs/issue-brief/trends-in-overall-and-non-covid-19-hospital-admissions/](http://www.kff.org/health-costs/issue-brief/trends-in-overall-and-non-covid-19-hospital-admissions/).
46. Jennifer P. Stevens et al., “How One Boston Hospital Built a COVID-19 Forecasting System,” Harvard Business Review, June 29, 2020, <https://hbr.org/2020/06/how-one-boston-hospital-built-a-covid-19-forecasting-system>.
47. PwC Health Research Institute, “Beyond IT: Why the Regulatory Push toward Interoperability Requires Whole Organizational Responses from Providers, Payers,” updated March 2020, [www.pwc.com/us/en/industries/health-industries/health-research-institute/fed-on-interoperability.html](http://www.pwc.com/us/en/industries/health-industries/health-research-institute/fed-on-interoperability.html).
48. National Association of Insurance Commissioners, staff memorandum to Group Capital Calculation (E) Working Group, April 13, 2017, [www.naic.org/documents/cmte\\_e\\_grp\\_capital\\_wg\\_related\\_staff\\_memo\\_scalars.pdf](http://www.naic.org/documents/cmte_e_grp_capital_wg_related_staff_memo_scalars.pdf).
49. National Association of Insurance Commissioners, Center for Insurance Policy and Research, “Risk-Based Capital,” last updated June 24, 2020, [https://content.naic.org/cipr\\_topics/topic\\_riskbased\\_capital.htm](https://content.naic.org/cipr_topics/topic_riskbased_capital.htm).
50. PwC estimated the Q2 RBC ratios since health plans do not calculate or report RBC on a quarterly basis. The required capital estimate was based on the change in claim cost and claim adjustment expense against year-end 2019. The total adjusted capital estimate was based on the Q2 2020 reported capital and surplus.
51. Rebecca Pifer, “‘In Many Ways More Challenging:’ Tenet Loses \$197M in COVID-19-Slammed Q3,” Healthcare Dive, Oct. 21, 2020, [www.healthcaredive.com/news/tenet-loses-197m-covid-19-slammed-q3-more-challenging-q2/587411/](http://www.healthcaredive.com/news/tenet-loses-197m-covid-19-slammed-q3-more-challenging-q2/587411/); HCA Healthcare, “Q3 2020 Earnings Call Transcript,” Oct. 26, 2020, [www.fool.com/earnings/call-transcripts/2020/10/26/hca-healthcare-hca-q3-2020-earnings-call-transcrip/](http://www.fool.com/earnings/call-transcripts/2020/10/26/hca-healthcare-hca-q3-2020-earnings-call-transcrip/).
52. Primary Care Collaborative, “Quick COVID-19 Primary Care Survey: Series 20 Fielded Sept. 4–8, 2020,” Sept. 22, 2020, [www.pcpcc.org/2020/09/21/primary-care-covid-19-week-20-survey](http://www.pcpcc.org/2020/09/21/primary-care-covid-19-week-20-survey).
53. PwC Health Research Institute, Health insurer of the future: Consumers’ advocate, providers’ partner, March 2017, <https://www.pwc.com/us/en/health-industries/health-research-institute/publications/pdf/pwc-hri-payer-of-the-future.pdf>.
54. Tara Bannow, “System-Owned Health Plans Provide Financial Buffer against Pandemic,” Modern Healthcare, Aug. 1, 2020, [www.modernhealthcare.com/finance/system-owned-health-plans-provide-financial-buffer-against-pandemic](http://www.modernhealthcare.com/finance/system-owned-health-plans-provide-financial-buffer-against-pandemic).
55. Strategy&, “COVID-19: Implications for Private Equity,” June 2020.
56. Pfizer, “Pfizer and BioNTech Announce Further Details on Collaboration to Accelerate Global COVID-19 Vaccine Development,” press release, April 9, 2020, [www.pfizer.com/news/press-release/press-release-detail/pfizer-and-biontech-announce-further-details-collaboration#:~:text=The%20collaboration%20will%20leverage%20Pfizer’s,global%20manufacturing%20and%20distribution%20network.&text=BioNTech%20and%20Pfizer%20will%20work,in%20response%20to%20the%20pandemic](http://www.pfizer.com/news/press-release/press-release-detail/pfizer-and-biontech-announce-further-details-collaboration#:~:text=The%20collaboration%20will%20leverage%20Pfizer’s,global%20manufacturing%20and%20distribution%20network.&text=BioNTech%20and%20Pfizer%20will%20work,in%20response%20to%20the%20pandemic).



57. Kyle Blankenship, “Moderna Aims for a Billion COVID-19 Shots a Year with Lonza Manufacturing Tie-Up,” Fierce Pharma, May 1, 2020, [www.fiercepharma.com/manufacturing/moderna-aims-for-a-billion-covid-19-shots-a-year-lonza-manufacturing-tie-up](http://www.fiercepharma.com/manufacturing/moderna-aims-for-a-billion-covid-19-shots-a-year-lonza-manufacturing-tie-up).
58. Massachusetts Institute of Technology New Drug Development Paradigms Initiative, “Projections from the Existing Pipeline of Cell and Gene Therapies: Launches and Patient Numbers,” Oct. 29, 2018, <https://newdigs.mit.edu/sites/default/files/FoCUS%20Research%20Brief%202018F210v027.pdf>.
59. PwC Health Research Institute, Medical Cost Trend: Behind the Numbers 2021, June 2020, [www.pwc.com/us/en/industries/health-industries/library/behind-the-numbers.html](http://www.pwc.com/us/en/industries/health-industries/library/behind-the-numbers.html).
60. MedStar Health, “CareFirst BlueCross BlueShield and MedStar Health Sign Landmark Value-Based Care Partnership to Help Transform Health Care,” press release, Sept. 16, 2020, [www.medstarhealth.org/mhs/2020/09/16/carefirst-bluecross-blueshield-and-medstar-health-sign-landmark-value-based-care-partnership-to-help-transform-health-care/](http://www.medstarhealth.org/mhs/2020/09/16/carefirst-bluecross-blueshield-and-medstar-health-sign-landmark-value-based-care-partnership-to-help-transform-health-care/).
61. PwC Health Research Institute analysis of Data.CMS.gov, “COVID-19 Nursing Home Data,” data as of week ended Oct. 4, 2020, <https://data.cms.gov/stories/s/COVID-19-Nursing-Home-Data/bkwz-xpvg/>; The COVID Tracking Project, “US Historical Data,” data for Oct. 4, 2020, accessed Oct. 20, 2020, <https://covidtracking.com/data/national>.
62. American Health Care Association and National Center for Assisted Living, “Survey: Nursing Homes Incurring Significant Costs and Financial Hardship in Response to COVID-19,” Aug. 8–10, 2020, [www.ahcancal.org/News-and-Communications/Fact-Sheets/FactSheets/Survey-SNF-COVID-Costs.pdf](http://www.ahcancal.org/News-and-Communications/Fact-Sheets/FactSheets/Survey-SNF-COVID-Costs.pdf).
63. Eleanor Laise, “As the Pandemic Struck, a Private-Equity Firm Went on a Nursing Home Buying Spree,” Barron’s, Aug. 6, 2020, [www.barrons.com/articles/as-the-pandemic-struck-a-private-equity-firm-went-on-a-nursing-home-buying-spree-51596723053](http://www.barrons.com/articles/as-the-pandemic-struck-a-private-equity-firm-went-on-a-nursing-home-buying-spree-51596723053).
64. PitchBook, “The Healthcare PE Investment Landscape: Assessing Key Investment Characteristics, Capital Flows, and Performance in a Burgeoning Space,” Sept. 25, 2020, <https://pitchbook.com/news/reports/q3-2020-pitchbook-analyst-note-the-healthcare-pe-investment-landscape>.
65. PwC Health Research Institute, Beyond the hype: Gene Therapies Require Advanced Capabilities to Succeed after Approval, September 2019, [www.pwc.com/us/en/industries/health-industries/assets/pwc-health-research-institute-beyond-the-hype-gene-therapy-report.pdf](http://www.pwc.com/us/en/industries/health-industries/assets/pwc-health-research-institute-beyond-the-hype-gene-therapy-report.pdf).
66. PwC Health Research Institute, Developing a COVID-19 Vaccine May Not Be Enough: Three Challenges to Turning Vaccines into Vaccinations, September 2020, [www.pwc.com/us/en/industries/health-industries/library/covid-19-vaccine-supply-distribution-challenges.html](http://www.pwc.com/us/en/industries/health-industries/library/covid-19-vaccine-supply-distribution-challenges.html).
67. Ibid.
68. Ibid.
69. PwC Health Research Institute, “A Whole New You: Deals as Makeovers,” in Top Health Industry Issues of 2020: Will Digital Start to Show an ROI?, December 2019.
70. PwC Health Research Institute, Advanced Analytics Fuel Tomorrow’s Commercial Strategy for Drugs and Devices, March 2019, [www.pwc.com/us/en/industries/health-industries/health-research-institute/commercial-pharma-analytics.html](http://www.pwc.com/us/en/industries/health-industries/health-research-institute/commercial-pharma-analytics.html); PwC Health Research Institute, “Clinical Trials in the New Health Economy: Digital Tools and Data Driving Awareness, Engagement and Retention,” April 2018, [www.pwc.com/us/en/industries/health-industries/health-research-institute/clinical-trials-in-new-health-economy.html](http://www.pwc.com/us/en/industries/health-industries/health-research-institute/clinical-trials-in-new-health-economy.html).





71. US Food and Drug Administration, “Drug Shortages: Root Causes and Potential Solutions,” updated February 21, 2020, accessed Sept. 24, 2020, [www.fda.gov/media/131130/download](http://www.fda.gov/media/131130/download); Susan DeVore, “Surviving the Waves of a Pandemic Storm: How to Fix the Supply Chain Flaws Exposed by COVID-19,” *Health Affairs*, Sept. 30, 2020, [www.healthaffairs.org/doi/10.1377/hblog20200928.305253/full/](http://www.healthaffairs.org/doi/10.1377/hblog20200928.305253/full/).
72. Mark Abdoo, “Exploring the Growing U.S. Reliance on China’s Biotech and Pharmaceutical Products,” testimony before the US–China Economic and Security Review Commission, July 31, 2019, [www.fda.gov/news-events/congressional-testimony/exploring-growing-us-reliance-chinas-biotech-and-pharmaceutical-products-07312019](http://www.fda.gov/news-events/congressional-testimony/exploring-growing-us-reliance-chinas-biotech-and-pharmaceutical-products-07312019); “Section 3: Growing U.S Reliance on China’s Biotech and Pharmaceutical Products,” USCC.gov, Nov. 1, 2019, accessed Sept. 25, 2020, [www.uscc.gov/sites/default/files/2019-11/Chapter%203%20Section%203%20-%20Growing%20U.S.%20Reliance%20on%20China%E2%80%99s%20Biotech%20and%20Pharmaceutical%20Products.pdf](http://www.uscc.gov/sites/default/files/2019-11/Chapter%203%20Section%203%20-%20Growing%20U.S.%20Reliance%20on%20China%E2%80%99s%20Biotech%20and%20Pharmaceutical%20Products.pdf).
73. Janet Woodcock, “Safeguarding Pharmaceutical Supply Chains in a Global Economy,” testimony before US House Committee on Energy and Commerce, Subcommittee on Health, Oct. 30, 2019, [www.fda.gov/news-events/congressional-testimony/safeguarding-pharmaceutical-supply-chains-global-economy-10302019](http://www.fda.gov/news-events/congressional-testimony/safeguarding-pharmaceutical-supply-chains-global-economy-10302019).
74. NORC at the University of Chicago, *Recent Trends in Hospital Drug Spending and Manufacturer Shortages*, Jan. 15, 2019, [www.aha.org/system/files/2019-01/aha-drug-pricing-study-report-01152019.pdf](http://www.aha.org/system/files/2019-01/aha-drug-pricing-study-report-01152019.pdf).
75. “Insurers Start Drug Company to Lower Prescription Prices,” *InsuranceNewsNet*, Jan. 23, 2020, <https://insurancenewsnet.com/innarticle/insurers-start-drug-company-to-lower-prescription-prices#>.
76. *Ibid.*
77. “COVID-19: Drugmakers May Find It Harder to Procure India-Produced APIs, Mostly Antibiotics,” PwC Health Research Institute, March 6, 2020, [www.pwc.com/us/en/industries/health-industries/library/india-produced-apis-restricted-covid-19.html](http://www.pwc.com/us/en/industries/health-industries/library/india-produced-apis-restricted-covid-19.html); Megan L. Ranney, Valerie Griffeth, and Ashish K. Jha, “Critical Supply Shortages—The Need for Ventilators and Personal Protective Equipment during the Covid-19 Pandemic,” *New England Journal of Medicine* 382, no. 18 (April 30, 2020), [www.nejm.org/doi/full/10.1056/NEJMp2006141](http://www.nejm.org/doi/full/10.1056/NEJMp2006141).
78. Society for Healthcare Organization Procurement Professionals, “Open Letter to All Post-Acute Care Provider Advocates,” April 7, 2020, [http://cdn.cnn.com/cnn/2020/images/04/16/shopp.covid.ppd.costs.analysis\\_.pdf](http://cdn.cnn.com/cnn/2020/images/04/16/shopp.covid.ppd.costs.analysis_.pdf).
79. Christi A. Grimm, *Hospital Experiences Responding to the COVID-19 Pandemic: Results of a National Pulse Survey March 23–27, 2020*, US Department of Health and Human Services Office of Inspector General, April 2020, [www.oig.hhs.gov/oei/reports/oei-06-20-00300.pdf](http://www.oig.hhs.gov/oei/reports/oei-06-20-00300.pdf); US Department of Justice, US Attorney’s Office, District of New Jersey, “Chinese Manufacturer Charged with Exporting Misbranded and Defective Masks Falsely Purporting to be N95 Respirators,” press release, June 5, 2020, [fda.gov/inspections-compliance-enforcement-and-criminal-investigations/press-releases/chinese-manufacturer-charged-exporting-misbranded-and-defective-masks-falsely-purporting-be-n95](http://fda.gov/inspections-compliance-enforcement-and-criminal-investigations/press-releases/chinese-manufacturer-charged-exporting-misbranded-and-defective-masks-falsely-purporting-be-n95).
80. PwC Health Research Institute, *President-elect Joe Biden: Building on a Legacy*, November 2020, [www.pwc.com/us/en/industries/health-industries/library/assets/pwc-hri-election-health-plans-biden.pdf](http://www.pwc.com/us/en/industries/health-industries/library/assets/pwc-hri-election-health-plans-biden.pdf).
81. “Pharmaceutical Supply Chain Transparency Executive Order Could Have Momentum,” PwC Health Research Institute, Aug. 13, 2020, [www.pwc.com/us/en/industries/health-industries/library/pharmaceutical-supply-chain-executive-order.html](http://www.pwc.com/us/en/industries/health-industries/library/pharmaceutical-supply-chain-executive-order.html).



82. Saheli Roy Choudhury, “Apple Supplier Foxconn Is Ahead of Its Peers in Diversifying out of China, Analyst Says,” CNBC, Aug. 13, 2020, [www.cnbc.com/2020/08/14/apple-supplier-foxconn-ahead-of-competitors-in-diversifying-out-of-china.html](http://www.cnbc.com/2020/08/14/apple-supplier-foxconn-ahead-of-competitors-in-diversifying-out-of-china.html).
83. Freddie Pierce, “Toyota Eyes Quake-Proof Supply Chain,” Supply Chain, Sept. 6, 2012, [www.supplychaindigital.com/procurement/toyota-eyes-quake-proof-supply-chain](http://www.supplychaindigital.com/procurement/toyota-eyes-quake-proof-supply-chain); James Carbone, “Toyota Buyers Mitigate Risk to Avoid Managing Supply Chain Crises,” Electronics Sourcing, Sept. 17, 2018, <https://electronics-sourcing.com/2018/09/17/toyota-buyers-mitigate-risk-to-avoid-managing-supply-chain-crises-by-james-carbone/>.
84. Michael Strong, “BMW’s South Carolina Plant Produces Its 5 Millionth Vehicle,” Detroit Bureau, June 11, 2020, [www.thedetroitbureau.com/2020/06/bmws-south-carolina-plant-produces-5-millionth-vehicle/](http://www.thedetroitbureau.com/2020/06/bmws-south-carolina-plant-produces-5-millionth-vehicle/).
85. PwC, Beyond China: US Manufacturers Are Sizing Up New—and More Diversified and Cost-Efficient—Global Footprints, July 2020, [www.pwc.com/us/en/library/fit-for-growth/supply-chain-resiliency.html](http://www.pwc.com/us/en/library/fit-for-growth/supply-chain-resiliency.html).
86. Brad W. Setser, “More Cures for More Patients: Overcoming Pharmaceutical Barriers,” testimony before US House Ways and Means Committee, Subcommittee on Health, Feb. 5, 2020, [https://waysandmeans.house.gov/sites/democrats.waysandmeans.house.gov/files/documents/Setser\\_Testimony.pdf](https://waysandmeans.house.gov/sites/democrats.waysandmeans.house.gov/files/documents/Setser_Testimony.pdf).
87. PwC, Beyond China: US Manufacturers Are Sizing Up New—and More Diversified and Cost-Efficient—Global Footprints, July 2020, [www.pwc.com/us/en/library/fit-for-growth/supply-chain-resiliency.html](http://www.pwc.com/us/en/library/fit-for-growth/supply-chain-resiliency.html).
88. Jon Leibowitz, Dan O’Brien, and Russell Anello, “Five Things to Know About the Role of GPOs in the Healthcare Supply Chain,” Managed Healthcare Executive, Sept. 14, 2017, [www.managedhealthcareexecutive.com/view/five-things-know-about-role-gpos-healthcare-supply-chain](http://www.managedhealthcareexecutive.com/view/five-things-know-about-role-gpos-healthcare-supply-chain).
89. PwC Health Research Institute, Developing COVID-19 Vaccines May Not Be Enough: Turning Vaccines into Vaccinations, September 2020, [www.pwc.com/us/en/industries/health-industries/library/covid-19-vaccine-supply-distribution-challenges.html](http://www.pwc.com/us/en/industries/health-industries/library/covid-19-vaccine-supply-distribution-challenges.html).
90. PwC Health Research Institute, “Beyond IT: Why the Regulatory Push toward Interoperability Requires Whole Organizational Responses from Providers, Payers,” updated March 2020, [www.pwc.com/us/en/industries/health-industries/health-research-institute/fed-on-interoperability.html](http://www.pwc.com/us/en/industries/health-industries/health-research-institute/fed-on-interoperability.html).
91. US Centers for Medicare and Medicaid Services, “CMS Interoperability and Patient Access Final Rule,” last updated July 17, 2020, [www.cms.gov/Regulations-and-Guidance/Guidance/Interoperability/index](http://www.cms.gov/Regulations-and-Guidance/Guidance/Interoperability/index).
92. “Providers and Payers Still Grapple with Privacy Concerns under Final Interoperability Rules,” PwC Health Research Institute, March 13, 2020, [www.pwc.com/us/en/industries/health-industries/library/privacy-concerns-interoperability-rules-3-13-20.html](http://www.pwc.com/us/en/industries/health-industries/library/privacy-concerns-interoperability-rules-3-13-20.html).
93. US Department of Health and Human Services, “The Access Right, Health Apps, & APIs,” accessed Nov. 10, 2020, [www.hhs.gov/hipaa/for-professionals/privacy/guidance/access-right-health-apps-apis/index.html](http://www.hhs.gov/hipaa/for-professionals/privacy/guidance/access-right-health-apps-apis/index.html).



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